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DIRECTORATE-GENERAL HEALTH AND CONSUMER PROTECTION

STUDY ON THE CALCULATION OF THE ANNUAL PERCENTAGE RATE OF CHARGE FOR CONSUMER CREDIT AGREEMENTS

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ACRONYMS

APR(C)	Annual percentage rate (of charge)
EU	European Union
MS	Member States(s)
ECB	European Central Bank
TCC	Total cost of the credit (to the consumer)

LEGAL ACTS AND RELATED DOCUMENTS

Directive 87/102/EEC	Council Directive 87/102/EEC of 22 December 1986 for the approximation of the laws, regulations and administrative provisions of the Member States concerning consumer credit, OJ L 42, 12 February 1987.
Directive 90/88/EEC	Council Directive 90/88/EEC of 22 February 1990 amending Directive 87/102/EEC for the approximation of the laws, regulations and administrative provisions of the Member States concerning consumer credit, OJ L 61, 10 March 1990.
Directive 98/7/EC	Directive 98/7/EC of the European Parliament and of the Council of 16 February 1998 amending Directive 87/102/EEC for the approximation of the laws, regulations and administrative provisions of the Member States concerning consumer credit, OJ L 101, 1 April 1998.
Commission proposal of 2002	COM(2002) 443 final – Proposal for a Directive of the European Parliament and of the Council on the harmonisation of the laws, regulations and administrative provisions of the Member States concerning credit for consumers.
Directive on Unfair Commercial Practices (UCPD)	Directive 2005/29/EC of the European Parliament and of the Council of 11 May 2005 concerning unfair business-to-consumer commercial practices in the internal market and amending Council Directive 84/450/EEC, Directives 97/7/EC and 2002/65 of the European Parliament and of the Council and Regulation (EC) No 2006/2004 of the European Parliament and of the Council (Unfair Commercial Practices Directive), OJ L 149, 11 June 2005.
Directive 2008/48/EC	Directive 2008/48/EC of the European Parliament and of the Council of 23 April 2008 on credit agreements for consumers and repealing Council Directive 87/102/EEC, OJ L 133, 22 May 2008.
Directive 2011/90/EU	Commission Directive 2011/90/EU of 14 November 2011 amending Part II of Annex I to Directive 2008/48/EC of the European Parliament and of the Council providing additional assumptions for the calculation of the annual percentage rate of charge, OJ L 296, 15 November 2011.
Guidelines on the application of Directive 2008/48/EC	Guidelines on the application of Directive 2008/48/EC (Consumer Credit Directive) in relation to costs and the Annual Percentage Rate of Charge, Brussels, 8.5.2012, SWD(2012) 128 final.

EXECUTIVE SUMMARY

This report presents the work carried out and the results obtained under service contract number 17.020200/08/520936, aimed at conducting a study on the calculation of the Annual Percentage Rate of Charge (APR) for consumer credit agreements. The aim of the study was twofold. Firstly, to adapt the examples provided in the Proposal for a Directive on consumer credit adopted by the Commission in 2002 to the current regulatory framework given by Directive 2008/48/EC and the products marketed in the EU. Secondly, to provide the Comission with scientific elements about the calculation of the APR for consumer credit agreements, including explanations on the calculation method and the way the cost of the credit and anatocism are reflected in the APR, together with the analysis of the assumptions used for the calculation of the APR. In the context of this second objetive, the contract also stipulated the provision of answers to the questions of the Member States (MS) about APR and the attendance at workshops where the APR or the examples are broached.

Dealing with the two objectives of the study requires adopting a broad perspective which covers the following three areas: the *regulatory framework*, the *technical and financial aspect*s of the APR and the *reality of the market* for consumer credit agreements in the EU. This report presents an analysis of these areas with respect to the relevant aspects on the disclosure and calculation of the APR, it provides a new set of examples for the calculation of the APR and extends the possibilities of obtaning the APR on consumer credit agreements for all the interested parties by providing an Excel simulator for the calculation of the APR coherent with the Directives in force. Finally, a list of specialized terms is included.

Release notes

The original study of 2009 has been amended in 2013 to make it coherent with Directive 2011/90/EU, adopted in November 2011, and the Guidelines on the Application of Directive 2008/48/EC in Relation to Costs and the Annual Percentage Rate of Charge, published on May 2012. Directive 2011/90/EU introduced significant changes in the assumptions for the calculation of the APR amending Part I of Annex I of the Directive 2008/48/EC. The Guidelines clarify some particular aspects of the Total Cost of Credit (TCC) and the application of the assumptions for the calculation of the APR as amended by the Directive 2011/90/EC. They also address specific problems encountered by the MS when implementing Directive 2008/48/EC. The amendment of the study, carried out under service contract 17.020200/12/638501, has been significant and affected chapters 1, 3 and 4. Most of the changes are derived from the new assumptions for the calculation of the APR. They have motivated changes in the section of the study dealing with the assumptions themselves and have required a significant revision of the examples for the calculation of the APR because some of the examples previously provided became invalid and additional examples illustrating the application of the new assumptions were required; as a result, the number of examples has increased from 24 to 41. Also, step-by-step explanations on how to solve the examples in the Excel simulator have been newly added. In relation to the Guidelines, the amendments have consisted in incorporating to the study those parts of the Guidelines relevant for the purposes of the study in a manner that is as close to the original as possible. In those cases where the Guidelens were too specific that might impair readability of the study and disrupt the flow of words, only references to parts of the

Guidelines have been made. Finally, chapter 4, devoted to the Excel simulator for the calculation of the APR, has changed for two reasons. First, because the changes in the assumptions and examples have implied changes on it. And second, because the description of the functioning of the simulator has been extended in order to provide examples which explain to the user the order and form of necessary manipulations on the simulator. Note that chapter 2, devoted to the analysis of credit markets in the European Union has not been updated and hence, the text describes the situation in the first quarter of 2009. This is advisable because the international financial and economic crisis has been contracting credit markets since 2008, reducing the variety of products and features far below usual levels. Thus, the situation of the market previous to the crisis is more relevant to ensure an ample coverage of products and features by the examples of calculation of the APR.

THE APR IN THE EU LEGAL FRAMEWORK FOR CONSUMER CREDIT AGREEMENTS

APR has been always present in the Community regulation of consumer credit agreements as an essential element of transparency in credit products. The objective of the APR is to provide a numerical and comparable representation of the cost of the credit to the consumer. Specifically, APR is defined as “the total cost of the credit to the consumer expressed as an annual percentage of the total amount of credit”.

To meet this objective and to contribute to the creation of a single consumer credit market in the European Union (EU), the elements comprising the total cost of the credit to the consumer (TCC) and the method for calculating the APR should be uniformly defined throughout the EU in order to avoid the appearance of differences in APR which might distort the comparison of products of different credit providers.

The changes in the law at EU level define the path followed to attain this result. In Directive 87/102/EEC, most of the decisions about the TCC and the method for calculating the APR were left to national legislation. Specifically, MS were allowed to determine the method used, no mathematical formula for the calculation of the APR was defined, and the elements to be included in the TCC were left to national legislation. The first amendment of this Directive, Directive 90/88/EEC, sought to harmonize these key aspects. A method for calculating the APR was introduced and a mathematical formula was defined, together with certain hypotheses for calculating the APR. The determination of the costs elements to be included in the APR was refined by eliminating the leeway of MS in the determination of the TCC and by introducing a list of exemptions from the TCC for the purpose of calculating the APR. However, as regards the formula, Directive 90/88/EEC allowed MS whose legislation was prior to the date of notification of the Directive (1 March 1990) to use their national formulas during a transitional period of three years, as for 1 January 1993. Directive 98/7/EC finally imposed the formula for the calculation of the APR to be used throughout the Community, allowing a transition period of 2 years (until March 2000) for its adoption by all the MS. However, the Directive did not solve the difficulties found in the application of the list of exemptions from the total cost of the credit, which translated into differences among MS in the treatment of costs for the calculation of the APR. This shortcoming, together with the development and spreading of new credit products and banking practices and the adoption of more stringent provisions than

those in the Directive by some MS, called for a new regulation that was finally adopted after a long negotiation process in spring 2008 under Directive 2008/48/EC. This Directive, unlike its predecessors, aims at full harmonisation of the regulation of key aspects of consumer credit agreements, thus promoting the reduction of barriers to cross-border provision of consumer credit and a high, equivalent consumer protection throughout the EU.

The changes introduced in the elements involved in the calculation of the APR by Directive 2008/48/EC are profuse and affect the scope of the regulation, the definition of the cost of the credit, and the conventions (or remarks) and assumptions used for the calculation of the APR.

SCOPE OF THE DIRECTIVE (2008/48/EC) AND DISCLOSURE OF THE APR

Specifically, under Directive 2008/48/EC, disclosure of APR at all the stages of the credit agreement (in advertising, at a pre-contractual and at a contractual level) is a central point in the strategy of consumer protection. This requirement applies to all credit agreements not exempt from the scope of the Directive, with only a few exceptions.

This Directive implies significant advances in respect to the information provided to the consumer. In this regard, it should be highlighted that when the APR is disclosed at the advertising or a pre-contractual stage, it should be accompanied by a representative example, the purpose of which is to make the APR and the cost of the credit more understandable to the consumer. The representative example in advertising should be representative of the type of credit under consideration, in order to keep comparability of the offers of different creditors. As we move to the pre-contractual stage, the Directive requires adapting the representative example to the information provided by the consumer. Finally, at a contractual level, the APR refers to the specific credit agreement concluded by the consumer.

THE COST ELEMENTS TO BE INCLUDED IN THE APR

As indicated, the determination of the cost of the credit is crucial for preserving comparability and the informative content of the APR.

Directive 90/88/EEC eliminated the margin of freedom of MS provided by Directive 87/102/EEC by defining in Article 1 (d) the TCC as "*all the costs, including interest and other charges, which the consumer has to pay for the credit*", and introducing a list of exemptions from the TCC for the purpose of calculating the APR in Article 1a (2). However, this list, which not only included exemptions but also exemptions of exemptions, proved to be a source of difficulties. As a result, as reported by the study presented by Reifner in 1998 to the Commission[1], a significant percentage (around 30%) of the costs faced by the consumers was not represented in the APR, with insurance premiums being the most relevant. Directive 98/7/EC did not deal with this issue, whereas Directive 2008/48/EC addresses this aspect in a profound revision of the provisions relative to the cost elements to include in the APR.

[1] Reifner, U. (1998): Harmonisation of Cost Elements of the Annual Percentage Rate of Charge, Hamburg, project AO-2600/97/000169.

In Directive 2008/48/EC, the TCC is defined in Article 3 (g) as: *"all the costs, including interest, commissions, taxes and any other kind of fees which the consumer is required to pay in connection with the credit agreement and which are known to the creditor, except for notarial costs; costs in respect of ancillary services relating to the credit agreement, in particular insurance premiums, are also included if, in addition, the conclusion of a service contract is compulsory in order to obtain the credit or to obtain it on the terms and conditions marketed*." According to this definition, the TCC comprises all the range of costs that the consumer has to pay in order to access the credit or to use it, which are known (or ascertainable) by the creditor, except for costs of a notarial nature. This is regardless of whether these costs they are payable to the creditor or a third party or whether they give access to financial or non-financial services. As regards the cost of ancillary services, the inclusion condition is more restrictive (note the words "in addition" in Article 3 (g)), because, only if these ancillary services are compulsory (i.e., imposed by the creditor regardless of whether they are imposed on his behalf or on behalf of a third party) to obtain the credit or to obtain it on the conditions marketed, their costs have to be included in the cost of the credit.

Finally, Article 19 also establishes the inclusion and exclusion of some costs from the TCC for the calculation of the APR. The exclusions, in the first paragraph of Article 19 (2) and in (3), refer to charges payable when the purchase is either paid by cash or credit and to charges for non-compliance, early payment and similar charges, all of which are already considered in the previous Directive. The inclusions, in the second paragraph of Article 19 (2), refer to charges related to the maintenance of accounts recording payment transactions and drawdowns, the use of means of payment for payment transactions and drawdowns, and other costs related to payment transactions, which might be now included in the APR, regardless of their amount.

THE CALCULATION OF THE APR

Once the cost elements to include in the APR are known, the next step consists of calculating this rate. To this end, three elements are required: (i) a formula which establishes the exact relationships between the different elements to be taken into account, (ii) the necessary explanatory remarks about the formula, and (iii) a set of assumptions aimed at quantifying the elements involved in the formula.

As mentioned, it was Directive 90/88/EEC which first introduced a method consisting of a mathematical formula. It also established some remarks on the formula and a series of assumptions aimed at determining unknown elements. Later, by Directive 98/7/EC, the application of the method was imposed throughout the Community, the remark regarding the measuring of time was extended and a new remark about the rounding of the APR was introduced. Afterwards, Directive 2008/48/EC introduced changes in remarks and, specially, in the assumptions. Finally, Directive 2011/90/EU modified some of these assumptions and added new ones.

The study analyses and justifies the three elements (formula, remarks and assumptions), which appear in Directive 2008/48/EC in some points of the APR Article and in Annex I,as amended by Directive 2011/90/EU.

Formula

Directive 2008/48/EC defines, in Article 19 (1), the APR as the annual rate of charge which equates, on an annual basis, the present value of all commitments (drawdowns, repayments of the credit and charges), future or existing, agreed by the creditor and the consumer, and states, in Part I of Annex I, the basic equation expressing this equivalence.

From the definition and the equation it can be deduced that what distinguishes the APR from other cost measures is that it puts the credit, its costs and time together, thus recognizing that these three elements are relevant in determining a comparable and uniform measure of the cost of the credit. In this way, the APR presents significant advantages over other measures of cost.

The APR is calculated on the basis of the present value rule, a concept widely used in business and economics which provides a means to compare cash flows at different times on a meaningful "like for like" basis by valuing them in the present. From this perspective, the APR is a synthetic measure that quantifies the average cost of the credit to the consumer over the duration of the agreement, so reflecting the periodic effort of the consumer to comply with his obligations regarding the credit.

Finally, the basic equation defines the APR as an effective annual rate of charge, discarding other options such as the use of a nominal rate or a simple rate. The study shows that this choice is justified by the fact that an effective rate is the most informative, comparable and financially sound rate to summarize costs in consumer credit agreements. Specifically, the dependence of a nominal rate on the frequency of compounding would preclude comparisons and, compared to a simple rate, an effective rate has in its favour the primacy of compound interest in finance and economics, a greater interpretability and a higher adaptation to situations where the amount of the credit varies, and the payments might adopt different and diverse patterns, as happens in consumer credit agreements.

Remarks

Directive 2008/48/EC includes six remarks on the formula, aimed at clarifying some elements of the formula, at avoiding ambiguities and at establishing some conventions for the calculation of the APR. The novelties in this Directive consists of the inclusion of a new remark providing an equivalent expression for the calculation of the APR based on net cash flows in each period, and the rules for the measurement of time.

The equivalent expression is considered to be helpful since it is convenient to obtain the APR using numerical methods. However, the existence of an error in the text of the Directive when defining the range of the periods should be noted.

The new rules for the measurement of time combine the two previous alternative methods introduced by Directive 98/7/EC (the calendar basis and the standard year method) to provide a convention for expressing time periods. When the periods can be measured as a whole number of weeks, months and years, the calculation is straightforward, but when it is necessary to count days, the clarification provided in the Guidelines on the application of Directive 2008/48/EC should be applied to attain a uniform and comparable APR.

Assumptions

The role of the assumptions for calculating the APR is to quantify the elements involved in the formula of the APR, especially when these are not known at the time the APR is calculated, so promoting comparability of the APR figures.

In Directive 2008/48/EC the assumptions are divided between the APR Article, which includes two traditional assumptions, and part II of Annex I, which includes a set of ten additional assumptions. This distinction is relevant because, as a novelty, in the Directive the Article 19(5) foresees the possibility of using a committee procedure to adopt additional assumptions for the calculation of the APR or to change existing ones when the existing assumptions are not sufficient to calculate the APR in a uniform manner or are not adapted to the reality of the market. However, this element of flexibility of the law only applies to the additional assumptions and not to other parts of the Directive. The comitology procedure, indeed, was applied in the elaboration of the measures provided for in Directive 2011/90/EU, which amends part II of Annex I by adding new assumptions and modifying others. The study focuses in this new set of assumptions taking into account the explanations and clarifications provided in the Guidelines on the application of Directive 2008/48/EC.

For a more structured exposition, the study groups the twelve assumptions according to the element of the credit they regulate and then distinguishes between assumptions related to the fulfillment of the agreement, to the amount of the credit, to drawdowns, to the duration and the repayment of the credit and to the treatment of rates and charges. Each assumption is analyzed from a perspective which combines the Directive and the reality of the market in order to solve the difficulties which might appear in the application of the assumptions and identify the credit products where the assumptions are most likely to be applied. The main conclusions are summarized below.

As regards the fulfilment of the agreement, Article 19 (3) establishes that the credit agreement will remain valid for the period agreed and that the creditor and the consumer will fulfil their obligations under it, which implies that charges for non-compliance, early payment or similar charges are not included in the calculation of the APR. Needless to say, this assumption will be applied to every single credit product for the calculation of the APR.

As for the amount of the credit, assumption (h) in part II of Annex I states that if the ceiling applicable to the credit is not known, it will be assumed that it amounts to €1500. This assumption is expected to be applied to some revolving credits, for example, in overdraft facilities where a limit is not provided or in revolving credit accounts and credit cards for consumers with high purchasing power.

The third set of assumptions refers to drawdowns and includes assumptions (a), and (b) in the Annex.

Assumption (a) will be frequently applicable. This assumption states that if a credit agreement gives the consumer freedom of drawdown, the total amount of credit shall be deemed to be drawn down immediately and in full. Revolving credit agreements typically provide freedom of drawdown and hence, the calculation of the APR will require this assumption to be applied.

Assumption (b) takes into account the existence of a limit as regards the amount and period of time among the different mechanism of drawdown. We have found examples of this situation in credit cards and revolving credit accounts for balance transfers and also in overdraft facilities in form of limits to charges for direct debit and cards. Obviously, in this case, the drawdown limits should be complied with, and using reasoning that is parallel to assumption (a) (freedom of drawdown without limits), the amount of credit will be assumed to be drawn down on the earliest date provided for in the agreement.

The next set of assumptions refers to the duration and the repayment of the credit.

Assumption (d) establishes a special regulation for overdrafts, according to which the amount of credit is drawn down immediately and in full and it remains so for the duration of the agreement, which means that repayment of the credit only takes place at the end of the agreement, which is consistent with the evidence found in the market for these type of products. When the duration of the overdraft is not known, it is assumed a duration of only three months. This short duration is justified by the transitory nature of these products.

Assumption (d) deals with open-end credit agreements other than overdrafts. Examples of these agreements include credit cards, charge cards and lines of credit agreements These agreements typically do not have a fixed duration, take the form of revolving credit agreements thus allowing the borrower to use the credit repeatedly as he repays the sums used, have freedom of drawdown and flexibility of repayment. Therefore, they require the application of assumption concerning duration, drawdown and repayments. Point (i) of assumption (e) establishes an applicable duration of one year, which is appropriate given that the agreements are open-ended and the APR is intended to provide an annual cost comparator. Point (ii) determines the scheme of repayment of the amount of the credit within the one year period. In general, such a scheme consists of equal monthly repayments of capital, which provides a relatively high level of APR compared with other schemes of repayment. But in cases such as charge cards, where the capital must be repaid only in full in respect of each payment period and once repaid becomes available to be drawn down again in full, the assumption states successive drawdowns and repayments of the entire capital over the period of one year.

Assumption (f) applies to credit agreements other than overdrafts and open-end credit agreements. It covers three different situations. First, cases where the date of a repayment of capital is not known (and cannot be ascertained) from the agreement. In these cases, the payment is assumed to be made at the earliest date provided for in the agreement, thus leading to the highest possible APR. Second, cases where the amount of a repayment of capital is not known (and cannot be ascertained) from the agreement. In these cases, the repayment is assumed to be the lowest amount for which the agreement provides. This choice of lowest repayments is preferable to requiring highest repayments as this could imply full repayment of the credit in a very short period which would be unrealistic. And third, cases where the date the agreement is concluded is not known (in advertising or at the pre- contractual stage) and this has an effect on the length of the interval to the first payment to be made by the consumer. In these cases, the date of conclusion is assumed to be the date which results in the

shortest interval between that date and the date of the first payment by the consumer, thus leading to a highest possible APR.

Finally, assumption (g) applies to all types of credit agreements, either open-end or non open-end (including overdraft facilities) in order to determine the date and/or amount of payments of capital, interest or other charges where these are unknown and cannot be ascertained from the agreement, and where the previous assumptions do not provide a solution. In these cases, the assumption states that the conditions required by the creditor will be respected before establishing any additional assumptions about dates or amounts. If these conditions do not determine the payments, then it is assumed that interest charges are payable together with the repayments of capital, other recurrent charges are payable at regular intervals, single sum (lump sum) costs are payable at the date of the conclusion of the credit agreement thus providing the highest possible APR and the final payment made by the consumer clears the balance owed.

The last set of assumptions refers to the treatment of rates and charges.

Assumption (c) deals with the possible existence of different ways of drawdowns with different charges and borrowing rates. This situation is usual in credit cards because they typically distinguish between transactions such as cash advances, payments for purchases, balance transfers and foreign currency transactions and impose different charges for each drawdown mechanism. Given that the existence of different charges implies obtaining a different APR depending on the drawdown mechanism assumed, the choice of the drawdown mechanism for the calculation of the APR is a relevant issue. According to the Directive, it should be the most common mechanism, but the Directive does not establish a method to determine it, which implies that MS may introduce provisions in this respect if they wish to guide creditors or they can leave the choice of the drawdown mechanism to each creditor.

Assumption (i) applies where different borrowing rates and/or charges are offered for a limited period or in respect of different amounts of credit. This appears in some credit products, especially in the form of lower or even zero introductory rates as a way to attract customers, for example for credit cards, or as lower or zero rates for low amounts, for example in overdraft facilities. The assumption implies the exclusion of these benefits for the calculation of the APR when, at the date of the calculation of the APR, the relevant elements of the credit which determine the application and the effect on the APR of the different interest rates or charges are not known. The aim is to consider, for the calculation of the APR, only those benefits which are certain and quantifiable at the time the APR is calculated, thus providing a realistic measure of the costs of the credit and of the APR. When these benefits are not certain or quantifiable, the APR shall be obtained under a worst case scenario where such benefits are disregarded for the calculation of the APR. For example, the effect on the APR of a low introductory rate in an open-end credit agreement for the first three months is not certain because the agreement is open-end hence it can last more or less, with the effect of decreasing or increasing, respectively, the influence of the introductory rate on the APR. As a result, the introductory rate should be disregarded for the calculation of the APR. Assumption (j) applies to those agreements where a fixed borrowing rate is agreed in relation to the initial period after which the borrowing rate is determined and subsequently adjusted according to

an agreed indicator. This feature appears especially in instalment credits, in some cases as a type of benefit to the borrower when the fixed rate is low in comparison with the variable rate. The assumption implies the fixed borrowing rate agreed in relation to the initial period to be taken into account for the calculation of the APR and after this initial period the borrowing rate is assumed to be determined by the value of the agreed indicator at the time of calculating the APR. It should be noted that this assumption might be needed to be applied in conjunction with assumption (i) in cases where both are relevant, that is, if the benefit coming from the fixed or the variable rate is not certain and quantifiable. In practical terms, if only assumption (j) of Annex I is used, there is no need to apply (i) in addition, but if any other assumption from Annex I is used (e.g. because the amount or duration of credit is unknown or if it varies), then this triggers assumption (i) in addition.

Finally, Article 19 (4) establishes the general treatment of borrowing rates and charges that are allowed to vary and are unquantifiable at the time of the calculation of the APR. According to the article, both the borrowing rate and the charges should be assumed to remain fixed in relation to their initial level until the end of the agreement. The most straightforward example of the application of this assumption is given by credit agreements with variable borrowing rates.

CONSUMER CREDIT AGREEMENTS IN THE EUROPEAN UNION

The previous connections between assumptions and products are based in the analysis carried out in this study of the characteristics of the main products available in consumer credit markets in the EU, which is also a key element for the adaptation of the examples of the calculation of the APR. The result of the analysis is presented in chapter 2 of the study. It should be noted that this analysis refers to the situation of the markets in the first quarter 2009, and hence the variety of product and features described could exceed what can be found nowadays, i.e. in a situation of consumer credit constraint. For the purposes of this study the former situation is more relevant.

A SNAPSHOT OF THE MARKET

Consumer credit markets experienced rapid and continuous expansion until 2008, due to the sustained economic growth and the relaxing of liquidity constraints at an international level. The EU was party to this process, but the pattern of growth and the relevance of the national markets differ significantly among countries. The expansion was more pronounced in Southern countries and the new members of Central and Eastern Europe, but the largest consumer credit markets still correspond to the most mature and large economies of Germany, France, UK, Spain and Italy, which account for nearly three quarters of consumer credit market in the EU.

This is, in fact, only one of the signs of the ample heterogeneity existing in the market, which is also reflected in disparities in lending structures and the primacy of credit products among countries. The reasons for such heterogeneity are diverse and have their roots in economic and social factors, such as differences in economic development, financial structures and consumer habits and attitudes toward credit products. Also, compared to wholesale financial markets, consumer credit markets are shown to be far from being fully integrated.

All these factors justify the adoption of regulatory initiatives, like Directive 2008/48/EC, aimed at promoting the creation of a single European market for these products, and as regards the scope of this study, they condition the approach to be taken for the coverage of the products marketed throughout the EU.

COLLECTING INFORMATION

The strategy designed to collect information about the main consumer credit products marketed in the EU dealt with the problem of dimension arising from the large number of MS and the wide range of credit products available in the market, which are also sometimes tailored to the specific needs of specific group of consumers. Also, there are difficulties related to the language and the terms used in the different MS which should be addressed. Finally, the heterogeneity in consumer credit agreements in respect to amounts, durations, conditions governing drawdowns and repayments and charges, which are elements which vary from product to product and from creditor to creditor, should be taken into account.

In order to adapt to these circumstances and with a view to the characteristics of the consumer credit market in the EU, our strategy for collecting information has followed two criteria: selection and ordering. The criterion of selection applies to the elements which define the credit products and the sources of information. Regarding the former, our interest has been restricted to those clauses and conditions which affect the APR in consumer credit products. As regards the sources of information, we have resorted to the original sources, that is, to the banking system, specialized companies and vendors. We have collected the relevant information from Internet, in recognition that Internet is one of the most transparent and fastest sources of information nowadays and that the higher level of competition which characterises this channel favours obtaining enhanced information about new structures and designs in consumer credit products. The criterion of ordering applies to the design of a sample of credit providers covering every single MS but at a different depth, depending on the share of the country in the EU market and that of the different credit providers in the national markets.

It should be highlighted that the diversity of credit providers does not preclude that the analysis be focused on credit products, because there is no division of products by type of credit provider, but merely a specialization of credit providers in certain types of products, customer segments, or a special focus on some characteristics of the products. Moreover, our research reveals that in some cases there is a tendency towards convergence of the products marketed by credit providers of different natures, by means of association or as a response to competitive pressures.

GENERAL FEATURES OF CONSUMER CREDIT AGREEMENTS

Our description of the products in the EU market begins with a general overview of the main types of consumer credit agreements and their general characteristics. As indicated, the focus is on all those clauses and conditions which affect the APR in consumer credit products, such as drawdown and repayment mechanisms, the existence of fees and charges, the temporal distribution of the cash flows corresponding to withdrawals, repayments, charges and fees, and the existence of sureties, insurance and other ancillary services which might be required in

connection with the credit. The exposition is in general terms in order to establish a common framework for the analysis of consumer credit agreements.

According to the basic structure and functioning, credit products are classified as instalment credits or revolving credits. In an instalment credit the borrower is provided with a fixed amount to be repaid over a given period by a fixed number of repayments called instalments. Instalments are usually constant over time, but they may be also increasing, decreasing or variable in amount. Examples of instalment credits are personal loans, car loans, and hire-purchase agreements. A revolving credit is a permanent reserve of credit whose limit is authorized by the creditor; the consumer repays the sum used according to the allowances stated in the credit contract and the reserve reconstitutes itself as repayments progress. Mechanism of repayments can take different forms, including the regular repayment of a percentage of the outstanding balance, with or without a minimum amount, the periodic payment of a fixed amount, or the payment of interest charges regularly and the repayment of the credit at the end of the agreement, among others. Examples of revolving credit are credit cards, revolving credit accounts, and overdraft facilities.

Fees and charges can adopt a huge variety of forms and schemes. Usually, the most important part of the cost of the credit is given by interest charges. These charges depend on the borrowing rate, the amount and the duration of the credit. The borrowing rate can be fixed or variable and its level depends on the characteristics of the credit, the creditor and the borrower. Calculation of interest charges could be straightforward or just the opposite, when the credit includes difference balance segments with different borrowing rates, limits, and introductory rates and charges. Charges other than interest present a wide range of forms and schemes linked to their specific nature (set-up costs, maintenance costs, fees linked to payment transactions and drawdowns, fees and charges for sureties and ancillary services, etc.). As a result, although all they increase the APR, they do so in different ways and extent. For example, set-up costs are usually expressed as a percentage of the amount of the credit, and they are usually paid up-front, which tends to increase the effect on the APR. However, maintenance costs are payable at regular intervals. Also, there are costs, such as single sum (lump sum) insurance costs, which are sometimes financed with the credit.

The requirement of sureties is relevant for the calculation of the APR not only because of the effect of their costs on the APR, but also because the nature of the surety might determine the credit agreement not to be regulated by the Directive, which is the case of non-recourse secured credits and credits guaranteed by immovable properties or by a right related to them.

Finally, the requirement to contract ancillary services connected to the credit has become a regular practice by creditors, especially in the most developed markets, as a way to maintain profitability in a context of high competition and decreasing margins. According to our research, the most common ancillary services required by creditors nowadays are to open an account with the entity and to take out payment protection insurance (PPI), in detriment to other services such as endowment policies, which had a role in the 90s. PPI deserves special attention not only from the perspective of the APR, given the magnitude of the costs and the diversity of schemes of payments, but also from the point of view of consumer protection, because it is not always beneficial compared to other alternatives of credit insurance.

SPECIFIC FEATURES OF CONSUMER CREDIT PRODUCTS

The analysis is completed with the description of the specific features of the products collected from the markets of the 27 MS, using a classification which distinguishes five types of consumer credit products: personal loans and hire-purchase agreements (which are forms of instalment credit) and revolving credit accounts, credit cards and overdraft facilities (which are forms of revolving credit).

The same approach is used for each product. First, we define the product, address possible ambiguities and, when relevant, discuss implications which might arise from a regulatory perspective. Second, we analyze the spread of the product in the market, its purpose, the most typical amounts and terms, the types and characteristics of the charges and fees of the credit, the most usual schemes of repayments, the requirement of sureties and insurance, and the existence of other ancillary services connected with the credit. Throughout the description, references to special features and concrete countries are made where pertinent. Finally, we draw some conclusions about the most outstanding features of the product and their connection with the assumptions for the calculation of the APR.

As a whole, it can be concluded that consumer credit agreements are very heterogeneous products. Their characteristics vary largely from product to product and there are also significant differences among products of the same type, depending especially on the purpose of the credit, the target public, and the banking practices in each country. Despite this, recent years have shown increasing competition among credit providers, which has motivated the adoption of different strategies that try to catch the attention of consumers by increasing flexibility in the schedule of payments and their amount, the offer of attractive prices, rates and charges (sometimes embedded in complex products with different balance segments and limits), the provision of different services, and a tailoring of products to the needs of different segments of the population. In parallel, the pressure on the benefits has promoted the cross-selling of ancillary services by creditors. The greater complexity of the products and the existence of flexibility mechanisms points to the need to use an increasing number of assumptions for the calculation of the APR, while the requirement of ancillary services emphasizes the appropriateness of a wide definition of the total cost of the credit to the consumer.

Finally, it is worth mentioning in this summary that, from a regulatory perspective, the study has also revealed the existence of certain mismatches between the scope of the Directive and the evidence gathered from consumer credit markets in respect to overdraft facilities, overrunning and leasing agreements.

Article 3 (d) of the Directive defines overdraft facilities in the following terms: "*overdraft facility means an explicit credit agreement whereby a creditor makes available to a consumer funds which exceed the current balance in the consumer's current account*", and Article 3 (d) defines overrunning as "*a tacitly accepted overdraft whereby a creditor makes available to a consumer funds which exceed the current balance in the consumer's current account or the agreed overdraft facility*". Both definitions are shown to be restrictive in view of the products available on the market, because there are cases in which overdraft facilities and overrunning appear in revolving credit account and credit cards.

As regard leasing agreements, Article 2 (d) of the Directive excludes from the scope "*hiring or leasing agreements where an obligation to purchase the object of the agreement is not laid down either by the agreement itself or by any separate agreement; such an obligation shall be deemed to exist if it is so decided unilaterally by the creditor*". That is, only those contracts where an obligation to purchase the object of the agreement exits are regulated.

EXAMPLES OF THE CALCULATION OF THE APR

Chapter 3 of the study presents the set of examples for the calculation of the APR. Taking as a starting point the examples provided in the Proposal for a Directive on consumer credit adopted by the Commission in 2002, we have deleted, changed and introduced new examples following three rules.

Firstly, the examples have been adapted to Directive 2008/48/EC, as amended by Directive 2011/90/EU. Different areas of the Directive have had an impact on the examples. In particular, the scope of the Directive determines the products to be covered by the examples; the definition of the total cost of the credit to the consumer determines the costs to be included for the calculation of the APR; the remarks on the basic equation of the APR in respect to the measurement of time periods have also led to changes in the examples, and the new assumptions are applied in the examples. To mention just two cases, under the Directive there is no place for the example of a leasing product without an obligation to purchase the object of the contract, because it is outside the scope of the Directive, and insurance costs are included in the total cost of the credit when they are mandatory to obtain the credit or to obtain it under the marketed conditions and not whenever insurance is taken out when the credit agreement is concluded, as stipulated in the Proposal.

Secondly, the examples have been adapted to the reality of consumer credit markets in the EU in order to be representative of the main products marketed. In this regard it is worth noting that the examples should be general enough to avoid losing suitability in a context where consumer credit markets are evolving continuously, but also specific enough to be able to reflect the main types of consumer credit agreement and the different elements which might appear in them. For this reason, the focus should be on the effect of these structures and elements on the calculation of the APR. The revision of the examples of the Proposal in the view of our findings about the characteristics of consumer credit agreements in the EU have revealed the existence of some features not reflected in the examples, which are included by means of new examples. These cover single-sum costs which are financed, insurance costs calculated and paid in different ways, or payment schemes not covered in the examples of the Proposal. With these additions, the set of examples covers a large variety of payment structures and charges which, either in isolation or in combination, are able to reproduce the main products available in the market. Again in relation to the adaptation of the examples to the market, we have revised the amounts, durations, repayments and charges considered in the examples, trying to find an equilibrium between the use of reasonable levels and the gains in simplicity and comparability of the examples if round and similar figures are used throughout the examples of the same type of credits.

Thirdly, the revision of the examples has also taken into account the objective of enhancing understanding. To this end, the examples are designed and ordered in such a way that additional features are introduced in a progressive way throughout the examples, in an attempt to go from the basic to the most complicated agreements and to avoid the simultaneous appearance of multiple variations, which might hinder a simple and proper identification and valuation of them. Also, all the information needed to calculate the examples is supplied, which is of special relevance given the possibility of replicating the examples using the Excel simulator provided. Moreover, for completeness and better comprehension, the amortisation table of each example calculated by the simulator is provided, together with step-by-step explanations on how to obtain it. Finally, financial reasoning has played a primary role in the explanations.

The changes introduced following these guidelines, together with the correction of some numerical errors found in the examples of the Proposal, make up the new set of examples, which includes a total of forty-one examples, thirty-two corresponding to credits with fixed duration, seven to open-end credits and two examples to overdraft facilities.

EXCEL SIMULATOR FOR THE CALCULATION OF THE APR

Finally, the APR simulator developed as a part of the study makes it possible to replicate the examples of calculation of the APR, obtain new examples and analyzes the effect of different elements of credit agreements on the APR.

The software is presented in a user-friendly Excel spreadsheet that allows the user to obtain the APR and the amortisation table of a large variety of credit agreement in only three stages and with very few limitations.

The simulator presents other interesting features, which can be summarized as:

- Directive compliance, because the input area is organized into several sections and includes the characteristics of the credit agreement included in the Standard European Consumer Credit Information form defined in the Directive. Also, where assumptions for the calculation of the APR might apply, this is indicated by balloon comments.

- Ample coverage, given the large number of characteristics and options available for defining the credit product.

- Simplicity, because the characteristics of the credit are provided through the use of simple menus and by entering numbers in specific cells. Consequently, no special training or financial knowledge is required to use the simulator. Some sections also include Notes with relevant explanations. And finally, as data are entered, the simulator informs as to possible errors and inconsistencies.

- Flexibility, because when the menus and cells are insufficient to describe the credit agreement, the user can, in most cases, enter his or her own data in the amortisation table.

- Interactivity, because the user can change some characteristics of the credit and see the effects of these changes on the amortisation table.
- Multilingual language, because the user can select the desired language from a list which includes all the official languages of the European Union.

The simulator then constitutes a suitable companion of the examples for all the parties interested in the calculation of the APR by providing the flexibility needed for adaptation to different needs and scenarios. On these grounds, the simulator is not aimed at providing creditors with a tool for their commercial activities in substitution of their internal systems.

INTRODUCTION

AIM OF THE STUDY

This report presents the work carried out and the results obtained under the service contracts numbers 17.020200/08/520936 and 17.020200/12/638501, aimed at conducting a study on the calculation of the APR for consumer credit agreements and afterwards amending it for coherence both with Directive 2011/90/EU and the Guidelines on the application of Directive 2008/48/EC. The tender specifications of the former contract establish the purpose and the subject of the contract as follows:

Tender specifications

1. Purpose and context of contract

The 1987 Directive on consumer credit (1987/102/ECC) did not provide a fully harmonised formula for calculating the Annual Percentage Rate of Charge (APRC). The absence of a harmonised calculation method prevents consumers from comparing the cost of credit offers on a cross-border basis.

In 2002, the Commission adopted a proposal for a revised Directive on Consumer Credits*, which contained a fully harmonised calculation formula as well as a number of practical application examples to ensure that the formula is used in the same way by all creditors. The Directive was adopted on 7 April 2008. The calculation examples were deleted from the text of the Directive and the Commission intends to publish them in another manner, for example on its website.

*[COM(2002) 443 final - Proposal for a Directive of the European Parliament and of the Council on the harmonisation of the laws, regulations and administrative provisions of the Member States concerning credit for consumers: http://ec.europa.eu/consumers/rights/background_en.htm]

2. Subject of contract

2.1. Adapt the examples provided in Annex II of the initial Commission proposal on Consumer Credit of 2002

The examples contained in the initial proposal need to be adapted due to the fact that the provisions of the Directive have been significantly amended since the initial Commission proposal of 2002. In addition, the consumer credit market has evolved too, and new credit products may need to be reflected in the examples.

The contractor will be asked to:

- check that the examples presented in the annex to the Commission proposal cover all the main existing credit products marketed in the 27 EU Member States
- according to the results of the above-mentioned check, delete certain examples, adapt existing ones or add new ones in order to better reflect the reality of the consumer credit market in 2008.

For this work, the contractor will be requested to refer to the scope of the Directive 2008/48/EC of the European Parliament and the Council of 23 April 2008 on credit agreements for consumers and repealing Council Directive 87/102/EEC, OJ L 133 of 22 May 2008.

2.2. Provide scientific elements on the formula used for calculating the APR as provided in the new Consumer Credit Directive adopted 23 April 2008.

> The Commission intends to organise implementation workshops to help the Member States in their transposition process. The first workshop is likely to take place in November 2008, the second in March 2009 and the third one in the autumn of 2009. During the course of the contract and in particular for the March 2009 workshop, the contractor will be expected to supply the Commission with answers to Member States' questions on the subject and to present his findings regarding the APR calculations.
>
> In addition, the Directive foresees recourse to comitology with respect to certain elements of the APR calculation. The Commission wants to gather additional technical elements concerning the APR in order to facilitate the discussions.
>
> According to the Directive, the calculation formula used in the new Consumer Credit Directive aims at describing as precisely as possible the total cost of the credit for the consumer. The main intention is to facilitate the comparison of offers, on the basis of one single figure.
>
> The contractor will be asked:
>
> - to provide detailed and easily understandable explanations on the calculation method provided in the Directive, which may be used by the Commission in its future discussions concerning national implementation of the Directive. This task includes providing indications on how the cost of the credit is reflected. If the APR calculation or the examples are the subject of one or several of the workshops, the contractor will be requested to attend the workshop;
> - to provide explanations and reflections on how anatocism (interest compounded on a yearly or less than yearly basis) is reflected in the APR calculation;
> - to reflect on the assumptions provided in the Directive for calculating the APR, and if necessary adapt them or propose new ones with a view to preparing possible future Commission proposals in the framework of Articles 19 and 25 of the new Consumer Credit Directive.

Dealing with the two objectives of the study requires adopting a broad perspective covering (i) the *regulatory framework of the APR*, (ii) the *technical and financial aspects* of this rate and (iii) *the market* for consumer credit agreements in the EU.

The three areas are relevant to both objectives. On the one hand, the examples of the calculation of the APR should be representative of the products marketed in the EU and, at the same time, should comply with the regulation and illustrate the technical aspects involved in the calculation of the APR. On the other hand, while the explanations on the calculation method of the APR and aspects such as how the cost of the credit and anatocism are reflected in the APR are basically technical issues, the assumptions should be valued on the basis of their adaptation to the products on the market, the real difficulties faced by the parties involved in a credit agreement in the interpretations and application of the assumptions and their consistency with the rest of the regulation on the APR.

For these reasons, this study presents an analysis of the three areas with respect to the relevant aspects about the disclosure and calculation of the APR. The set of examples proposed and an Excel simulator developed for the calculation of the APR in consumer credit agreements completes the study.

After the publication of the original study in 2009, the comitology procedure mentioned in the tender specifications was applied. As a result, in 2011 the Commission adopted the Directive

2011/90/EU amending the Annex I of the Directive 2008/48/EC and in 2012 the Commission published the Guidelines on the application of Directive 2008/48/EC (Consumer Credit Directive) in relation to costs and the Annual Percentage Rate of Charge. The Directive introduced significant changes in the assumptions for the calculation of the APR and the Guidelines clarify some particular aspects of the TCC and the application of the assumptions for the calculation of the APR as amended by the Directive 2011/90/EC. They also address specific problems encountered by the MS when implementing Directive 2008/48/EC. From all these it emerged a need to amend some elements of the text and the examples contained in the study. Such an amendment was carried out under the second contract, whose results are thus included in this version of the study. Note that the analysis of credit markets in the EU has not been updated (hence, the study describes the situation in the first quarter of 2009) because it was neither requiered by the contract nor it is advisable because the international financial and economic crisis has been contracting credit markets since 2008, reducing the variety of products and features far below usual levels. Thus, the situation of the market previous to the crisis is more relevant to ensure an ample coverage of products and features by the examples of calculation of the APR.

SOURCES OF INFORMATION

The sources of information used in this study include:

- The past and present legal framework for consumer credit agreements at EU level and related background material.
- Existing studies, reports and guides about the market and the regulation issued or promoted by public and private entities including EU institutions, consumer agencies, industry associations, banking supervisors and financial advisors.
- Websites of consumer credit providers available on Internet, covering all the MS, the banking industry, specialized credit companies, car dealers and stores.

STRUCTURE OF THE STUDY

The structure of the report is as follows.

Chapter 1 analyzes the APR in the framework of the regulation of consumer credit agreements. After an introductory section showing the role of the APR and the main changes in the regulation, the second section of this chapter deals with the scope of Directive 2008/48/EC and the disclosure of the APR. The third section focuses on the elements of the cost of the credit to be included in the APR, using a dynamic perspective which reveals the shortcomings of the previous Directives and the rationale of the present one. Finally, the fourth section deals with the more technical aspects of the APR, starting from the formula, continuing with the remarks on the formula and ending with the assumptions for the calculation of the APR. The analysis of the formula reveals the principles underlying the use of the APR as a means of

comparison of the cost of the credit of different products and justifies the choice of an effective rate of charge in which anatocism is present. The remarks on the formula are analyzed in the view of their implications for the calculation of the APR. The assumptions are also discussed from this viewpoint, and additional explanations about the application of assumptions to specific situations and credit agreements are indicated.

Chapter 2 presents the results of the research on consumer credit agreements in the EU carried out in 2009. This chapter is also organized in four sections. The first section, as an introduction, offers a snapshot of the market, and points out its heterogeneity. The second part explains the methodology used to collect information about the products marketed in the MS of the EU from the main credit providers in the market. The next two sections describe the products. The third section provides an overview of the two main types of consumer credit agreements (instalment credits and revolving credits) and their general characteristics as regards their mechanism and forms of withdrawal and repayment, their fees and charges, and the existence of sureties, insurance and other ancillary services. The fourth section goes into the details of the products found on the market and their specific characteristics. It uses a classification which distinguishes personal loans, hire-purchase agreements, revolving credit accounts, credit cards and overdraft facilities.

The findings of the previous chapters are brought together in chapter 3, devoted to examples of the calculation of the APR. The first two sections of this chapter examine the examples of the initial Proposal of the Commission of 2002 (Annex) and explain the changes introduced on the basis of the Directive 2008/48/EC (as amended by Directive 2011/90/EU), the reality of the consumer credit market in the EU and some informative considerations. The last section contains the new set of examples and some preliminary remarks on them. This section is self-contained, and hence can be distributed independently of the rest of the study.

The same applies to the last two chapters of this report, which include the instructions of the Excel simulator for the calculation of the APR in consumer credit agreements developed in the context of this study (chapter 4), and the list of terms elaborated for the transposition workshop on Directive 2008/48/EC held in Brussels in March 2009 (chapter 5).

1. THE APR IN THE EU LEGAL FRAMEWORK FOR CONSUMER CREDIT AGREEMENTS

1.1. INTRODUCTION

The interest of the Community in regulating of consumer credit in Europe has a long history. It started with some preparatory work carried out by the Commission in mid 1960s.

The aim of the Directive is to promote a single market for consumer credit in the EU. In this field, the functioning of the single market is distorted by several aspects, such as the differences in national legislation regarding consumer protection, differences in banking and financial practices, the cost of cross-border payments, the tax obstacles to cross-border provision, and cultural and physiological barriers on the consumers' side. Among all these obstacles, consumer credit regulation at an EU level has focused on consumer protection, assuming that a proper protection to consumers will promote cross-border purchases and credit and the advantage of a single European market. This objective of consumer protection has been gaining in importance, not only in the area of consumer credits, but in all the fields of the Community action[2].

Consumer protection relies on two key types of provisions: those aimed to ensure a contractual equilibrium between the parties involved in the credit agreement, and provisions relative to consumer information. As regard the latter, the aim is to correct the information asymmetries that might appear between consumers and credit providers through the right of the consumer to receive information that is easy to understand and readily comparable.

In consumer credit regulation, information focuses particularly on the total cost of credit to the consumer, or TCC, and its expression by means of the annual percentage rate of charge for credit, or APRC, or simply APR. The information given to the consumer should allow him, on the one hand, to identify the cost of the credit and, on the other, to compare the products of different providers.

Directive 87/102/EEC was the first step towards the harmonization of the legal and financial conditions of consumer credit. This Directive was amended and completed by Directive 90/88/EEC and Directive 98/7/EC. Finally, it has recently been replaced by Directive 2008/48/EC, which has been also amended by Directive 2011/90/EU. The long process since the initial proposal, its amendments and also the long time elapsed before the new Directives were adopted illustrate the difficulties in finding an agreement about consumer credit regulation at an EU level.

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[2] The essential foundation stone for consumer protection was introduced in the Maastricht Treaty, which in Article 129 (a) provides that the Union must contribute to the objective of consumer protection and aims in particular to protect the economic interests of consumers and to provide them with adequate information. Article 153 (2) of the Treaty of Amsterdam provides for the integration of consumer policy into the other Community policies and actions.

From the beginning of the harmonization process, it was considered that the total cost of credit should include all the costs that the consumer has to pay, including interest and other charges, and that these costs should be expressed in terms of an annual percentage rate of charge. It is this rate which provides consumers with a means of comparing credit across the EU.

What has changed over time and with the successive Directives are the cost elements which must be included in the TCC and the margin of freedom allowed to MS as to the determination of these elements and the method, or mathematical formula, used for calculating the APR. Both the formula and the elements comprising the TCC are crucial, because the existence of differences generates differences in the APR calculated for identical products, which is an undesirable result.

In **Directive 87/102/EEC**, most of the decisions about the TCC and the method for calculating the APR were left to national legislation. Concretely, MS were allowed to determine the method used and no mathematical formula was defined, although the Directive foresaw the adoption of one or more Community methods in subsequent Directives; Also, the elements to be included in the TCC were left to national legislation. MS could also determine some essential contractual conditions and were allowed to introduce more stringent provisions than those of the Directive.

So much leeway left to the MS meant that Directive 87/102/EEC had a modest impact on the harmonization of consumer protection measures. Also, given the years elapsed between the proposal in 1979 to the adoption of the Directive, it was shown to be inadequate for modern credit instruments, such as credit cards, and for some credit facilities such as advances on current accounts (overdrafts), where the duration of the credit and its use are not known at the time the APR has to be calculated.

The first amendment of Directive 87/102/EEC, **Directive 90/88/EEC**, sought to harmonize two key aspects: i) a method for calculating the APR was introduced and a mathematical formula was defined, together with certain hypotheses for calculating the APR; and ii) the determination of the costs elements to be included in the APR was refined by eliminating the leeway of MS in the determination of the TCC and by introducing a list of exemptions from the TCC for the purpose of calculating the APR.

However, as regards the formula, Directive 90/88/EEC allowed the MS whose legislation was prior to the date of notification of the Directive, 1 March 1990, to use their national formulas during a transitional period of three years from 1 January 1993. Also, the launch of a negative list for the cost exempted from the TCC that not only included exemptions but also exemptions from exemptions, provoked misunderstandings and still allowed ample leeway to the MS, and also to industry, when determining which elements to include and exclude from the calculation of the APR.

Given the widespread use of the statutory formula among the MS (the only exceptions were Germany, France and Finland as reported by the Commission), and the provision in Directive 90/88/EEC on the capacity of the Council to decide before the end of the transitory period (1 January 1996), the establishment of a single formula for APR on the basis of a proposal of the

Commission, a further step in the harmonization of the method of calculation of the APR was given with the Directive 98/7/EC.

The **Directive 98/7/EC** finally imposed the formula for the calculation of the APR to be used throughout the Community, allowing a transition period of 2 years (until March 2000) for its adoption by all the MS. It also introduced rules for the calculation of time periods and the accuracy of the figure for the APR.

However, the enhancement of the mathematical aspects of the APR was not accompanied by parallel advances in the clarification or extension of the cost elements to be included in the APR, which remained unchanged. The possibility of further harmonization was foreseen in the Directive but left for a future time.

In short, by the end of the nineties, although a single method for calculating the APR was defined and imposed, the cost elements to include in the APR were not defined precisely. There were even some technical issues about the calculation of the APR which were not clear enough. As indicated in the explanatory memorandum accompanying the original proposal for a new consumer credit Directive submitted by the Commission in 2002 (Commission proposal of 2002):

> *"[…] there were two recurrent problems affecting the introduction of the APR: first, the calculation conventions for expressing both the time periods and the rounding of amounts and second, the fixing of cost – "the cost base" – to be taken into account. To make sure that the APR is completely reliable and serviceable throughout the Community the Member States must calculate it in a uniform way and include in the same way all the cost elements linked to the credit agreement. However, despite the changes introduced by Directive 98/7/EC this is not always the case.*
>
> *There are signs, for example, of difficulties with substantiating the "obligatory" nature of insurance and sureties covering the repayment of the credit. The fact that they are obligatory means that they have to be included as costs in the cost base and this prompted a number of Member States to regulate this area beyond the requirements of the directive by use of the minimum clause. The exclusion of certain types of costs from the directive serves no (or no longer any) purpose and several Member States have therefore included these costs in their national cost bases. There are also a number of cases where the directive is not sufficiently clear, for example with regard to the effect of the commissions payable to intermediaries or taxes due when the credit agreement is concluded or performed. All of the foregoing means that there can be differences of ten, twenty or more percent depending on how strictly a Member State defines the composition of its cost base."*

These problems were only a part of the drawbacks of the Directive 87/102/EEC, amended by Directives 90/88/EEC and 98/7/EC. On the one hand, the Community framework for consumer credit was inadequate for the new situation of the consumer credit market. New products had

appeared and extended quickly among consumers[3], thus perturbing the adequate balance between the rights and obligations of consumers and credit providers. On the other hand, some MS, in an attempt to adapt to the new situation, had gone beyond the provisions in the Directive and had adopted more detailed and stringent provisions in their national laws. The new requirements, although were acting in favour of national consumers, were running against the single market for consumer credits. Creditors adapting their products to different national legislations and consumers unequally protected might be constituting clear barriers to the promotion of cross-border provision of consumer credit.

Directive 2008/48/EC implies a radical change in the focus of consumer credit regulation. This is mainly because this Directive is aimed at full harmonisation. Consequently, where there are provisions harmonised by the Directive, MS cannot maintain or introduce national provisions different to those of the Directive. The key areas of maximum harmonisation include: information requirements at a pre-contractual and contractual level, right of early repayment, right of withdrawal, and the calculation of the APR. The provisions in all these areas are intended to guarantee a high and equivalent level of consumer protection throughout the European Union[4].

In what refers to the object of this study, that is, the method, conventions and assumptions for the calculation of the APR, the explanatory memorandum accompanying the Commission proposal of 2002 explicitly mentioned the above objective:

> *"This proposal for a directive contains a reassessment both of the calculation conventions and of the inclusion or exclusion of certain costs on the basis of their economic justification so that a minimum of credit costs will be excluded and a maximum of clarity achieved. This should, as a rule, bring about the maximum possible harmonisation of the national cost bases and a greater degree of uniformity as regards calculation."*

The changes introduced in these elements by Directive 2008/48/EC (as amended by Directive 2011/90/EU) are profuse, and most of them have a significant impact on the APR, as will be shown in this chapter. First we focus on the scope of this Directive. Secondly, we analyze the cost elements to include in the APR. The discussion on the changes in the conventions and assumptions used for the calculation of the APR is left to the last section of this chapter, which is devoted to the calculation of the APR.

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[3] For example, overdrafts on current accounts, not in use in 70s, were used by nearly a third part of consumers in the new century.

[4] Although, in general, consumer associations welcome the maximum harmonisation approach, they also find some shortcoming in this objective. For example, the Bureau Européen des Unions de Consommateurs (BEUC) guide "Consumer credit: A fair deal for consumers" of 2003 starts by saying that the maximum harmonisation objective might reduce consumer protection in some MS whose national consumer credit laws have gone far beyond the minimum requirements of the Directive 87/102/EEC and might make difficult the appearance of national developments and/or new financial products.

1.2. SCOPE OF THE DIRECTIVE AND DISCLOSURE OF THE APR

Needless to say, the scope of the Directive 2008/48/EC on credit agreements for consumers aims to cover all forms of consumer credits. In this respect, since the definitions of consumer and credit agreement have undergone no change from Directive 87/102/EEC[5], it might be expected that they are trying to deal with the same reality.

Concretely, Article 3 of Directive 2008/48/EC provides the following definitions:

> *(a) 'consumer ' means a natural person who, in transactions covered by this Directive, is acting for purposes which are outside his trade, business or profession;*
>
> *(c) credit agreement means an agreement whereby a creditor grants or promises to grant to a consumer credit in the form of a deferred payment, loan or other similar financial accommodation, except for agreements for the provision on a continuing basis of services or for the supply of goods of the same kind, where the consumer pays for such services or goods for the duration of their provision by means of instalments;*

The above assertion does not imply the absence of changes when we go into the details of the law. This is because of a series of reasons. First, the market for consumer credits has changed significantly during the last two decades, which translates into the appearance of new products and players and new ways to see the financial business. Secondly, the laws regulating financial markets in general have also evolved at both a European and a national level. And thirdly, social and political sensitiveness regarding consumer credit have also changed.

All these forces have had an effect on Directive 2008/48/EC, leading to changes, although not in the general scope, but in the list of exemptions from the scope and the cases with a special (light) regime regulated on it. In the following, we discuss these changes.

This analysis is relevant for the purposes of this work because, as a general rule, under the Directive 2008/48/EC the disclosure of APR is compulsory for all consumer credit agreements regulated by the law. Hence, the adaptation of the examples provided in Annex II of the Commission proposal of 2002 should take into account the scope of Directive 2008/48/EC.

To facilitate the discussion, Table 1 provides a comparison of the exemptions and the special cases regulated as we move from the Directive 87/102/EEC to the Commission proposal of 2002 and finally to Directive 2008/48/EC. They have been ordered so as to introduce them according to the rationale behind the exemptions and the special cases.

The first argument is that agreements which do not involve credit facilities should be exempted from the scope. This is the case of the exception included in the definition itself of credit agreements in Article 3 of Directive 2008/48/EC stated above (*agreements for the provision on a provision on a continuing basis of services or for the supply of goods of the same*

[5] The definitions are found in Article 1 of the Directive 87/102/EEC and Article 3 of the Directive 2008/48/EC.

kind, where the consumer pays for such services or goods for the duration of their provision by means of instalments), and also of that of the exception in Article 2(2)(d) (*hiring or leasing agreements where an obligation to purchase the object of the agreement is not laid down either by the agreement itself or by any separate agreement*). In both cases the payments made by the consumer constitute the remuneration for the services or goods he is receiving. This contrast with the definition of a credit, which implies the return of money in a future time in exchange for a good or service whose use or ownership are forwarded. As can be seen in the table, this exemption was already considered in similar terms in Directive 87/102/EEC.

A second reason for exemptions is the special nature of certain credit agreements which justify a separate treatment and even a separate regulation. This is the case of *mortgage credits* in Article 2(2)(a) and *credit agreements linked to transactions in financial instruments* in Article 2(2)(h). As regards the latter, it was not considered an exemption in Directive 87/102/EEC because at the time this Directive was adopted there was no legislation specific to financial instruments protecting the consumer/investor in credit agreements related to these instruments. Directive 2004/39/EC now guarantees a level protection similar to that provided in Directive 2008/48/EC, and hence these agreements need not to be included in the scope of Directive 2008/48/EC. Mortgage credits, on the other hand, are a case of special interest because it is difficult to establish a clear separation between consumer and mortgage credits. For example, in the USA and the UK the term 'consumer credit' comprises mortgage loans, since housing is a part of consumer expenses. However, it is generally recognized that these credits have a special nature and hence, as chosen by the Community, a separate treatment might be advisable. In fact, the exclusion of mortgage credits has been a constant in the Community regulation, as can be seen in Table 1. However, the requisites for these credits to be exempted have changed over time. In Directive 87/102/EEC, the exemption was based on the purpose of the credit (*acquiring or retaining property rights in land or a building, or with the purpose of renovating or improving a building*), no matter what the credit's guarantee. Hence, credit agreements secured by mortgages or immovable property were not excluded entirely. In the Commission proposal of 2002, only loans with a similar purpose but also guaranteed by a mortgage on immovable property or similar were excluded. Finally, Directive 2008/48/EC excludes credit for the two reasons, either by their guarantee (s*ecured by a mortgage or similar on immovable property or by a right related to it*) according to Article 2(2)(a), or by their purpose (*acquire or retain property rights in land or a building*) according to Article 2(2)(b). It is worth noting that under Directive 2008/48/EC, credits intended to renovate or improve a building, which were exempt under Directive 87/102/EEC, are now in the scope of the consumer credit Directive (obviously, provided that they are not guaranteed by immovable property or rights on it).

The amount of the credit has been other reason for exclusions in the Directives, although not in the Commission proposal of 2002. As shown in Table 1, under both Directives, *credits agreements involving an amount less than 200 ECU/EUR* were excluded from the scope, as were *credit agreements amounting to more than a maximum limit*, specified at ECU20,000 in 1987 and €75,000 in 2008. These exclusions are justified by the fact that the protection mechanisms of the Directive do not match with credit agreements for either very large or very small financial amounts. On the one hand, credits for very large amounts are not typical consumer credit agreements. On the other hand, for credit agreements for very small amounts

the protection measures would imply unnecessary administrative burdens both for consumers and grantors of credit; also, such credits have a limited cross-border impact.

As with consumer credit for low amounts, there are other cases in which the reason of exemption or the existence of a light regime lies in the excessive burden and information overload when compared to the (low) cost of the credit to the consumer. In this regard, exempt from the scope of the Directive 2008/48/EC are in particular: *overdrafts to be repaid within 1 month* [Article 2(2)(e)], *credit agreements to be repaid within 3 months with only insignificant charges*[6] and *credit agreements free of interests or any other charges* [Article 2(2)(f)], and *credit agreements related to the deferred payment of existing debts also free of any charges* [Article 2(2)(j)]. A light regime is required under Directive 2008/48/EC for *overdraft facilities to be repaid on demand or within 3 months* [Article 2(3)] and *credit agreements in the form of overrunning* [Article 2(4)]. In the cases mentioned, the consumer usually faces low cost for the credit due either to low charges or to their absence, or to the short duration of the credit agreement[7]. Interestingly, if we compare these exemptions to the exemptions in points (c), (d) and (j) of Article 2(1) of the Directive 87/102/EEC and the light regime for advances in current accounts in point (e), it can be concluded that Directive 2008/48/EC is more stringent in allowing exemption or special regulations.

Credit agreements offered to a restricted public under terms more favorable than those prevailing in the market (or previously concluded by the consumer) are also special cases in both Directives. In this regard, the margin of freedom left to MS in Article 2(2) of Directive 87/102/EEC about these agreements appears in the Directive 2008/48/EC in the form of the two exemptions from the scope of points (l) and (g) of Article 2(2) (*loans granted by statutory provisions and with a general interest purpose to a restricted public, and credit granted by an employer to their employees*) and the leeway for MS to apply a light regime to *credits granted by mutual organizations to their members* according to Article 2(5) and to *agreements which provide for arrangements to repay debt in default* as stated in Article 2(6).

Finally, Directive 2008/48/EC has included two new exemptions from the scope. These exemptions, shown at the end of Table 1, refer to *credit agreements where the liability of the consumer is limited to the item offered in guarantee* of the credit (Article 2(2)(k)), and *credit agreements which are the outcome of a settlement reached in court or before another statutory authority* (Article 2(2)(i)). The measurement of the duties of the consumer in material terms in the former case and the non-commercial nature of the credit in the latter are the reasons behind these exemptions.

From all the above it can be concluded that exemptions from the scope or the application of a light regime are linked to those situations in which the protection of the consumer is granted

[6] The Guidelines on the application of Directive 2008/48/EC clarifies the meaning of 'insignificant charges'. Also note that although the cost in euros of overrunning and overdraft facilities is usually low, it might be high when calculated in relation to the low amount and short duration of the credit.

[8] See section 2.6 of the Guidelines on the application of Directive 2008/48/EC for a detailed explanation of the information to be provided to the consumer prior to the conclusion of the credit agreement.

by other laws (either existing or future, such as the case of mortgage loans) or by favourable conditions that make it unnecessary to impose the requirements of information, advice and measures required under the Directive.

In the Directive the disclosure of the APR as well as the provision of other information[8] is central to the objective of consumer protection. This requirement applies to all credit agreements within the scope of the Directive and at all three stages of the agreement: in advertising, at a pre-contractual and at a contractual stage.

The only variations to this rule are as described below[9]:

- Despite the exemption from the scope of the Directive of *overdraft facilities to be repaid within 1 month*, Article 6(5) imposes the obligation to provide certain information which includes the APR, illustrated by means of a representative example at the pre-contractual stage.
- Under the light regime applicable to *overdraft facilities to be repaid on demand or within 3 months*, MS may decide that the APR does not need to be provided at any stage of the process. Note however that the total cost of the credit must be included in the overdraft agreement by virtue of Article 10(5)(f), and this should be calculated by reference to the same assumptions as for the APR calculation.
- Under the light regime applicable to *credit agreements in the form of overrunning*, neither the APR nor a representative example is required to be provided. According to Article 2(4), only Articles 1 to 3, 18, 20 and 22 to 32 of the Directive are applicable to overrunning credits. As established in Article 18(1), an agreement to open a current account that would allow a consumer to overrun, must contain, in addition, the information referred to in Article 6(1)(e), that is, information on the borrowing rate and on other charges, which does not include the APR. Also, according to Article 18(2), if the overrunning becomes significant and lasts for more than 1 month, additional information should be provided, but it still does not include the APR.

It should be noted that the freedom of MS to introduce or maintain requirements at a national level on the disclosure of the APR is however different for each case. Specifically:

- The exclusion from the scope of the Directive of *overdraft facilities to be repaid within 1 month* allows MS to apply the provisions of the Directive to these credit agreements pursuant to Recital 10. It states that: "*this Directive should be without prejudice to the application by Member States, in accordance with Community law, of the provisions of this Directive to areas not covered by its scope. A Member State could thereby maintain or introduce national legislation corresponding to the provisions of this Directive or certain of its provisions on credit agreements outside the scope of this*

[8] See section 2.6 of the Guidelines on the application of Directive 2008/48/EC for a detailed explanation of the information to be provided to the consumer prior to the conclusion of the credit agreement.

[9] Note that the Directive refers to overrunning and overdraft facilities in current accounts.

Directive". Therefore, MS could mandate the disclosure of the APR for these agreements at a national level.

- *Overdraft facilities to be repaid on demand or within 3 months* and *credit agreements in the form of overrunning* are light regime contracts, which means that only explicitly specified provisions of the Directive should apply to them, and not others. This is made clear in Recital 11, which specifies that: "*In the case of specific credit agreements to which only some provisions of this Directive are applicable, Member States should not be allowed to adopt national legislation implementing other provisions of this Directive.* For *overdraft facilities to be repaid on demand or within 3 months*, as stated above, the provisions applicable give MS the freedom to decide if the APR is to be provided or not at any stage. However, in the case of overrunning credits, the provisions on the APR are not applicable, and hence MS are not allowed to require creditors to disclose the APR as defined in the Directive at any stage. Also, it would be misleading to the consumer to use the term APR to refer to a measure of cost which is obtained differently. This, however, does not prevent MS from obliging the disclosure of other ad-hoc measures of costs under the national law regulating the current account agreement, which is outside the scope of the Directive. However the information requirements in Article 18 of the Directive should be fulfilled with respect to information aspects covered by the Directive.

When the APR should be disclosed at the advertising or a pre-contractual stage, the Directive indicates that it should be accompanied by a representative example[10], whose purpose is to make the APR and the cost of the credit more understandable to the consumer. The relevant parts of the Directive include the following:

> Recital 19: *"As the annual percentage rate of charge can at this stage be indicated only through an example, such example should be representative. Therefore, it should correspond, for instance, to the average duration and total amount of credit granted for the type of credit agreement under consideration and, if applicable, to the goods purchased. When determining the representative example, the frequency of certain types of credit agreement in a specific market should also be taken into account […]".*
>
> Article 4(2): *"The standard information shall specify in a clear, concise and prominent way by means of representative example: […]"*
>
> Article 5(1)(g): *"[…] the annual percentage rate of charge and the total amount payable by the consumer, illustrated by means of a representative example*

[10] The reference to the representative example as a means to illustrate the APR has a long history, as it was introduced in advertising in Directive 87/102/EEC. As stated in Article 3: "*any advertisement, or any offer which is displayed at business premises, in which a person offers credit or offers to arrange a credit agreement and in which a rate of interest or any figures relating to the cost of the credit are indicated, shall also include a statement of the annual percentage rate of charge, by means of a representative example if no other means is practicable*".

> *mentioning all the assumptions used in order to calculate that rate; where the consumer has informed the creditor of one or more components of his preferred credit, such as the duration of the credit agreement and the total amount of credit, the creditor shall take those components into account […]".*

It should be noted that throughout the Directive all references are made to the representative example (including the representative APR) in the singular and not representative examples in plural[11]. This reflects the fact that, for a given credit, the representative example at each stage of the credit agreement is unique.

The Directive defines the representative example in advertising in broad terms, only requiring that the example must be representative of the type of credit under consideration.

In any case, as clarified in the Guidelines on the application of Directive 2008/48/EC, if it is a question of reflecting market conditions in general or trying to reflect the exact characteristics of the credit to be obtained by the consumer from the creditor, a specific consumer credit should be chosen rather than the general market. Otherwise, there might be significant differences between the information advertised and the information provided to the consumer at the pre-contractual stage and when the agreement is concluded. The risk of this happening is higher with regard to credits targeted at groups of consumers who are particularly vulnerable or with regard to low value or short term credits.

Therefore, in general, the creditor should determine the content of the representative example on the basis of reasonable expectations regarding the offer. At this stage the provisions of the Directive on Unfair Commercial Practices (Directive 2005/29/EC, or "UCPD") complement the provisions of Directive 2008/48/EC: as part of the commercial communication of the creditor, the representative example should display clear and truthful information on the cost of the credit and, even if the information provided is factually correct, its overall presentation should not be likely to deceive the consumer and cause him to take a decision that he would not have taken otherwise (Article 6(1) of the UCPD).

In cases where an element of the credit varies significantly and such a variation has a significant effect on the APR it may be appropriate to make use of the assumptions for the calculation of the APR in Annex I of the Directive (as amended by Directive 2011/90/EU) in order to determine the specific value of such an element. An example of such a situation is where the amount of credit can vary considerably and there are costs which are independent

[11] Article 6(1)(f), in reference to pre-contractual information for credit agreements under the light regime of Article 2 points 3, 5 and 6, states that the APR is illustrated by means of “representative examples”. To determine whether this plural form is allowing more than one representative example in the case of the specific agreements covered by Article 6 or it simply refers to the different types of contracts covered by Article 6, the objective of the Directive and its motivation provided in the recitals should be taken into account. Recital 19, in particular, refers to the "representative example" in singular and underlines the need to insure the comparability of different offers. This comparability would be very difficult to achieve in case of several representative examples. Therefore, the plural should be interpreted in the context of the different types of agreement regulated by Article 6.

from the amount of the credit. This should be read in conjunction with Article 7 of the UCPD concerning misleading omissions. In this context, Article 7(4) of the UCPD states that the price of the product or service offered should be indicated, or when the price cannot be reasonably calculated in advance, the manner in which the price is calculated is material information that needs to be communicated to the consumer in a clear, timely and unambiguous manner in invitations to purchase.

Other examples are agreements for credit cards and other revolving credit agreements. At the advertising stage, it may be appropriate for the representative example and the APR to be calculated on the basis of a €1500 credit limit, in accordance with assumption (h) of Annex I, on the grounds that this is representative of such agreements. However, if the advertiser knows that this is an unlikely scenario, e.g. because the creditor does not lend above a certain lower threshold, a lower amount should be considered instead.

In the case of personal loans and other fixed-sum credit agreements, it may be preferable for each creditor to base the representative example on an amount of credit which is representative of that creditor's own product range and expected customer base, as these may vary considerably among creditors. In order not to be misleading in the sense of Article 6(1) of the UCPD, the display of information, even if factually correct, should not deceive the consumer in relation to the price of the credits compared in a way that might cause him to take a transactional decision that he would not have taken otherwise.

At the pre-contractual stage, these difficulties are likely to be fewer, since at this stage the Directive requires adaptation of the representative example to the preferences and information (if any) provided by the consumer. Finally, at the contractual stage, no representative example exists because the APR refers to the specific credit agreement concluded by the consumer, and the unknown elements of the credit, if any, will be determined by the relevant assumptions.

TABLE 1. EXCLUSIONS FROM THE SCOPE AND SPECIAL CASES

Directive 87/102/EEC, consolidated version (Article 2)	Commission proposal of 2002 (Article 3(2))	Directive 2008/48/EC (Article 2)
(1)(b) hiring agreements except where these provide that the title will pass ultimately to the hirer;	(b) hiring agreements which exclude the passing of the title to the hirer or to persons entitled by him;	(2)(d) hiring or leasing agreements where an obligation to purchase the object of the agreement is not laid down either by the agreement itself or by any separate agreement; such an obligation shall be deemed to exist if it is so decided unilaterally by the creditor;
	(e) credit agreements concluded with investment firms within the meaning of Article 1 (2) of Council Directive 93/22/EEC41 for the purposes of allowing an investor to carry out a transaction relating to one or more of the instruments listed in Section B of the Annex to that directive, where the firm granting the credit is involved in such transaction	(2)(h) credit agreements which are concluded with investment firms as defined in Article 4 (1) of Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments ([1]) or with credit institutions as defined in Article 4 of Directive 2006/48/EC for the purposes of allowing an investor to carry out a transaction relating to one or more of the instruments listed in Section C of Annex I to Directive 2004/39/EC, where the investment firm or credit institution granting the credit is involved in such transaction;
(1)(a) credit agreements or agreements promising to grant credit: - intended primarily for the purpose of acquiring or retaining property rights in land or in an existing or projected building, - intended for the purpose of renovating or improving a building as such	(a) credit agreements the aim of which is to grant credit for the purchase or transformation of private immovable property that the consumer owns or is seeking to acquire and which are secured either by a mortgage on immovable property or by a surety commonly used in a Member State for this purpose;	(2)(a) credit agreements which are secured either by a mortgage or by another comparable security commonly used in a Member State on immovable property or secured by a right related to immovable property; (2)(b) credit agreements the purpose of which is to acquire or retain property rights in land or in an existing or projected building;
(1)(f) credit agreements involving amounts less than 200 ECU or more than 20 000 ECU;	—	(2)(c) credit agreements involving a total amount of credit less than EUR 200 or more than EUR 75 000;

Directive 87/102/EEC, consolidated version (Article 2)	Commission proposal of 2002 (Article 3(2))	Directive 2008/48/EC (Article 2)
(1)(g) credit agreements under which the consumer is required to repay the credit: - either, within a period not exceeding three months, - or, by a maximum number of four payments within a period not exceeding 12 months. (1)(c) credit granted or made available without payment of interest or any other charge; (1)(d) credit agreements under which no interest is charged provided the consumer agrees to repay the credit in a single payment;	(c) credit agreements under the terms of which the consumer is required to repay the credit in a single payment within a period not exceeding three months, without the payment of interest or any other charges;	(2)(e) credit agreements in the form of an overdraft facility and where the credit has to be repaid within one month; (2)(f) credit agreements where the credit is granted free of interest and without any other charges… … and credit agreements under the terms of which the credit has to be repaid within three months and only insignificant charges are payable; (2)(j) credit agreements which relate to the deferred payment, free of charge, of an existing debt;
(1)(e) credit in the form of advances on a current account granted by a credit institution or financial institution other than on credit card accounts. Nevertheless, the provisions of Article 6 *(information before agreement, including APR)* shall apply to such credits;		(3) In the case of credit agreements in the form of an overdraft facility and where the credit has to be repaid on demand or within three months, only Articles 1 to 3, Article 4 (1), Article 4 (2) (a) to (c), Article 4 (4), Articles 6 to 9, Article 10 (1), Article 10 (4), Article 10 (5), Articles 12, 15, 17 and Articles 19 to 32 shall apply. (4) In the case of credit agreements in the form of overrunning, only Articles 1 to 3, 18, 20 and 22 to 32 shall apply.

Directive 87/102/EEC, consolidated version (Article 2)	Commission proposal of 2002 (Article 3(2))	Directive 2008/48/EC (Article 2)
(2) A Member State may, in consultation with the Commission, exempt from the application of this Directive certain types of credit which fulfil the following conditions: - they are granted at rates of charge below those prevailing in the market, and - they are not offered to the public generally.	(d) credit agreements which meet the following conditions: i) they are granted by the creditor as a secondary activity, i.e. outside the sphere of his principal commercial or professional activity, ii) they are granted at annual percentage rates of charge lower than those prevailing on the market, iii) they are not offered to the public generally;	(2)(l) credit agreements which relate to loans granted to a restricted public under a statutory provision with a general interest purpose, and at lower interest rates than those prevailing on the market or free of interest or on other terms which are more favourable to the consumer than those prevailing on the market and at interest rates not higher than those prevailing on the market. (2)(g) credit agreements where the credit is granted by an employer to his employees as a secondary activity free of interest or at annual percentage rates of charge lower than those prevailing on the market and which are not offered to the public generally; (5) Member States may determine that only Articles 1 to 4, 6, 7 and 9, Article 10 (1), points (a) to (h) and (l) of Article 10 (2), Article 10 (4) and Articles 11, 13 and 16 to 32 shall apply to credit agreements which are concluded by an organisation which: (a) is established for the mutual benefit of its members; (b) does not make profits for any other person than its members; (c) fulfils a social purpose required by domestic legislation; (d) receives and manages the savings of, and provides sources of credit to, its members only; and (e) provides credit on the basis of an annual percentage rate of charge which is lower than that prevailing on the market or subject to a ceiling laid down by national law, and whose membership is restricted to persons residing or employed in a particular location or employees and retired employees of a particular employer, or to persons meeting

Directive 87/102/EEC, consolidated version (Article 2)	Commission proposal of 2002 (Article 3(2))	Directive 2008/48/EC (Article 2)
		other qualifications laid down under national law as the basis for the existence of a common bond between the members. Member States may exempt from the application of this Directive credit agreements concluded by such an organisation where the total value of all existing credit agreements entered into by the organisation is insignificant in relation to the total value of all existing credit agreements in the Member State in which the organisation is based and the total value of all existing credit agreements entered into by all such organisations in the Member State is less than 1 % of the total value of all existing credit agreements entered into in that Member State. Member States shall each year review whether the conditions for the application of any such exemption continue to exist and shall take action to withdraw the exemption where they consider that the conditions are no longer met. (6) Member States may determine that only Articles 1 to 4, 6, 7, 9, Article 10 (1), points (a) to (i), (l) and (r) of Article 10 (2), Article 10 (4), Articles 11, 13, 16 and Articles 18 to 32 shall apply to credit agreements which provide for arrangements to be agreed by the creditor and the consumer in respect of deferred payment or repayment methods, where the consumer is already in default on the initial credit agreement and where: (a) such arrangements would be likely to avert the possibility of legal proceedings concerning such default; and (b) the consumer would not thereby be subject to terms less favourable than those laid down in the initial credit agreement. However, if the credit agreement falls within the scope of paragraph 3, only the provisions of that paragraph shall apply.

Directive 87/102/EEC, consolidated version (Article 2)	Commission proposal of 2002 (Article 3(2))	Directive 2008/48/EC (Article 2)
		(2)(i) credit agreements which are the outcome of a settlement reached in court or before another statutory authority;
		(2)(k) credit agreements upon the conclusion of which the consumer is requested to deposit an item as security in the creditor's safe-keeping and where the liability of the consumer is strictly limited to that pledged item;

1.3. THE COST ELEMENTS TO BE INCLUDED IN THE APR

As stated above, in consumer credit regulation the requirements of information focus particularly on the total cost of credit to the consumer and its expression by means of the APR. The goal is to allow consumers to be informed and aware of any cost element that in practice will burden household income in the future as a result of the conclusion of a credit agreement.

These costs include interest charges, which are the most obvious but not the only cost of a credit. Fees, commissions and non-interest charges paid to the creditor or other parties in relation to the credit or payments on linked cross-selling products such as insurance or current accounts, among others, are also a part of the total cost of credit to consumers. This is in fact why the APR is never defined as an interest rate, but as a rate of charge.

When the APR is intended to be an element of comparison of different consumer credits in order to promote cross-border agreements and competition inside a single European market, it is evident that both the method and assumptions for calculating the APR and the cost elements to be included in the APR, should be defined in an identical manner throughout the Community.

Both tasks are faced with difficulties, but of a different nature. While the method and assumptions for calculating the APR rest mainly on mathematical arguments, which one may agree with or not, in the determination of the costs to be included in the TCC and the APR mathematics play no role, the discussion is in economic and legal terms and hence, it is more diffuse and open to different arguments and interests to a larger extent. This can be confirmed by the fact that the APR formula has remained the same since its introduction by Directive 90/88/EEC. However, the provisions related to costs have changed significantly every time they have been reassessed.

These changes are mainly due to financial innovation and banking practices and the difficulties found in the application of the regulation by the MS and industry.

It has always been the intention that any cost element the consumer is required to pay for the credit should be included in the TCC. The nature of those costs (interest, fees, commissions, taxes or charges of any nature) does not matter nor whether the costs are payable to the creditor, to a credit intermediary, to the authority responsible for levying taxes or to any other third party authorized to claim payments for services in connection with the credit agreement[12].

Directive 87/102/EEC first defined the TCC as

[12] In the view of Directive 2008/48/EC, only notary costs should be excluded and costs for ancillary services not covered by Article 3 (g, second half).

> "*all the costs of the credit including interest and other charges directly connected with the credit agreement, determined in accordance with the provisions or practices existing in, or to be established by, the Member States*" [Article 1 (d)],

It allowed an ample leeway for MS in the determination of the elements of the TCC. This margin of freedom of MS was eliminated by Directive 90/88/EEC. This Directive substituted the previous definition by the following:

> "'*total cost of the credit to the consumer' means all the costs, including interest and other charges, which the consumer has to pay for the credit*"

It also introduced a list of costs to exclude from the TCC for the purpose of calculating the APR[13] in Article 1a (2)[14]. These exemptions are shown in Table 3, together with the provisions of the Commission proposal of 2002 and Directive 2008/48/EC.

In general, the list of exemptions in Article 1a (2) of Directive 90/88/EEC excluded from the TCC for the calculation of the APR the costs payable by the consumer for non-compliance, charges other than the purchase price to be paid also when the purchase is made in cash, charges for the transfer of funds and account maintenance unless the consumer has a reasonable freedom of choice and charges are abnormally high, charges for insurance or guarantees except if they are designed to ensure payment to the creditor, in the event of the death, invalidity, illness or unemployment of the consumer and are mandatory, and membership subscriptions to associations arising from agreements separate from the credit agreement.

This list proved to be a source of difficulties, mainly because it not only regulates exemptions, but also "exemptions of exemptions". That is, the list of exceptions is both a negative and a double-negative (positive) list in so far as exemptions of the exemptions were also regulated either explicitly, as in the case of insurance, or implicitly by a series of 'if' and 'and' clauses for other cases. Difficulties were also reported in assessing the 'obligatory' nature of some costs.

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[13] Note that although the TCC is defined in broad terms in the previous definitions, for the calculation of the APR the TCC should be quantified. This quantification should be made ex-ante, that is, before the borrower uses the credit. It is for this reason that, for the calculation of the APR, the TCC should be calculated on the basis of the representative example upon which the APR is based (at advertising and the pre-contractual stage) or the agreement concluded with the consumer (at the contractual stage) together with the assumptions used for the calculation of the APR. The distinction between the (wide) definition of the TCC and its quantification for the calculation of the APR is relevant. For example, assumption (c) of Annex I of Directive 2011/90/EU implies using the highest charges corresponding to the most common drawdown mechanism for the calculation of the APR; however, the costs corresponding to other mechanisms are also elements of the TCC and as such they should be disclosed to the consumer for him to take an informed credit decision.

[14] Directive 90/88/EEC also allowed MS to exclude from the calculation of the APR those costs not included in the calculation of maximum limits to the APR in national legislation in MS with laws in force on 2 March 1990 as long as the Council did not decide to impose the formula for APR. Since the APR was imposed by Directive 98/7/EC, this allowance was transitory.

This 'obligation' is the first requisite to include a cost as indicated by the definition of the TCC, which uses the expression '*the consumer has to pay for the credit*'.

As a result, some MS introduced regulations about the 'obligatory' nature of insurance and guarantees specially, while some did not transpose some of the costs excluded or included according to the Directive to their national laws. As reported in the study presented by Reifner in 1998, which aimed to inform the Commission about the harmonisation of the cost elements of the APR (p. 62):

> *"There is a wide variety of regulation concerning special cost elements. The overall effect is that the four exemptions (insurance, membership, bank account, default) of the Directive lead to a de facto situation that none of these fees are included in the APR calculation anywhere in the Member States.*
>
> *If the Directive is seen simply as a harmonisation Directive to provide consumers with equal information in all Member States, it seems to have worked sufficiently well because the minimum requirements of disclosure are standard in all countries.*
>
> *If the purpose of the Directive is to further consumer protection in the sense that the consumer gets a true and fair view of the cost connected with a specific consumer credit supply, it falls short. "*

This study reports that only interest, administration fees, commissions and brokers' fees had always been included in the APR (and observed by industry) since they concerned services directly connected to the credit. However, the remaining cost elements, meaning insurance charges (irrespective of the purpose of the insurance or its mandatory nature), fees for bank accounts and cards, and notary fees were not included in practice. This meant that in practice up to 30% of standard costs that a consumer paid in a consumer credit agreement were not represented in the APR.

The most striking case was insurance because as reported by the study, insurance premiums could make up a quarter of the credit costs in some cases. This can be seen in Table 2, which reproduces table 7 from Reifner's study, incorporated here because of its interest. For each cost element, the first column, when highlighted, indicates that the costs are paid at the beginning of the credit, thus reducing the amount of the credit left at the consumer's disposal. The second column, when highlighted, indicates that, in contrast, the costs are financed and thus are added to the amount owed, which implies that these cost generate additional interest charges. The third column shows to what extent the fee or cost has to be delivered to a party other than the creditor (stronger highlighting indicates that a greater part goes to third parties). The last column, when highlighted, gives a rough estimation of whether a cost element was typically included in the APR calculation and the portion of the total cost of the credit it may amount to.

TABLE 2. OVERVIEW OF COST ELEMENTS IN REIFNER'S STUDY

Fees for	Up-front	Financed	Third Party	Incl. in APR
Setting-up and administrative costs			_	2%
Broker				5%
Guarantees				1%
Authentication before notary				0.2%
Life insurance				->20%
Disablement Insurance				->20%
Unemployment Insurance				->30%
Risk Insurance for Loss, Theft of Securing Goods				1%
Credit Life Insurance				->30%
Stamp duty				0.1%
Overdraft charges				4%
Continuing line of credit				0.1%
Authorisation of credit				1%
Confirmation				0.5%
Providing an account statement				0.5%
Endorsements				
Bank account				0.5%
Membership for risk groups				1%
Credit cards				0.4%
Transmission of funds				0.1%
Not using the credit				0.25%
Waiting				0.25%
Early repayment/cancellation				20%
Service charges				1%

Source: Reifner, U. (1998): Harmonisation of Cost Elements of the Annual Percentage Rate of Charge, Hamburg, project AO-2600/97/000169.

In these circumstances, it was evident that a profound revision of the cost elements was needed. Since Directive 98/7/EC did not introduce any change in the TCC, this task was left for Directive 2008/48/EC.

The determination of the TCC and the costs to include in the APR was in fact a central issue in the consultation and negotiations that culminated in Directive 2008/48/EC. The positions of consumer organizations and the industry were opposite to each other: while consumer

representatives supported a wide definition of the TCC including all the costs that the consumer has to pay in connection with the credit (even notary costs and taxes), industry representatives defended a narrow definition which only includes the costs levied by the creditor for its own benefit[15]. Industry argued that only a narrow definition allows comparisons because different cost elements might be included in the national definitions and the creditors' knowledge of these costs might vary from creditor to creditor, which would imply that the APR would be neither harmonised nor valid for comparisons.[16]

Guided by the goal of consumer protection, and in line with the previous Directives, the Commission opted for a broad definition by defining the TCC in its proposal of 2002 in the following terms:

> "*total cost of credit to the consumer" means all the costs, including borrowing interest, indemnities, commissions, taxes and any other kind of charge which the consumer has to pay for the credit*" [Article 2 (g)]

As can be seen, there is no change in contents with respect to the definition of the TCC in 1990. The definition was only amended in order to clarify the cost to be included by replacing 'interest and other charges' by 'borrowing interest, indemnities, commissions, taxes and other kind of charge'. In fact, this list cannot be interpreted as a positive and exhaustive list of all cost elements.

In the legislative process, however, some amendments were introduced to this definition[17]. In particular, the European Parliament proposed a narrower definition of the TCC, only including costs *known to the creditor* and excluding costs payable to third persons outside the financial sphere, such as notaries and tax authorities. The Commission partly accepted the amendment but then added an explicit mention to the inclusion of the costs associated to ancillary services

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[15] The demands by industry inspired the new concepts of 'sums levied by the creditor' and 'total lending rate' in the Commission proposal of 2002. The first concept made reference to all the mandatory costs associated with the credit agreement to be paid to the creditor by the consumer, and the second to the rate representing the sums levied by the creditor expressed as an annual percentage of the total amount of credit and calculated in the same way as the APR. Both concepts were finally abandoned and do not appear in Directive 2008/48/EC.

[16] See, for example, EBIC Position Paper on Consumer Credit Directive (18-06-2004, available at: http://www.eubic.org/Position%20papers/EBIC%20position%20on%20CCD%2018%20Junev2.pdf), FBE Observations on the Modified Proposal for a Directive on Credit to Consumers (31-08-2006, available at: http://www.publications.parliament.uk/pa/ld200506/ldselect/ldeucom/210/210we09.htm) and, in connection with the APR for mortgage loans, the report of the Mortgage Industry and Consumers Expert Group (final, 20-12-2006, available at: http://ec.europa.eu/danmark/documents/alle_emner/okonomisk/070117_realkreditmarkeder-2.pdf).

[17] See COM(2007) 546 final - Communication from the Commission to the European Parliament in accordance with the second paragraph of Article 251 (2) of the EC Treaty on the common position adopted by the Council with a view to the adoption of a Directive of the European Parliament and of the Council on credit agreements for consumers.

related to the credit agreement (in particular, insurance premiums) if they are compulsory in order to obtain the credit or to obtain it on the advertised rate and are concluded by the consumer with or via the creditor[18]. Finally, the Council re-introduced taxes as an element of the TCC, so that only notarial costs were excluded from the TCC.

As a result, the TCC was defined in the Directive 2008/48/EC as follows:

> *"'total cost of the credit to the consumer ' means all the costs, including interest, commissions, taxes and any other kind of fees which the consumer is required to pay in connection with the credit agreement and which are known to the creditor, except for notarial costs; costs in respect of ancillary services relating to the credit agreement, in particular insurance premiums, are also included if, in addition, the conclusion of a service contract is compulsory in order to obtain the credit or to obtain it on the terms and conditions marketed."* [Article 3 (g)].

As to this definition and according to the Guidelines on the application of Directive 2008/48/EC, it should be noted that:

- The TCC comprises all the range of costs that the consumer has to pay in order to access the credit or to use it[19], which are known (or ascertainable) by the creditor[20], except for notarial costs. These include, for example, interest charges, taxes and commissions arising from the credit agreement (as opposed to a service or goods tax, for example), credit intermediation fees payable by the consumer (see Article 21(c)), administrative fees (e.g. loan preparation or examination and authorisation of the credit), membership fees, costs for providing account statements or for postage.
- The exclusion of notarial costs refers only to those costs of a notarial nature, e.g. the fees a notary receives for the establishment of a legal act such as the notarial act.
- It should also be kept in mind that all eligible costs are to be accounted for regardless of whether they are payable to the creditor or a third party or whether they give access to financial or non-financial services (e.g. membership fees). In this context, taxes connected with the credit agreement and collected by a notary (for example on

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[18] In the first amendment proposal adopted by the Commission on 28 October 2004 after the Parliament first reading, the costs of ancillary services were included in the TCC in the following terms: "*Costs relating to ancillary services relating to the credit agreement, in particular insurance premiums, are included if the service is compulsory in order to obtain the credit or the advertised rate, and is concluded with the creditor or with a third party, if the creditor, or, where applicable, the credit intermediary have concluded it on behalf of this third party or have presented the offer or the service as such to the consumer.*"

[19] This does not include dormancy or inactivity fees, which are linked to non-use of the credit. Nevertheless, these fees must be disclosed as part of pre-contractual information under Articles 5(1)(i) and 6(1)(e) and contractual information under Article 10(2)(k).

[20] Throughout the Directive there are several references to creditor's knowledge about the costs of the credit. The issue is addressed in section 3.4 of the Guidelines on the application of Directive 2008/48/EC.

behalf of the government) should therefore be included in the total cost of the credit to the extent that they are known to the creditor.

- The TCC is limited to the costs of credit, and does not include any offsetting *income or benefits*. These are not covered by Article 3(g). However, it is open to the creditor to disclose such income or benefits separately, subject to this not being misleading to the consumer.

- As for ancillary services, it should be noted that:

  - Ancillary services refer to services which are auxiliary or supplementary to the credit agreement, sometimes offered in the form of cross-selling products. Examples of these services include the opening of any kind of account, insurance contracts, concierge services or loyalty programs. Insurance contracts could include credit insurance, payment protection insurance, travel insurance, purchase insurance, motor insurance or other types of insurance[21], sureties or guarantees[22]. Also another type of ancillary service is an agreement that provides that capital constituted from payments made by the consumer would not result in an immediate corresponding amortisation of the amount of credit. This list is not exhaustive, because the Directive does not limit the types of ancillary services.

  - Given that these ancillary services could be maintained for longer periods than the duration of the credit, their costs are included even if they are incurred after the repayment date of the credit, should the terms of the commitment described in the credit agreement oblige the consumer to maintain the services for such a longer period. If, on the contrary, the commitment to maintain these services finishes when the credit is repaid, only the costs due during the course of the credit agreement shall be included in the total cost of credit, together with any costs for withdrawing from the ancillary service at the termination of the credit agreement, if these costs exist and are known to the creditor. In the case where the duration of the ancillary service is shorter than the duration of the credit, the costs for this shorter period shall be taken into account.

  - Article 3(g) introduces two situations which determine whether the cost of ancillary services should be included in the TCC. The existence of either of these two situations implies the inclusion of these costs:

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[21] Under Directive 2008/48/EC, the inclusion of insurance costs is mandated irrespective of the purpose of the insurance. This is different from Directive 90/88/EEC, which excluded from the TCC charges for insurance, or for guarantees not designed to ensure payment to the creditor in the event of death, invalidity, illness or unemployment.

[22] As stated in section 1.2, according to Article 2(2)(k) "*credit agreements upon the conclusion of which the consumer is requested to deposit an item as security in the creditor's safe-keeping and where the liability of the consumer is strictly limited to that pledged item*" are excluded from the scope of the Directive.

- o if the ancillary service is mandatory to obtain the credit or,
- o if the ancillary service is mandatory to obtain the credit on the terms and conditions marketed. The service could be necessary, for example, to obtain the marketed borrowing rate, charges or duration of the credit.

These apply even if the ancillary services that are required to obtain the credit agreement or the terms and conditions marketed do not relate directly to it or are not financial in nature.

- Ancillary services can be considered as not mandatory where[23]:
  - o the consumer is informed and can choose at any time during the credit agreement between products offered by the creditor including being able to keep the same credit facility but without any ancillary services (bundling),
  - o the consumer can withdraw from the ancillary services at any time and stop paying their costs without this withdrawal having any cost or any other effect on the terms of the credit.

Also to be highlighted from the definition of the TCC is the substitution of the expression '*the consumer has to pay for the credit*' in Directive 98/7/EC and the Commission proposal of 2002 by the expression ' *the consumer is required to pay in connection with the credit*', which is more general and hence should avoid inappropriate exclusions to a large extent.

As to the costs to include or exclude[24] from the TCC for the purpose of calculating the APR:

- As shown in the second and third row of Table 3, charges for early payment, non compliance or similar charges (e.g. late payment charges in the form of interest or penalties, charges for exceeding the credit limit, charges for returned payments, charges for collection of unpaid debts, charges for calls to pay amounts due or to fulfil other obligations, etc.) have never been included in the APR, since it is assumed that the creditor and the consumer will comply with the terms of the agreements and the credit will be valid for the period initially agreed.
- As shown in the third row of the table, charges other than the purchase price which, for purchases of goods or services, the consumer is obliged to pay whether the transaction is executed in cash or on credit, meaning that these are costs not paid in connection with the credit agreement (e.g. vehicle registration in the consumer's name for administrative records in the case of a loan to purchase a car).

[23] Nevertheless, if contracted as a result of the credit agreement, creditors should disclose the costs referred to in Articles 5(1)(i),6(1)(e) and Article 10(2)(k), unless these services are contracted separately from the credit agreement.

[24] Some of the charges excluded may nevertheless be required to be disclosed to the consumer in pre-contractual information under Articles 5(1) and 6, and contractual information under Article 10.

- The fourth row refers to the costs of a linked account and the expenses or fees for such an account. In this regard, according to the clarification provided in the Guidelines on the application of Directive 2008/48/EC:

  - Second paragraph of Article 19(2) implies that the TCC will include the costs of maintaining an account recording both payment transactions and drawdowns[25] (including credit or debit accounts). Costs incurred for using a particular means of payment for payment transactions or drawdowns (e.g. cheques or cards) on that account are also included. In addition, any other costs relating to payment transactions on the account (e.g. fees for recording transactions, for the transfer of funds or for arranging a direct debit in connection with the credit) are also included. However if the opening of the account is optional and its costs "*have been clearly and separately shown in the credit agreement or in any other agreement concluded with the consumer*", such costs can be excluded from the TCC. This means that even if the opening of the account is optional, should the consumer is not able to know the costs of the account because they have not been shown clearly or separately, then such costs should be **included** in the total cost of credit[26]. This requirement aims to prevent that creditors would hide costs and it encourages them to provide clear and complete information about their products.

  - It should also be noted that although the wording of Article 19(2) seems to imply that only the costs of new accounts may be excluded from the calculation of the total cost of credit (under certain circumstances specified in Article 19(2)), the cost of a pre-existing account can also be excluded from the calculation of the TCC, provided that maintaining such account is not a condition to obtain the credit or to obtain it according to the terms and conditions marketed. This is because under these circumstances the pre-existing account is neither a mandatory ancillary service nor its costs are costs "*which the consumer is required to pay in connection with the credit agreement*". Accordingly, its costs are not included in the TCC as defined in Article 3(g).

  - Finally, it is worth mentioning that under Directive 2008/48/EC this type of costs is more likely to be included in the TCC than in Directive 87/102/EEC and the Commission proposal of 2002. The latter allowed the exclusion of agreed costs which could be identified by the consumer (the costs have been clearly and separately shown), and Directive 87/102/EEC allowed required costs to be excluded when their amount were not abnormally high.

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[25] The payment transactions and drawdowns mentioned in this paragraph should be understood as those related to the credit.

[26] Note that the conditions in Article 19(2), second paragraph, imply that the costs relating to payment transactions can be excluded only if the account to which they are linked is also excluded on the basis that it meets the two conditions of optional opening and clear and separate presentation of costs.

- The next rows in Table 3 refer to provisions in Directive 87/102/EEC and the Commission proposal of 2002 which do not have a specific translation in Directive 2008/48/EC because they correspond to costs already regulated in other provisions. The most striking case is that of insurance and guarantees. The significant change in the treatment of these costs as we move from Directive 87/102/EEC to the Commission proposal of 2002 clearly reveals the limited success of Directive 87/102/EEC to include in the APR the charges for insurance and guarantees imposed by the creditor and aimed to ensure the payment of the credit and its charges in the event of the death, invalidity, illness or unemployment of the consumer. The Commission proposal of 2002 opted for a very broad solution, with inclusion in the TCC of the cost of any type of insurance (regardless of its objective) provided that it is taken out when the credit agreement is concluded. Under Directive 2008/48/EC, insurance and guarantees are treated as ancillary services, and hence the inclusion of their costs depends on the compulsory nature of the service, as stated in the definition of the TCC in Article 3. In relation to insurance and guarantees, it is worth mentioning that it could be expected that those costs whose existence cannot be known in advance will not be included in the TCC. For example, if the consumer concludes an agreement for the maintenance of a good purchased by credit, according to which a charge has to be paid if the good deteriorates, this charge will not be included in the TCC, given that it is not possible to know if the good will deteriorate nor when this event will occur.

TABLE 3. ELEMENTS OF THE TOTAL COST OF THE CREDIT

Directive 87/102/EEC, consolidated version	Commission proposal of 2002	Directive 2008/48/EC
1987 Definition of TCC (Art. 1 (d)): 'total cost of the credit to the consumer' means all the costs of the credit including interest and other charges directly connected with the credit agreement, determined in accordance with the provisions or practices existing in, or to be established by, the Member States. **From 1990: Definition of TCC** (Art. 1 (d)): "total cost of the credit to the consumer" means all the costs, including interest and other charges, which the consumer has to pay for the credit.';	**Definition of TCC** (Art. 2 (g)): "total cost of credit to the consumer" means all the costs, including borrowing interest, indemnities, commissions, taxes and any other kind of charge which the consumer has to pay for the credit;	**Definition of TCC** (Art. 3 (g)): 'total cost of the credit to the consumer ' means all the costs, including interest, commissions, taxes and any other kind of fees which the consumer is required to pay in connection with the credit agreement and which are known to the creditor, except for notarial costs; costs in respect of ancillary services relating to the credit agreement, in particular insurance premiums, are also included if, in addition, the conclusion of a service contract is compulsory in order to obtain the credit or to obtain it on the terms and conditions marketed;
From 1990*:* Art. 1a (4) (b) The calculation shall be made on the assumption that the credit contract is valid for the period agreed and that the creditor and the consumer fulfil their obligations under the terms and by the dates agreed.	Art. 12 (3). The calculation of the annual percentage rate of charge shall be based on the assumption that the credit contract will remain valid for the period agreed and the creditor and the consumer will fulfil their obligations under the terms and by the dates agreed	Art. 19 (3). The calculation of the annual percentage rate of charge shall be based on the assumption that the credit agreement is to remain valid for the period agreed and that the creditor and the consumer will fulfil their obligations under the terms and by the dates specified in the credit agreement.
From 1990: Exclusions from the TCC for the purpose of calculating the APR (Art. 1a (2)): **Exclusion Art. 1a (2)** (i) charges payable by the borrower for non-compliance with any of his commitments laid down in the credit agreement; **Exclusion Art. 1a (2)** (ii) charges other than the purchase price which, in purchases of goods or services, the consumer is obliged to pay whether the transaction is paid in cash or by credit;	Art. 12 (2) (first paragraph): For the purpose of calculating the annual percentage rate of charge, the total cost of the credit to the consumer shall be determined, with the exception of charges payable by the consumer for non-compliance with any of his commitments laid down in the credit agreement and charges other than the purchase price which, for purchases of goods or services, he is obliged to pay whether the transaction is paid in cash or on credit.	Art. 19 (2) (first paragraph): For the purpose of calculating the annual percentage rate of charge, the total cost of the credit to the consumer shall be determined, with the exception of any charges payable by the consumer for non-compliance with any of his commitments laid down in the credit agreement and charges other than the purchase price which, for purchases of goods or services, he is obliged to pay whether the transaction is effected in cash or on credit.

Directive 87/102/EEC, consolidated version	Commission proposal of 2002	Directive 2008/48/EC
From 1990: Exclusions from the TCC for the purpose of calculating the APR (Art. 1a (2)): **Exclusion Art. 1a (2)** (iii) charges for the transfer of funds and charges for keeping an account intended to receive payments towards the reimbursement of the credit the payment of interest and other charges except where the consumer does not have reasonable freedom of choice in the matter and where such charges are abnormally high; this provision shall not, however, apply to charges for collection of such reimbursements or payments, whether made in cash or otherwise;	Art. 12 (2) (second paragraph): The costs of maintaining an account recording both payment transactions and credit transactions, the costs of using a card or another means of payment for both payment transactions and drawdowns, and the costs relating to payment transactions in general shall be regarded as credit costs unless they have been clearly and separately shown in the credit agreement or in any other agreement concluded with the consumer.	Art. 19 (2) (second paragraph): The costs of maintaining an account recording both payment transactions and drawdowns, the costs of using a means of payment for both payment transactions and drawdowns, and other costs relating to payment transactions shall be included in the total cost of credit to the consumer unless the opening of the account is optional and the costs of the account have been clearly and separately shown in the credit agreement or in any other agreement concluded with the consumer.
From 1990: Exclusions from the TCC for the purpose of calculating the APR (Art. 1a (2)): **Exclusion Art. 1a (2)** (v) charges for insurance or guarantees; INCLUDED are, however, those designed to ensure payment to the creditor, in the event of the death, invalidity, illness or unemployment of the consumer, of a sum equal to or less than the total amount of the credit together with relevant interest and other charges which have to be imposed by the creditor as a condition for credit being granted.	Art. 12 (2) (third paragraph): Costs relating to insurance premiums shall be included in the total cost of the credit if the insurance is taken out when the credit agreement is concluded.	
From 1990: Exclusions from the TCC for the purpose of calculating the APR (Art. 1a (2)): **Exclusion Art. 1a (2)** (iv) membership subscriptions to associations or groups and arising from agreements separate from the credit agreement, even though such subscriptions have an effect on the credit terms;		

1.4. THE CALCULATION OF THE APR

The APR is a numerical and comparable representation of the cost of the credit to the consumer. It has been always presented in the Community regulation of consumer credit agreements as an essential element of comparison and transparency in credit products. In particular, as shown in Table 4, from 1987 the successive Directives have coincided in defining the APR as the "*total cost of the credit to the consumer expressed as an annual percentage of the amount of the credit granted*".

This definition, however, is quite general, and does not establish a method for calculating the APR. In fact, three elements are required for a proper calculation of the APR: (i) a formula which establish the precise relationships among the different elements to take into account, (ii) the necessary explanatory remarks about the formula to avoid ambiguities, and (iii) a set of assumptions aimed at quantifying the elements involved in the formula if they are not known, given that the only unknown variable should be the APR.

As indicated at the beginning of the chapter, it was Directive 90/88/EEC which first introduced a method consisting of a mathematical formula with some remarks and a series of assumptions aimed at determining unknown elements. Later, in 1998 the application of the method was imposed throughout the Community, the remark regarding the measuring of time was expanded and a new remark about the rounding of the APR was introduced. Finally, Directive 2008/48/EC introduced changes in both the remarks and assumptions, and the assumptions were later amended by Directive 2011/90/EU.

In this section we analyze the formula, remarks and assumptions for the calculation of the APR, so finishing our study on the APR in the EU legal framework with the most technical part of the Directive. Compared to previous sections, the analysis carried out here is more detailed in order to accomplish one of the objectives of the study, namely providing the Commission with technical and scientific elements regarding the calculation of the APR. We first deal with the formula, then the remarks, and finally the assumptions.

FORMULA

Directive 90/88/EEC introduced a formula and gave a congruent mathematical definition of the APR. As can be seen in Table 4, the mathematical definition has gained in clarity through the different Directives and the terminology has changed to reflect the terms used in the Directive, but the concept, and also the formula, remains unchanged.

In particular, according to Directive 2008/48/EC, Article 19 (1), the APR is defined as the annual rate of charge which equates, on an annual basis, the present value of all commitments (drawdowns, repayments of the credit and charges), future or existing, agreed by the creditor and the consumer.

Part I of Annex I states the basic equation expressing this equivalence, placing the total present value of drawdowns on the one hand and the total present value of repayments and payments of charges on the other hand as follows:

$$\sum_{k=1}^{m} C_k (1+X)^{-t_k} = \sum_{l=1}^{m'} D_l (1+X)^{-s_l}$$

where:

- X is the APR,
- m is the number of the last drawdown,
- k is the number of a drawdown, thus $1 \leq k \leq m$,
- C_k is the amount of drawdown k,
- t_k is the interval, expressed in years and fractions of a year, between the date of the first drawdown and the date of each subsequent drawdown, thus $t_1=0$
- m' is the number of the last repayment or payment of charges,
- l is the number of a repayment or payment of charges,
- D_l is the amount of a repayment or payment of charges,
- s_l is the interval, expressed in years and fractions of a year, between the date of the first drawdown and the date of each repayment or payment of charges.

The formula has a series of implications and entails some decisions and choices which we discuss in the following pages.

TABLE 4. THE DEFINITION OF THE APR

	Directive 87/102/EEC	Directive 90/88/EEC	Directive 98/7/EC	Commission proposal of 2002	Directive 2008/48/EC
General definition	Art. 1 (2) (e): 'Annual percentage rate of charge' means the total cost of the credit to the consumer expressed as an annual percentage of the amount of the credit granted and calculated according to existing methods of the Member States.	Art. 1 (2) (e): 'Annual percentage rate of charge' means the total cost of the credit to the consumer, expressed as an annual percentage of the amount of the credit granted and calculated in accordance with Article 1a.	Same as Directive 90/88/EEC	Art. 2 (h): 'Annual percentage rate of charge' means the total cost of the credit to the consumer expressed as an annual percentage of the total amount of credit granted.	Art. 3 (i): 'Annual percentage rate of charge' means the total cost of the credit to the consumer, expressed as an annual percentage of the total amount of credit, where applicable including the costs referred to in Article 19 (2).
Mathematical definition	–	Art. 1a (1) (a): The annual percentage rate of charge, which shall be that equivalent, on an annual basis, to the present value of all commitments (loans, repayments and charges), future or existing, agreed by the creditor and the borrower, shall be calculated in accordance with the mathematical formula set out in Annex II.	Art. 1a (1) (a): The annual percentage rate of charge which shall be that rate, on an annual basis which equalizes the present value of all commitments (loans, repayments and charges), future or existing, agreed by the creditor and the borrower, shall be calculated in accordance with the mathematical formula set out in Annex II.	Art. 12 (1): The annual percentage rate of charge, which equates, on an annual basis, the present value of all commitments (drawdowns, repayments and charges), future or existing, agreed by the creditor and the borrower, shall be calculated in accordance with the mathematical formula set out in Annex I.	Art. 19 (1): The annual percentage rate of charge, equating, on an annual basis, to the present value of all commitments (drawdowns, repayments and charges), future or existing, agreed by the creditor and the consumer, shall be calculated in accordance with the mathematical formula set out in Part I of Annex I.

CREDIT, COSTS AND TIME TOGETHER

What distinguishes the APR from other cost measures is that it puts the credit, its costs and time together, thus recognizing that these three elements are relevant in determining a comparable and uniform measure of the cost of the credit.

For example, the total cost of the credit is also a measure of costs given by the simple sum of the costs paid over the duration of the credit. Compared to it, the APR takes into account:

- the costs of the credit but not only in what refers to their amount but also to the periods at which these costs are paid, because they are relevant for determining the effort made by a borrower to afford their obligations in relation to the credit, meaning that for the borrower a sum of money payable today is more costly (represents a higher financial effort) than a similar sum payable in a month, and this is more costly than the same amount payable at a year, etc.;

- the amount of the credit, meaning that the value of the costs is set in relation to the value of the credit thus avoiding the dependence on the APR as a cost measure of the level or amount of credit, and

- the duration of the credit, meaning that the APR is given as a kind of an average periodic rate of charge which indicates the average periodic effort which the costs of the credit represent to the consumer.

These features imply that APR is able to express the cost of the credit as a standard measure which borrowers can use to compare the costs of a credit with another of different characteristics. For example, let us consider the following cases:

- A credit for an amount which is double the amount granted by another credit and with payments (repayments of the credit and payment of charges) which are also twice the amount and are due at the same moment has the same APR, meaning that credit is equally costly for the borrower for each unit of amount of the credit.

- For two agreements for the same amount of credit and payments equally distributed over time, the one with higher payments has a higher APR, revealing that it is more costly for the borrower.

- For two agreements for the same amount of credit and equal amount of payments, the one whose payments are due earlier (either because one or more payments are due earlier, higher payments are due early, the payments are started to be due earlier or the payments have to be paid more frequently) has a higher APR, revealing that it is more costly for the borrower[27].

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[27] To see this, for example consider that each payment D_l is split into two parts, one payable at time s_l and the other at mid-time between s_{l-1} and s_l, that is, at time $s_{l-1}+(s_l-s_{l-1})/2$. Given that $s_{l-1}+(s_l-s_{l-1})/2$ is lower than s_l, (1+X)^-[$s_{l-1}+(s_l-s_{l-1})/2$] is higher than (1+X)^-s_{l-1} , which implies that X, the APR, will have to be higher to restore the equality between the right and left hand of the expression.

- Two credit agreements with different durations and equal APR imply a same mean periodic effort for the borrower which translates into a higher total cost of the credit for the credit of longer duration.

Interestingly, it should be noted that although the payments to be made by the borrower have a different nature (repayment of the amount of the credit, interest charges, administrative, charges, maintenance charges, charges for drawdowns or payments, costs of ancillary services, etc) and they might be computed by the creditor using different methods and variables, this separation is meaningless for the calculation of the APR. The mathematical formula allowing the APR to be calculated as the only unknown value in the equation can be applied only once the amounts and the dates of the payments to be made by consumer and drawdowns of the credit are known or specified according to the assumptions for the calculation of the APR.

This makes it evident, for example, that the APR should not therefore be confused with the borrowing rate charged by the creditor or with the internal calculation the creditor makes in relation to calculating interest charges, for which the creditor may use different methods of calculation in accordance with applicable national law[28]. These different methods could include, for instance, the use of simple interest or compound interest, or different compound frequencies (daily, weekly, monthly, etc.). As the Directive does not regulate the method used for calculating interest charges, MS and/or creditors are able to determine the calculation method used for those charges.

The only relevant information for APR calculation is to know the amount of the repayments and charges and the time they are due. These amounts, together with the amount and the dates of drawdowns, allow the APR to be obtained from the basic equation. The calculation should be done using numerical methods which usually use successive approximations to reach the solution, because the APR appears in the denominators, raised to different powers, and hence the calculation is not straightforward.

PRESENT VALUE RULE

The basic equation makes use of the present value rule by defining the APR as that rate which equates the present value of the drawdowns of the credit made by the borrower to the present value of the payments to be made by him or her.

The present value rule is a concept widely used in business and economics because it provides a means to compare cash flows at different times on a meaningful "like for like" basis by

[28] The existence of a clear distinction between the mechanisms of calculation of the costs of the credit by creditors and the calculation of the APR is usual in the regulation of the APR. Directive 2008/48/EC recognizes this in recital 19: "*As regards the borrowing rate, the frequency of instalments and the capitalisation of interest, creditors should use their conventional method of calculation for the consumer credit concerned*". For the United States, see Truth in Lending, Comptroller's Handbook, Comptroller of the Currency Administrator of National Banks, October 2008, p. 11.

valuing them in the present. To this end, the value of any future sum is “discounted” to the present using a rate which represents the time value of money.

The equivalence, from the point of the view of the borrower, between the time value of money and the APR is quite convenient in our context because the APR represents the cost to be paid by the borrower for using the amount of money granted by the credit and hence, the APR represents the time value of that money.

Also, from a financial perspective, the APR in consumer credit products acts similarly to the internal rate of return (IRR) in financial investments. Like the IRR, the APR is a synthetic measure. It does not determine the amounts to be paid periodically (or received in the case of the IRR) but, quite differently, it gives a measure of the average cost (return) of the credit over the duration of the agreement. Interpreted in this way, it makes it evident that the consumer should compare the APR with the benefits derived from the use of the credit in terms of the utility that he or she will receive from the goods bought with the credit over the duration of the agreement.

Moreover, if the consumer, instead of consuming, invests the money obtained and the investment yields a return equal to the APR, the payments of the credit can be satisfied by the proceeds from the investment. To see this, consider a credit agreement for an amount of C which is drawdown immediately and two payments, given by D1 and D2 payable at years 1 and 2, respectively. The basic equation of the APR implies that:

$$C = \frac{D_1}{(1+APR)} + \frac{D_2}{(1+APR)^2}$$

Multiplying both sides by (1+APR), the equality still holds

$$C(1+APR) = D_1 + \frac{D_2}{(1+APR)}$$

meaning that the amount C, if it grows at a rate given by the APR, is enough to pay the amount D1 and a surplus exists, that is:

$$C(1+APR) - D_1 = \frac{D_2}{(1+APR)}$$

Now, multiplying again by (1+APR), we get that the surplus, if it grows at the rate given by the APR, coincides with the payment D2, and hence guarantee a full repayment of the credit:

$$[C(1+APR) - D_1](1+APR) = D_2$$

Therefore, the APR in credit agreements and the IRR in investments are the two sides of the same coin. The former reflects costs and the latter reflects benefits, but they are constructed on the same basis.

Interestingly, if we re-order the last expression so that drawdowns appear on one side and payments on the other, we obtain:

$$C(1+APR)^2 = D_1(1+APR) + D_2$$

This expression differs from the basic equation in that all cash-flows are valued at the end of the agreement, instead of at the beginning. Also, the previous expression

$$C(1+APR) = D_1 + \frac{D_2}{(1+APR)}$$

is making a valuation at time 1. Despite this, the APR obtained from any of the three expressions is the same, which reveals that APR is not affected by the choice of the valuing date theoretically[29].

EFFECTIVE ANNUAL RATE

The basic equation defines the APR as an effective annual rate of charge. In order to understand its implications and justify this choice, we need to explore the different type of rates, the compounding frequency and the principle of anatocism. First, we explain these concepts in the context of interest rates and later we discuss their application for the calculation of the APR.

Simple Interest, Compound Interest and a first sight to Anatocism

In a credit agreement, the borrower is granted an amount of money, known as the principal of the credit, which has to be repaid with interest. Interest can be defined in different ways which reflect how it is charged and paid.

The simplest case is that of simple interest. Simple interest refers to a situation where interest is never added to the amount owed, which implies that it is always paid as soon as it is generated. That is, if the principal of the credit is *P*, and the interest rate for each period is *i*, at the end of each period the borrower will have to pay an amount of *Pxi* for interest charges and the amount owed will remain at *P*. For example[30], if a consumer borrows €100 and interest is payable annually at an annual rate of 12%, at the end of each year the consumer will have to pay 100x0.12=€12 for interest charges and the amount owed will remain at €100. When the

[29] In the context of the Directive, the application of specific rules for measuring time intervals might, in practice, leads to differences depending on the valuation date. It is for this reason that remark (b) of Annex I states a precise valuation date, given as the date of the first drawdown of the credit.

[30] Note that in the calculations interest rates are expressed in units instead of percentages. Percentages are only a convenient form to express interest rates.

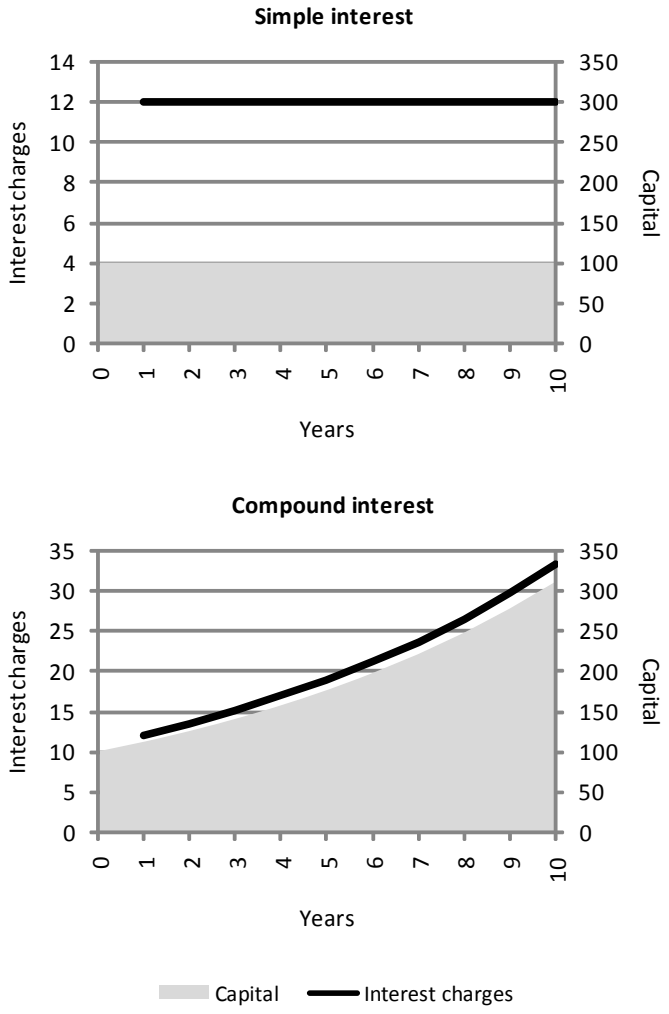
period of charge is different from the period for which the rate is defined (usually a year), simple interest uses a *proportional rule* according to which interest charges are given by the interest rate times the length of the period of charge expressed in periods of the interest rate. This can be expressed as P x i x t. For example, interest charges using an annual rate of 12% for a period of 2.5 years are Px0.12x2.5, interest charges for a period of 1 month are Px0.12x(1/12), or interest charges for a period of 20 days are Px0.12x(20/365).

Compound interest refers to the opposite situation, where interest can be added to the amount owed[31]. This means that interest is earned on interest from that moment on. That is, if instead of being paid, interest is accumulated to the principal, at the end of the first period the amount owed by the borrower will be Px(1+i), at the end of second the period it will be P x (1+i) x (1+i) = P x $(1+i)^2$, at the end of the third period P x $(1+i)^3$, and so on. For the example we would have: capital at the end of the first period = 100 x (1+0.12)=€112; capital at the end of the second period = €112 x (1+0.12)=€125.44; capital at the end of the third period = €125.44 x (1+0.12)=€140.49, and so on.

Figure 1 extends the example comparing the evolution of capital and interest charges under simple and compound interest over ten years. As before, interest is given as an annual rate of 12%. The differences between the two graphs are striking.

[31] In the list of terms of chapter 5 a comparison is done between the financial terms principal and capital and the terms in Directive 2008/48/EC.

FIGURE 1. INTEREST CHARGES AND CAPITAL UNDER SIMPLE AND COMPOUND INTEREST



Related to compound interest we have three concepts:

- Compounding, which is the act of declaring interest to be capital (i.e. interest is compounded). In simple interest there is no compounding.
- Compounding frequency, which defines how often interest is added to the capital. Usual compounding frequencies are yearly (1 year), monthly (1 month) and daily (1 day).
- Anatocism, which is the principle of charging interest on interest, thus increasing interest charges, a fact which is clearly illustrated in Figure 1.

Compounding frequencies, Nominal and Effective Interest Rates

For any compound interest rate to be completely specified it is necessary to know the level of the rate and the compounding frequency. The compounding frequency leads us to two additional concepts, the nominal rate and the effective rate.

The nominal rate is defined by a *proportional conversion method* as the periodic interest rate multiplied by the number of periods per year. For example, a 1% interest rate per month means a nominal interest rate of 1x12=12% or equivalently, a nominal rate of 12% means a periodic rate of 0.12/12=1% per month.

Nominal rates with different compounding frequencies are not comparable. For example, a nominal rate of 12% compounded annually on a capital of €100 implies a capital at the end of the year of 100x(1+0.12)=€112. The same rate, compounded monthly implies that the capital at the end of year is 100x(1+0.01)^12=€112.68. In this case the difference is not large, but it increases with the level of the rate (for example, for a nominal rate of 40% we obtain balances of 100x(1+0.4)=€140 and 100x(1+0.4/12)^12=€160.10 respectively) and the horizon (at the end of 10 years the balances are 100x(1+0.12)^10=€310.58 and 100x(1+0.01)^(10x12)=€330.04 respectively).

However, once the compounding frequency is known, interest rates may be converted to allow for comparisons. In fact, for any given interest rate and compounding frequency, an 'equivalent' rate can be obtained for a different compounding frequency, which applied on the same initial capital gives the same balance over any horizon. For example, from a nominal rate i_f compounded f times a year we can obtain the equivalent rate i_g compounded g times a year as follows (*equivalent conversion method*):

$$\left(1+\frac{i_f}{f}\right)^f = \left(1+\frac{i_g}{g}\right)^g$$

When g is 1, that is, the compound frequency is yearly, we obtain the effective interest rate. That is, the effective interest rate is an equivalent rate calculated as if compounded annually. Or, in other terms, effective interest rate is the interest rate restated from the nominal interest rate as an interest rate with annual compound interest.

Using the previous equation, if we use r to refer to the effective rate and i to the nominal rate, we obtain:

$$r = \left(1+\frac{i}{f}\right)^f - 1$$

where, as before, f is the number of compounding periods per year.

The effective rate is also known as the Effective Annual Rate (EAR) or Annual Equivalent Rate (AER), terms which make explicit the annual compounding frequency and the equivalent nature of the effective rate.

Table 5 shows effective rates obtained from different nominal rates for different compounding frequencies. For example, the effective rate obtained from a nominal rate of 10% compounded monthly is given as r=(1+0.1/12)^12-1=10.471%. As can be seen, for compounding periods of less than a year, the nominal rate is always lower than the effective rate, with the difference being higher, the higher the compounding frequency and the nominal rate.

When the compounding frequency tends to infinity it occurs that:

$$\lim_{f \to \infty} \left(1 + \frac{i}{f} \right)^f = e^i$$

where *e* is the mathematical constant *e*, or Euler's number given approximately as 2.71828. Hence, in this limiting case, the effective rate is given as[32]:

$$r = e^i - 1$$

TABLE 5. EFFECTIVE RATE VERSUS NOMINAL RATE

Nominal rate	Frequency of compounding					
	Yearly	Semi-Annual	Quarterly	Monthly	Daily	Continuous
1.000%	1.000%	1.002%	1.004%	1.005%	1.005%	1.005%
5.000%	5.000%	5.062%	5.095%	5.116%	5.127%	5.127%
10.000%	10.000%	10.250%	10.381%	10.471%	10.516%	10.517%
15.000%	15.000%	15.563%	15.865%	16.075%	16.180%	16.183%
20.000%	20.000%	21.000%	21.551%	21.939%	22.134%	22.140%
25.000%	25.000%	26.563%	27.443%	28.073%	28.392%	28.403%
30.000%	30.000%	32.250%	33.547%	34.489%	34.969%	34.986%
40.000%	40.000%	44.000%	46.410%	48.213%	49.150%	49.182%
50.000%	50.000%	56.250%	60.181%	63.209%	64.816%	64.872%

Finally, from an effective rate *r*, the periodic rate can be calculated using the equivalent conversion method as:

$$\frac{i}{f} = (1 + r)^{1/f} - 1$$

where, as before, *f* is the number of compounding periods per year.

[32] This result is frequently used in finance because the use of the mathematical constant *e* facilities calculations when integral and derivative calculus is involved.

From Interest Rates to APR and back to Anatocism

The concepts of simple, nominal and effective interest can be applied to our context in which the APR of a credit has to be calculated. The main difference is that the APR is not the borrowing rate used to compute the charges for interest or any payment of the credit but the rate which indicates the total cost of the credit (including interest, fees and other charges) to the consumer over the duration of the credit agreement, that is, the rate which reflects the periodic effort of the consumer to comply with his obligations regarding the credit.

This point is crucial in the discussion because the definition of the APR does not alter the total cost of the credit, the frequency of payments or their amounts, and it does not impose the method to determine the charges of the credit. In fact, as explained before, the APR is obtained once the payments and drawdowns are known. For example, in a credit agreement interest charges could be obtained using simple interest, but it does not preclude defining the APR as a nominal rate or an effective rate.

Hence, potentially the APR might be defined as a simple, nominal or effective rate of charge. The EU Directives, since the establishment of the mathematical formula in 1990, have always opted for an effective APR, while the US regulation requires the disclosure of a nominal APR. Voices can also be heard that ask for the use of a simple rate.

In our view, the definition of APR as an effective rate of charge is a sensible choice. We will justify this assertion by showing the problems of the other two alternatives. Our main argument is that the most informative, comparable and financially sound rate is an effective rate.

To illustrate the differences among the APR obtained using an effective rate (APRe), a nominal rate (APRn) and a simple rate (APRs), let us consider a credit agreement for a total amount of credit of €1000 repayable in 4 half-yearly instalments of €288.59. These instalments are obtained assuming a borrowing rate (defined as a nominal rate) of 12%.

Table 6 shows the amortisation table of the credit and other relevant information. The upper left corner shows the total cost of the credit (given as the sum of the payments for interest), the total amount of the credit, and the total amount payable (given as the sum of the previous two amounts or, equivalently, by the sum of the four instalments). The first column of the amortisation table shows the period in semesters (1 is the first semester, 2 is the second semester, etc). The second column shows the drawdown of the credit at the conclusion of the agreement (time 0). Next the balance at the beginning (before charging interest) and at the end (after charging interest and the payment of the instalment) of each period is shown. The next block in the table refers to the repayment of the credit: each instalment (in the column Total) comprises the repayment of interest (column interest) and the remaining amount is directed to the amortisation of part of the capital of the credit. The last block includes the cash flows, defined as drawdowns minus payments for each period. In the first column of this block (value at each period) cash flows are given by their value at each period (they are not discounted). In the next three columns the cash flows are discounted using an effective, nominal, and simple APR, respectively. In the upper cells we show the value of each APR which provides a value of zero for the sum of the discounted cash flows, as can be seen in the bottom

cells. This example illustrates the typical situation we can find: the effective APR is usually higher than the nominal APR, but lower than the simple APR.

TABLE 6. AMORTISATION TABLE AND APR USING EFFECTIVE, NOMINAL AND SIMPLE RATES

Total cost of the credit	154.37
Total amount of credit	1000.00
Total amount payable	1154.37

APRe	APRn	APRs
12.360%	12.000%	12.698%

Period	Drawdowns	Balance		Payments			Cash flows			
		Initial	Final	Repayment of the credit			Value at each period	Present value APRe	Present value APRn	Present value APRs
				Capital amortisat.	Interest	Total				
0	1000.00		1000.00				1000.00	1000.00	1000.00	1000.00
1		1000.00	771.41	228.59	60.00	288.59	-288.59	-272.26	-272.26	-271.36
2		771.41	529.10	242.31	46.28	288.59	-288.59	-256.85	-256.85	-256.08
3		529.10	272.26	256.85	31.75	288.59	-288.59	-242.31	-242.31	-242.42
4		272.26	0.00	272.26	16.34	288.59	-288.59	-228.59	-228.59	-230.14
							SUM	0.00	0.00	0.00

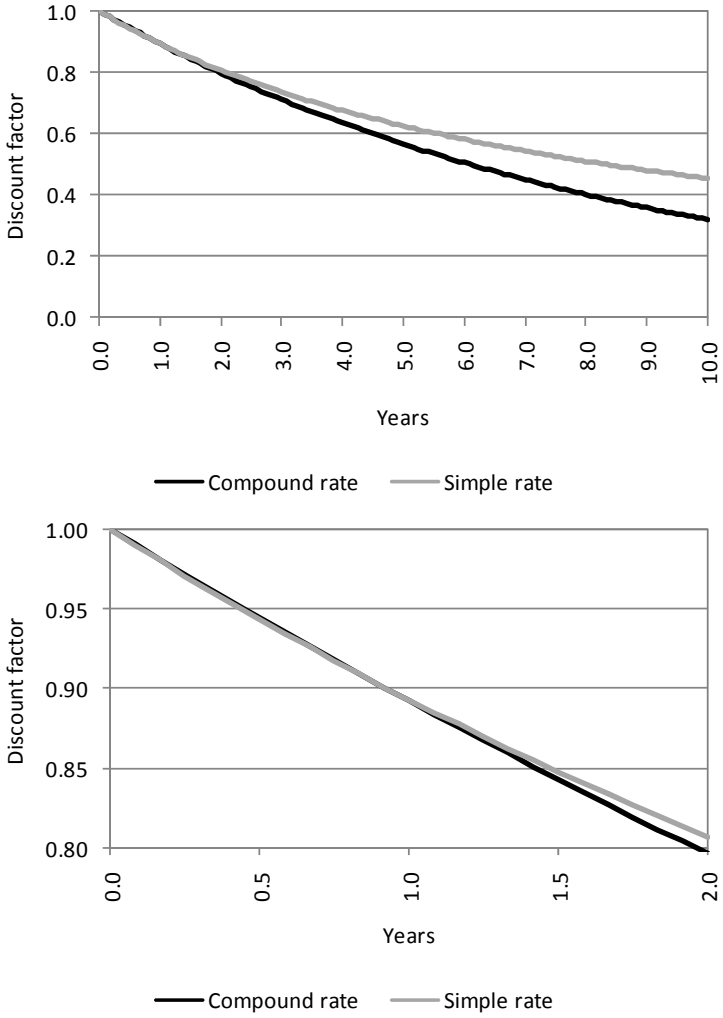
The higher value of the effective APR compared to the nominal APR is justified by an argument given previously: when the number of payments per year is higher than 1 (or equivalently, the compound frequency is lower than 1), the nominal rate is always below the effective rate and both rates coincide when payments are made yearly. Since in most credit agreements payments are made at most yearly, the nominal APR will be typically below the effective APR. What we should ask ourselves now is if the lower nominal APR is more representative of the cost of the credit than the effective APR. The answer is negative. This is because, as we explained above, the nominal rate depends on the frequency of payments and two nominal rates with unequal frequencies cannot be compared. Therefore, if the APR of credit products were disclosed as a nominal rate, consumers would not be able to use them to compare different products. Hence, it is necessary to resort to an equivalent rate with a given compound frequency. But it happens that the effective rate is just that rate, an equivalent rate for a compound frequency of one year. Hence, it is preferable to use an effective rate over the nominal rate.

Now, let us consider the simple rate in comparison to the effective rate. A simple APR will be typically higher than the effective APR, except for credit agreements of a very short duration not exceeding a threshold which depends on the characteristics of the credit (borrowing rate, dates and amount of payments), but which is near to 1 year. This is because the factor used to discount each cash flow (called the discount factor) under simple APR is always higher than the discount factor under compound interest for all periods exceeding the year. This is illustrated in Figure 2, which shows the discount factor defined as 1/(1+APR x t) for simple APR, and $1/(1+APR)^t$ for effective APR; *t* is the period expressed in years. Note that the discount factor $1/(1+APR/f)^{fxt}$ for nominal APR is the same as the effective discount factor[33] and for this reason we can refer to compound rates in general. In the first graph the period ranges from 0 to 10 years and in the second graph we detail the short end of the first graph by making *t* range from 0 to

[33] This explains that present values in Table 6 are the same for effective and nominal APR.

2 years. The APR in the graphs is assumed to be 12%. As can be seen, the discount factor under compound APR can be significantly lower than the discount factor under simple APR for long periods and only in very short periods is there a very slight difference in favour of the discount factor under compound APR. The higher discount factors under simple APR imply that the APR will have to be higher to compensate for the higher value of the discounted cash flows.

FIGURE 2. DISCOUNT FACTORS UNDER SIMPLE AND COMPOUND RATES



This mathematical justification of the higher values of simple APR compared to compound APR is only reflecting the fact that the financial laws of simple and compound interest lead to different results but it does not give preference to any of the two rules[34]. For this reason, it is necessary to consider other arguments.

Hence, the question that now emerges is if, besides this mathematical explanation of the higher value of the simple APR, there are economic or financial arguments which would

[34] For example, the assertion that simple APR it is preferable because it is higher is an empty argument unless other founded reasons are provided.

suggest that simple APR is a better choice than compound APR. The answer is again negative. In fact, the use of an equivalent rate like the effective rate has a more solid basis. The reasons are the following:

- In finance, the present value rule is typically applied using compound interest, with the only exception being the valuation of short term instruments usually with a single cash-flow, such as Treasury bills, commercial paper, repurchase agreements or other money market instruments[35]. However, consumer credit agreements can last for several years and typically involve a series of cash flows[36]. Therefore, if the APR is defined in the same way for any credit agreement independently of its duration and number of payments in order to preserve comparability, the rate used for discounting should be a compound rate. Also, discount factors used in other areas of economics such as in the determination of the purchase power, or the net present value of firm projects also use compound interest, which indicates the primacy of compound interest in finance and economics nowadays. From a theoretical point of view, it can be highlighted that in the case of compound interest the force of interest (in actuarial science) or the instantaneous rate (in financial markets), representing the instantaneous rate of growth of an investment (or debt) per each monetary unit invested (or owed) at each moment in time remains constant over time[37]. This fits in with the notion of an APR reflecting the average and constant effort of the borrower along the life of the credit in order to pay its costs. However, the decreasing force of interest which is obtained under simple interest has a difficult interpretation in our context.

- While in traditional credit facilities (e.g. personal loans with constant instalments and instalment plans) interest is not compounded because interest charges are paid as soon as they are generated, modern instruments (e.g. credit cards or revolving credit accounts) and new repayment techniques applied to traditional instruments (e.g. increasing installments or flexibility in the repayment of capital and interest) lead to compound interest whenever interest charges are not paid in full and added to capital. Therefore, the constancy of capital which is intrinsic to simple interest is violated, which makes simple APR a very unnatural and forced choice.

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[35] See, for example, Sherris, M. (1996): "Money and capital markets: pricing, yields and analysis", Allen & Unwin, 1996, or any other textbook about financial investments covering pricing.

[36] In this sense, consumer credit agreements are similar to bonds, and the APR is similar to the IRR (or yield to maturity, YTM) in bond markets. Bond markets in industrialized countries and international bond markets use indefectibly the financial law of compound interest to define the IRR or YTM. For the markets in the euro area see, for example, Bank of England (1998): Practical Issues Arising from the Introduction of the Euro, nº 8, 1 June 1998, pp. 50-54 (available at http://www.bankofengland.co.uk/archive/Documents/historicpubs/practicalissues/jun98.pdf).

[37] A discussion of the force of interest under simple and compound interest can be found, for example, in Broverman, S.A. (2004): Mathematics of Investment and Credit, ACTEX Publications, pp. 34-40.

- The large number of variations found in consumer credit agreements for repayments, in the payment of charges, which might be recurrent or not and might coincide or not with the dates for the repayment of the credit, and the possibility that other sources of income and expenses connected to the credit as a result of mandatory ancillary services should be taken into account when calculating the APR, makes an equivalent rate a more suitable choice for APR since it omits any mention of nominal, periodic rates, or of restrictive interest rules such as simple interest.

- Using an effective APR increases interpretability. As seen before, when discussing the use of the present value rule, the APR, when defined as an effective rate, can be interpreted as the annual return that the consumer should obtain from the initial capital received in order to repay the credit. That is, if he takes the capital and invests it, for example, in a bank accounts or bonds, and if he obtains from this investment an annual rate equal to the APR of the credit he will be able to repay the credit on the proceeds. From the point of view of the creditor, at any point in time the APR reflects the annual rate charged on the outstanding balance of the credit so that at the end of the credit the capital and the charges are paid by the borrower. These explanations are true under compound rate, but false under simple rate[38].

In connection with this discussion, it should be noted that anatocism is inherent to any compound APR. Therefore, it is misleading to say that compound APR expresses the total cost of the credit except for the cost of anatocism. The costs for interest on interest comprised in the repayment of the credit will always be present in the APR no matter whether it is a simple, nominal or effective APR. Otherwise the APR would not be able to equate the present value of drawdowns to the present value of the repayments and payments of charges. But one thing is the interest on interest included in the cost of the credit, and another is the interest on interest (or more precisely the cost on cost) included in the APR.

To illustrate this, let us consider a credit agreement for an amount of C which is drawn down immediately and to be repaid in two years; the borrowing rate is given as an effective rate of *r*. The repayment then amounts to:

$$C(1+r)^2$$

Expanding the term in parenthesis, we obtain:

$$C\left(1+2r+r^2\right)=C(1+2r)+C\times r^2$$

[38] Concretely, if the amount of credit C grows at the rate given by the simple APR over two years, we obtain the following pointless expression:

$$C(1+APR\times 2)=\frac{(1+APR\times 2)D_1}{(1+APR)}+D_2$$

Also, it should be noted that the equivalence of amounts irrespectively of the time of valuation only holds for compound APR, and not for simple APR.

where the first term on the right includes the repayment of the amount of the credit (*C*) and simple interest on it (*C*x2*r*), and thus the second term is the cost of anatocism (for charging interest on interest).

Using an effective APR, the basic equation is:

$$C = \frac{C(1+r)^2}{(1+APR)^2}$$

which indicates that APR=*r*.

The costs for interest on interest implicit in the effective APR can be obtained as follows:

$$C(1+APR)^2 = C\left(1+2APR+APR^2\right) = C(1+2APR)+C\times APR^2$$

giving the same costs as the credit because APR=*r*.

Now consider the existence of a fee of an amount *F* to be paid at the conclusion of the agreement. The costs for interest on interest on the credit are still Cxr^2. The basic equation becomes:

$$C = F + \frac{C(1+r)^2}{(1+APR)^2}$$

and the new APR increases to a level above *r* to reflect the higher costs arising from the fee. Again, the costs for anatocism implicit in the APR are $CxAPR^2$, but this time they are different to those of the credit.

<u>In short, what is highly relevant is to recognize that compound rates refer to a situation where funds are invested and reinvested including their proceeds. As indicated, this is the most usual situation in the financial world, given that investors, creditors and borrowers do not take the money and freeze it: this is not a rational behavior</u>.

In any case, as a final remark, it should be indicated that if the APR aims to be an element of comparison of different credit products with different structures and characteristics, using simple interest, compound interest, or any other rule is feasible provided that the chosen measure increases as interest and charges increase and the same measure is used by any agent under any circumstances. <u>The measure chosen is merely a convention</u> (similar to the use of day count conventions of the type Actual/360, Actual/Actual or 30/360) which does allow comparisons. However, when requirements go further and comprehension and soundness are valuable features, the analysis and arguments become more complex. Those provided in this section point to the suitability of an effective rate as the APR in EU consumer credit markets.

REMARKS

After introducing the basic equation, part I of Annex I also includes the following series of remarks on the equation:

(a) The amounts paid by both parties at different times shall not necessarily be equal and shall not necessarily be paid at equal intervals.

(b) The starting date shall be that of the first drawdown.

(c) Intervals between dates used in the calculations shall be expressed in years or in fractions of a year. A year is presumed to have 365 days (or 366 days for leap years), 52 weeks or 12 equal months. An equal month is presumed to have 30.41666 days (i.e. 365/12) regardless of whether or not it is a leap year.

(d) The result of the calculation shall be expressed with an accuracy of at least one decimal place. If the figure at the following decimal place is greater than or equal to 5, the figure at that particular decimal place shall be increased by one.

(e) The equation can be rewritten using a single sum and the concept of flows (A_k), which will be positive or negative, in other words either paid or received during periods 1 to k, expressed in years, i.e.:

$$S = \sum_{k=1}^{n} A_k \left(1 + X\right)^{-t_k}$$

S being the present balance of flows. If the aim is to maintain the equivalence of flows, the value will be zero.

The remarks were not altered during the negotiation of Directive 2008/48/EC, and hence they remained as stated in the Commission proposal of 2002. However, as can be seen in Table 7, some novelties are introduced in the Directive.

TABLE 7. REMARKS ABOUT THE FORMULA

Directive 87/102/EEC (consolidated version): Annex II, Remarks	Directive 2008/48/EC: Annex I. Remarks
From 1990: (a) The amounts paid by both parties at different times shall not necessarily be equal and shall not necessarily be paid at equal intervals.	(a) The amounts paid by both parties at different times shall not necessarily be equal and shall not necessarily be paid at equal intervals.
From 1990: (b) The starting date shall be that of the first loan.	(b) The starting date shall be that of the first drawdown.
From 1990: (c) Intervals between dates used in the calculations shall be expressed in years or in fractions of a year. **FROM 1998:** A year is presumed to have 365 days or 365,25 days or (for leap years) 366 days, 52 weeks or 12 equal months. An equal month is presumed to have 30,41666 days (i.e. 365/12).	(c) Intervals between dates used in the calculations shall be expressed in years or in fractions of a year. A year is presumed to have 365 days (or 366 days for leap years), 52 weeks or 12 equal months. An equal month is presumed to have 30,41666 days (i.e. 365/12) regardless of whether or not it is a leap year.
FROM 1998: (d) The result of the calculation shall be expressed with an accuracy of at least one decimal place. When rounding to a particular decimal place the following rule shall apply: If the figure at the decimal place following this particular decimal place is greater than or equal to 5, the figure at this particular decimal place shall be increased by one.	(d) The result of the calculation shall be expressed with an accuracy of at least one decimal place. If the figure at the following decimal place is greater than or equal to 5, the figure at that particular decimal place shall be increased by one.
	(e) The equation can be rewritten using a single sum and the concept of flows (Ak), which will be positive or negative, in other words either paid or received during periods 1 to k, expressed in years, i.e.: $$S = \sum_{k=1}^{n} A_k (1+X)^{-t_k}$$ S being the present balance of flows. If the aim is to maintain the equivalence of flows, the value will be zero.

NON EQUAL AMOUNTS OR PERIODS

(a) The amounts paid by both parties at different times shall not necessarily be equal and shall not necessarily be paid at equal intervals.

This remark appeared in 1990 and has always remained in the same terms. It simply warns about the heterogeneity which might appear inside the set of drawdowns or payments, and between drawdowns and payments.

The most simple credit product would consist of a single drawdown and one or several equally spaced instalments of equal months, but from there on the variations are huge. For example, there might be limits as regards the amount of drawdowns in specific periods, the existence of special payments (advance or final payments) and non-interest charges alters the homogeneity of payments, non-interest charges might be payable at dates different from those of the repayments, the period to the first repayment might be different to the rest, etc.

STARTING DATE

(b) The starting date shall be that of the first drawdown.

This remark also appeared in 1990 and its meaning has not changed from then. It is relevant because the APR might be affected by the valuation date due to the application of specific rules for measuring time intervals.

MEASUREMENT OF TIME

(c) Intervals between dates used in the calculations shall be expressed in years or in fractions of a year. A year is presumed to have 365 days (or 366 days for leap years), 52 weeks or 12 equal months. An equal month is presumed to have 30.41666 days (i.e. 365/12) regardless of whether or not it is a leap year.

Unlike the two previous remarks, this remark has changed significantly since 1990. Only the first sentence, stating that intervals between dates used in the calculations of the APR should be expressed in years or in fractions of a year, has remained unchanged from 1990, when it was introduced.

In 1998 it was accompanied by additional details which provided two alternative methods for the measurement of time: the calendar basis (according to which 1 year=365 days or 366 days for leap year), and the standard year method (according to which 1 year=365 days or 365.25 days, or 52 weeks or 12 months of 365/12=30,411666 days). Each option produced a different APR, as illustrated in the examples of the calculation of the APR included in the Directive. However, the examples did not use leap years or short periods of some days to illustrate the handling of days and leap years.

In Directive 2008/48/EC the remark combines the two previous alternative methods so that it is recognized that leap years have a different number of days but when counting weeks or months, calendar days are omitted. As happened in the previous Directive, application of this method is straightforward when the intervals between dates can be expressed as a whole number of weeks, months or years because in this case a single kind of fraction of the year is used[39]. However clarification is needed when the periods cannot be measured as a whole number of weeks, months and years (for example, when a repayment takes place in 1 month and 3 days). In order to attain the objective of comparability of the APR by providing a uniform

[39] This is coherent with the assertion in the explanatory memorandum accompanying the Commission proposal of 2002, where the text of remark (c) appears. In pages 17-18 of this memorandum it is explained that "*The proposal is for complete standardisation in respect of rounding-off and what is understood by a year. Only the method for calculating fractions of a year has been retained*". When compared with the methods for the measurement of time established in Directive 98/7/EC (the calendar basis and the standard year method), it is evident that there is an intention to abandon the calendar basis.

application of remark (c) compatible with its wording, the Guidelines on the application of Directive 2008/48/EC clarify that it shall be considered that:

Only when an interval between dates used in the calculation cannot be expressed as a whole number of years, months or weeks, the interval shall be expressed as a whole number of one of these periods in combination with a number of days. For the choice among years, months or weeks, consideration shall be given to the frequency of drawdowns and payments. When using days:

(i) Every day shall be counted, including weekends and holidays;

(ii) Equal periods and then days shall be counted backwards to the date of the initial drawdown; and

(iii) The length of a period of days shall be obtained excluding the first day and including the last day (simple subtraction of dates), and shall be expressed in years by dividing this period by the number of days (365 or 366 days) of the complete year counted backwards from the last day to the same day of the previous year.

This approach is largely similar to the existing convention used in bond markets in the Euro area, known as Actual/Actual AFB[40] or Actual/Actual (Euro) in international markets[41]. However, it departs significantly from other conventions such as 30/360 or actual/360, which are clearly incompatible with this remark (c).

The first paragraph of the explanation in italics above implies that:

- No combination of years or fractions of years is allowed other than a combination of days and either years, equal months or weeks.
- If the interval can be expressed as a whole number of years, months or weeks, the interval shall not be expressed in days.
- The frequency of drawdowns and repayments shall be taken into account for the choice among years, months or weeks. For example, in the case of a single immediate drawdown and monthly repayments, regular periods of one month will be used; in the case of monthly drawdowns and yearly repayments, regular periods of one month will be used because they allow the expression of the time intervals of both drawdowns and repayments as a whole number of regular periods.

Points (ii) and (iii) above determine that time periods will be counted backwards. According to (ii), if an interval between dates is comprised of regular periods (years, months or weeks) and days, the period of days will appear at the beginning of the interval, i.e. after having taken account of the regular periods. According to (iii) above, to express a period of days in years,

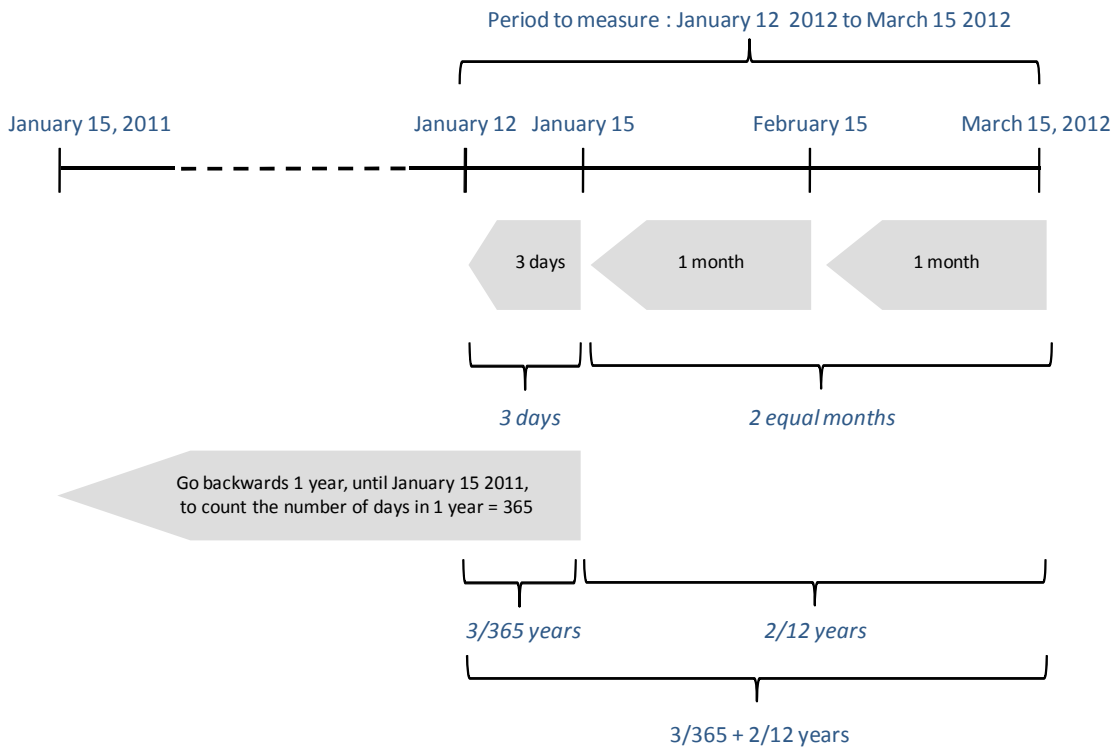
[40] AFB stands for the Association Française des Banques.

[41] This convention was supported by the European Commission and the European Monetary Institute before the introduction of the euro in 1999.

the period will be divided by the number of days of the year between the last calendar day of the period and the same day of the previous year.

For example, if months are used, the interval between January 12 2012 and March 15 2012 is given as 2 months (from March 15 2012 to January 15 2012) and 3 days (from January 15 2012 to January 12 2012). To express this interval in years, months are divided by 12 (the number of months in a year), and the period of 3 days from January 15 2012 to January 12 2012 is divided by the number of days of the year from January 15 2012 to January 15 2011, that is, by 365 days. Note that in this example the rule of simple subtraction of dates established in point (iii) above has been applied to obtain the result that, between January 15 2012 and January 12 2012, there are only 3 days, and not 4 days as would be obtained if both days (January 15 and January 12) were counted. Similarly, the period from January 15 2012 to January 15 2011 comprises 365 days and not 366 days (within this period, February 2011 has 28 days).

This example is illustrated in the following scheme:



If a credit agreement whose first drawdown is made at the conclusion of the agreement on January 12 2012 is considered and payments are to be made on the 15th day of each of the 3 succeeding months, from February to April, the intervals between the date of the first drawdown and the successive payments are:

- Payment on February 15 2012: 3/365+1/12 (1 month from February 15 2012 to January 15 2012 plus 3 days from January 15 2012 to January 12 2012 within a year from January 15 2012 to January 15 2011 with 365 days).
- Payment on March 15 2012: 3/365+2/12 (2 months from March 15 2012 to January 15 2012 plus 3 days from January 15 2012 to January 12 2012 within a year from January

15 2012 to January 15 2011 with 365 days; equivalently, it can be obtained adding 1 month to the interval of the previous payment to obtain March 15 2012).

- Payment on April 15 2012: 3/365+3/12 (add 1 month to the interval of the previous payment to obtain April 15 2012).

If the credit agreement were to be signed one year later, on January 12 2013, the intervals would be:

- Payment on February 15 2013: 3/366+1/12 (1 month from February 15 2013 to January 15 2013 plus 3 days from January 15 2013 to January 12 2013 within a year from January 15 2013 to January 15 2012 with 366 days).
- Payment on March 15 2013: 3/366+2/12 (add 1 month to the interval of the previous payment to obtain March 15 2013).
- Payment on April 15 2013: 3/366+3/12 (add 1 month to the interval of the previous payment to obtain April 15 2013).

If the credit agreement were to be signed on January 12 2012, foreseeing annual payments due on the 15th of February of each year from 2012 to 2014, the intervals would be:

- Payment on February 15 2012: 34/365 (34 days from February 15 2012 to January 12 2012 within a year from February 15 2012 to February 15 2011 with 365 days).
- Payment on February 15 2013: 34/365+1 (add 1 year to the interval of the previous payment to obtain February 15 2013).
- Payment on February 15 2014: 34/365+2 (add 1 year to the interval of the previous payment to obtain February 15 2014).

The treatment of leap years deserves special attention when the last day in February applies, because, as is usual, any reference to a day in February which does not exist (e.g. 31st) is considered to be a reference to the last day in February (28th, or 29th if a leap year) and any reference to a day which does exist is a reference to that date. To illustrate, consider the following examples:

- Agreement signed on 25/02/2013 with first payment on 28/03/2013: the interval is given as 1 month (from 28/**03**/2013 to 28/**02**/2013) plus 3 days (from **28**/02/2013 to **25**/02/2013) within a year (from 28/02/**2013** to 28/02/**2012)** with 366 days, that is, as 1/12+3/366 years. Note that counting backwards 1 year from 28/02/2013 implies going to the same date of the previous year because it exists, that is, to 28/02/2012 (and not to **29**/02/2012).
- Agreement signed on 26/02/2013 with first payment on 29/03/2013: the interval is given as 1 month (from **29**/**03**/2013 to **28**/**02**/2013, the last day of February; but not to 01/03/2013) plus 2 days (from **28**/02/2013 to **26**/02/2013) within a year (from 28/02/**2013** to 28/02/**2012**) with 366 days, that is, as 1/12+2/366.

- Agreement signed on 26/02/2012 with first payment on 29/03/2012: the interval is given as 1 month (from 29/**03**/2012 to 29/**02**/2012, because this date exists) plus 3 days (from **29**/02/2012 to **26**/02/2012) within a year (from **29**/**02**/2012 to **28**/**02**/2011, the last day of February; but not to 01/03/2011) with 366 days, that is, as 1/12+3/366.

The above explanation of remark (c) has two main advantages. Firstly, the time intervals are independent of the exact date the agreement is signed. To illustrate this, consider a payment in 1 month and 1 day. Applying the rules we would obtain a period of 1/12 years plus 1 day, irrespective of the date the agreement is due to be signed – in fact, that date is usually unknown before the contract is signed. In the absence of the rules, creditors might use intervals from 29 to 32 days in the advertising and the pre- contractual stages, which might lead to significant differences in the APR. Later at the time the agreement is signed, the APR figure might be different from the one used in advertising and the pre-contractual information simply because the length of the interval changes. It is evident that such differences are not conducive to comparability of the APR among products and creditors. Moreover, it can be asserted that, strictly speaking, only regular periods are feasible in the advertising and the pre-contractual stages. For example, for a payment in 1 month, there is little justification in using 28, 29, 30 or 31 days instead of 1/12 years. And if 1/12 years is used, the period of 1 month and 1 day should be expressed as 1/12 years plus 1 day for coherence.

Secondly, the rules deal unambiguously with leap years. That is, in order to obtain the period of days expressed in years, the rules imply dividing by the number of days of the year between the first payment date and the same date of the previous year. For example, if the agreement is concluded on December 1 2012 and the first payment is on February 2 2013, application of the rules implies using 2/12 (from February 2 2013 to December 2 2012) plus 1/366 (1 day from December 2 2012 to December 1 2012, divided by the 366 days between December 2 2012 and December 2 2011). In the absence of rules, creditors might divide by 365 if they take the days in a normal year when the payment takes place (2013), or 366 if they take the days of the year 2012, or even, if they only use days, divide the days in 2012 by 366 and the days in 2013 by 365 days. Again, different solutions and different APRs might be obtained in the absence of explicit rules. These examples show that the rules are designed to obtain a uniform calculation of the APR throughout the EU.

Implicit in remark (c) is that if certain time intervals are used in the APR formula, those intervals shall also be used to ascertain the amounts of interest and other charges used in the formula. For this reason, creditors shall use the method of measurement of time intervals described above to obtain the figures for the payments of charges. However, this is only applicable for the purposes of the calculation of the APR, and does not impact on the amounts actually charged by the creditor under the agreement, although if these are different, it may be necessary to explain the existence of this difference to avoid misleading the consumer. The application of this rule for the calculation of the APR implies that in the absence of non-interest charges, and assuming an identical method of calculation, the APR will equal the (effective) borrowing rate of the credit.

ACCURACY AND ROUNDING-OFF

(d) The result of the calculation shall be expressed with an accuracy of at least one decimal place. If the figure at the following decimal place is greater than or equal to 5, the figure at that particular decimal place shall be increased by one.

A last remark introduced in 1998 referred to the accuracy and rounding of the APR; it has been maintained in Directive 2008/48/EC with minor changes in the wording and no change in the meaning.

As can be seen, the required accuracy is not demanding and the rounding-off follows usual rules. Specifically, the remark establishes the minimum level of accuracy of the APR figure in one decimal place (higher levels of accuracy, such as two decimal places, with the rounding off rule, can also be applied). As to the rounding, note that the figure to be increased by one is the one at the last decimal place. For example, if the APR is expressed with one decimal place, the figure at this (first) place is increased by one if the figure at the following (second) decimal place is greater than or equal to 5; if the APR is expressed with two decimal places, the figure at this (second) place is increased by one if the figure at the following (third) decimal place is greater than or equal to 5. Using a numerical example, for 3.055%, the APR with one decimal place is 3.1% and the APR with two decimal places is 3.06%; for 3.054%, the APR with one decimal place is 3.1% and the APR with two decimal places is 3.05%.

EQUIVALENT EXPRESSIONS

(e) The equation can be rewritten using a single sum and the concept of flows (A_k), which will be positive or negative, in other words either paid or received during periods 1 to k, expressed in years, i.e.:

$$S = \sum_{k=1}^{n} A_k \left(1 + X\right)^{-t_k}$$

S being the present balance of flows. If the aim is to maintain the equivalence of flows, the value will be zero.

A novelty of Directive 2008/48/EC is the introduction of this last remark referring to an alternative equation to the basic equation. This equation, based on net cash flows for each period, is very convenient to obtain the APR using numerical methods and, in fact, it is the one used in the Excel simulator.

However, the existence of an error in the text should be noted because, according to the equation, periods range from 1 to *n*, and not to *k* as indicated in the text; *k* is actually the index for the sum of cash flows in the equation.

Finally, we consider it positive not to include more formulas because although special and sophisticated formulas exist for some standardized credit products, they can be provided in the examples of the calculation of the APR, as we have done. Also, the availability of routines

to perform numerical analysis and the trend towards individualized products with special features make most of these formulas unnecessary to obtain a reliable APR figure.

ASSUMPTIONS

The assumptions for the calculation of the APR were first introduced together with the formula by the Directive 90/88/EEC and were maintained in Directive 98/7/EC. Directive 2008/48/EC includes the assumptions for the calculation of the APR in Article 19(3) and 19(4) and in part II of Annex I, as referred to in Article 19(5). Directive 2008/48/EC has implied significant changes, in particular in the 'additional assumptions', that is, the set of assumptions established in Article 1a (7) in the old Directives and in part II of Annex I in Directive 2008/48/EC.

This distinction is relevant because in Directive 2008/48/EC, as a novelty, Article 19 (the APR article) foresees the possibility of using a committee procedure to adopt additional assumptions for the calculation of the APR or to change existing ones when the existing assumptions are not sufficient to calculate the APR in a uniform manner or are not adapted to the reality of the market. But this only applies to the additional assumptions and not to other parts of the Directive, including Annex I (with the mathematical formula and the remarks) and the APR article (Article 19). This is because only these additional assumptions are considered non-essential elements of the Directive (see recital 49 and the second paragraph of Article 19 (5)). Hence, the additional assumptions constitute the element of flexibility of the law to adapt to the commercial situation at the market and to solve inadequacies that might preclude the calculation of the APR in a uniform manner throughout the EU. In fact, Directive 2011/90/EU was adopted in order to solve the difficulties found in reference to credits without a fixed duration or repayable in full repeatedly and provide additional standards for the timing of the initial drawdown of the credit and the payments to be made by the consumer when other assumptions do not provide a solution. This implied changes in former assumptions (d), (f) and (e), and the addition of point (iii) in new assumption (f) and a completely new assumption (g). The set of assumptions was also reordered according to their content. As a result, assumptions (a) to (d) and (h) to (j) of Directive 2011/90/EU coincide with assumptions in Directive 2008/48/EC and assumptions (d) to (g) are either completely new or adapted from former assumptions. Given that mentioning both sets (2008 and 2011) of assumptions would be confusing due to the large number of assumptions and unfruitful due to the short span of the 2008 assumptions existence, in the following we disregard the 2008 assumptions and focus the analysis in the assumptions of Directive 2011/90/EU [42]. For this analysis, we largely follow the Guidelines on the application of Directive 2008/48/EC.

The assumptions are the following. In the APR article we found:

- Article 19 (3): 'The calculation of the annual percentage rate of charge shall be based on the assumption that the credit agreement is to remain valid for the period agreed

[42] For an analysis of the 2008 assumptions and their problems, see the initial version of this study.

and that the creditor and the consumer will fulfil their obligations under the terms and by the dates specified in the credit agreement'.

- Article 19 (4): 'In the case of credit agreements containing clauses allowing variations in the borrowing rate and, where applicable, charges contained in the annual percentage rate of charge but unquantifiable at the time of calculation, the annual percentage rate of charge shall be calculated on the assumption that the borrowing rate and other charges will remain fixed in relation to the initial level and will remain applicable until the end of the credit agreement.'
- Article 19 (5): 'Where necessary, the additional assumptions set out in Annex I may be used in calculating the annual percentage rate of charge'.

Part II of Annex I, as amended by Directive 2011/90/EU, includes the following ten assumptions[43]:

(a) If a credit agreement gives the consumer freedom of drawdown, the total amount of credit shall be deemed to be drawn down immediately and in full.

(b) If a credit agreement gives the consumer freedom of drawdown in general but imposes, amongst the different ways of drawdown, a limitation with regard to the amount of credit and period of time, the amount of credit shall be deemed to be drawn down on the earliest date provided for in the agreement and in accordance with those drawdown limits.

(c) If a credit agreement provides different ways of drawdown with different charges or borrowing rates, the total amount of credit shall be deemed to be drawn down at the highest charge and borrowing rate applied to the most common drawdown mechanism for this type of credit agreement.

(d) In the case of an overdraft facility the total amount of credit shall be deemed to be drawn down in full and for the whole duration of the credit agreement. If the duration of the overdraft facility is not known the annual percentage rate of charge shall be calculated on the assumption that the duration of the credit is 3 months.

(e) In the case of an open-end credit agreement, other than an overdraft facility, it shall be assumed that:

(i) the credit is provided for a period of 1 year starting from the date of the initial drawdown, and that the final payment made by the consumer clears the balance of capital, interest and other charges, if any;

(ii) the capital is repaid by the consumer in equal monthly payments, commencing 1 month after the date of the initial drawdown. However, in cases where the capital must be repaid only in full, in a single payment, within each payment period, successive

[43] All references in the assumptions to the conclusion of the agreement are references to the date the agreement is executed. This is usually the date when the agreement is signed by the parties involved (and not when it comes to an end), unless otherwise specified.

drawdowns and repayments of the entire capital by the consumer shall be assumed to occur over the period of 1 year. Interest and other charges shall be applied in accordance with those drawdowns and repayments of capital and as provided for in the credit agreement.

For the purposes of this point, an open-end credit agreement is a credit agreement without fixed duration and includes credits which must be repaid in full within or after a period but, once repaid, become available to be drawn down again.

(f) In the case of credit agreements other than overdrafts and open-end credits as referred to in the assumptions set out in points (d) and (e):

(i) if the date or amount of a repayment of capital to be made by the consumer cannot be ascertained, it shall be assumed that the repayment is made at the earliest date provided for in the credit agreement and is for the lowest amount for which the credit agreement provides;

(ii) if the date of conclusion of the credit agreement is not known, the date of the initial drawdown shall be assumed to be the date which results in the shortest interval between that date and the date of the first payment to be made by the consumer.

(g) Where the date or amount of a payment to be made by the consumer cannot be ascertained on the basis of the credit agreement or the assumptions set out in points (d), (e) or (f), it shall be assumed that the payment is made in accordance with the dates and conditions required by the creditor and, when these are unknown:

(i) interest charges are paid together with the repayments of capital;

(ii) a non-interest charge expressed as a single sum is paid at the date of the conclusion of the credit agreement;

(iii) non-interest charges expressed as several payments are paid at regular intervals, commencing with the date of the first repayment of capital, and if the amount of such payments is not known they shall be assumed to be equal amounts;

(iv) the final payment clears the balance of capital, interest and other charges, if any.

(h) If the ceiling applicable to the credit has not yet been agreed, that ceiling is assumed to be EUR 1 500.

(i) If different borrowing rates and charges are offered for a limited period or amount, the borrowing rate and the charges shall be deemed to be the highest rate for the whole duration of the credit agreement.

(j) For consumer credit agreements for which a fixed borrowing rate is agreed in relation to the initial period, at the end of which a new borrowing rate is determined and subsequently periodically adjusted according to an agreed indicator, the calculation of the annual percentage rate shall be based on the assumption that, at the end of the fixed borrowing rate

period, the borrowing rate is the same as at the time of calculating the annual percentage rate, based on the value of the agreed indicator at that time.

The role of these assumptions is to determine some of the elements to be included in the total cost of credit. This is required when these elements are not known or cannot be ascertained at the time the APR is calculated, or when they may vary, depending on how the credit agreement is operated.

The assumptions are intended to ensure that the APR is calculated in a consistent way to promote the comparability of different offers. Hence, the term 'Where necessary' at the beginning of Article 19(5) refers the creditor to the additional assumptions in the Annex only where those assumptions are necessary in relation to the specific agreement, e.g. where key features such as amount or duration of credit are uncertain. In general, though, the APR calculation will depend on the terms of the individual credit agreement, and the expression 'where necessary' should be understood in this context. For example, as will be explained later, assumption (i) will apply only where other assumptions in (a) to (h) of Annex I apply, since otherwise the terms of the contract (together with assumption (j), as necessary) give sufficient certainty.

Also note that Articles 5(1)(g), 6(1)(f), 10(2)(g) and 10(5)(f) of Directive 2008/48/EC imply that the APR is accompanied by an indication of the assumptions used in the calculation at the pre-contractual and contractual stages, which provides an element of transparency to the consumer and facilitates the understanding of the APR figure. The assumptions indicated will be those applicable to the credit in question, as set out in Article 19 and Part II of Annex I.

Finally, it is worth mentioning that the Directive does not provide for the application of the assumptions to areas outside of the calculation of the APR (at advertising, pre- contractual and contractual stages). However, if they are used, their appropriateness should be assessed on a case by case basis. For example, for the calculation of the compensation to the creditor in the case of early repayment (Article 16) it would not be appropriate to apply borrowing rates to future payments based on the value of the agreed indicator when the agreement was concluded (Article 10(2)(f)). Rather, it should be based on the value of the indicator when early repayment actually takes place.

For a more structured discussion in the analysis that follows in the next subsections, we have ordered the twelve assumptions according to the main element of the credit they regulate as shown in Table 8. Also, Table 9 offers a comparison of the assumptions of Directive 87/102/EEC, the Commission proposal of 2002 and Directive 2008/48/EC (as amended by Directive 2011/90/EU). In the following we discuss the assumptions and indicate the credit products where application of the assumptions is most likely to take place. The reader is referred to chapter 2 for a description of the different credit products and their most characteristic features in the EU markets.

TABLE 8. ASSUMPTIONS FOR THE CALCULATION OF THE APR

Fulfillment of the agreement	
Art. 19 (3) the agreement remains valid for the period agreed and the parties fulfil their obligations	
Amount	
(h) ceiling of the credit unknown	€1500
Drawdowns	
(a) freedom of drawdown without limits	the total amount of credit is drawn down immediately and in full
(b) freedom of drawdown with limits with regard to the amount and period of time	drawdown at the earliest date and in accordance with the limits
Duration and repayment	
(d) overdraft facilities	the total amount of credit is drawn down immediately and in full for the whole duration, and if duration is unknown, assume 3 months
(e) open-end credits	duration of 1 year and repayment in equal monthly payments , or successive drawdowns and repayments of the entire capital in appropriate cases
(f) credits other than overdraft and open-end credits where: the date or amount of a repayment of capital is not known, or the date of conclusion of the credit is not known	 lowest repayment allowed at the earliest date allowed, the date of the initial drawdown is such that the interval between that date and the date of the first payment is the shortest
(g) the date or amount of a payment still cannot be ascertained	payment as required by the creditor and when his conditions are not known, specific rules for interest charges, single sum charges and regular charges
Rates and charges	
(c) different ways of drawdown with different charges or borrowing rates	highest charge and borrowing rate applied to the most common drawdown mechanism
(i) different borrowing rates and charges offered for a limited period or amount	highest borrowing rate and charges are applied for the whole duration
(j) fixed borrowing rate for a initial period and later periodically adjustable borrowing rate according to an indicator	use the fixed borrowing rate for the initial period and thereafter the borrowing rate is determined by the value of the agreed indicator at the time of calculating the APR
Art. 19 (4) variable borrowing rate or charges	the borrowing rate and the charges remain fixed in relation to the initial level

TABLE 9. ASSUMPTIONS FOR THE CALCULATION OF THE APR (BIS)

Directive 87/102/EEC, consolidated version	Commission proposal of 2002	Directive 2008/48/EC, as amended by Directive 2011/90/EU
Fulfillment of the agreement		
From 1990: Art. 1a (4) (b) The calculation shall be made on the assumption that the credit contract is valid for the period agreed and that the creditor and the consumer fulfill their obligations under the terms and by the dates agreed.	Art. 12 (3) The calculation of the annual percentage rate of charge shall be based on the assumption that the credit contract will remain valid for the period agreed and the creditor and the consumer will fulfil their obligations under the terms and by the dates agreed.	Art. 19 (3) The calculation of the annual percentage rate of charge shall be based on the assumption that the credit agreement is to remain valid for the period agreed and that the creditor and the consumer will fulfil their obligations under the terms and by the dates specified in the credit agreement.
Amount		
From 1990: Art. 1a (7) if the contract does not specify a credit limit, the amount of credit granted shall be equal to the amount fixed by the relevant Member State, without exceeding a figure equivalent to ECU 2 000;		Annex I.II (additional assumptions) (h) If the ceiling applicable to the credit has not yet been agreed, that ceiling is assumed to be EUR 1 500.
Drawdowns		
	Art 12 (5) (a) if a credit agreement gives the consumer freedom of drawdown, the total amount of credit shall deemed to be drawn down immediately and in full;	Annex I.II (additional assumptions) (a) If a credit agreement gives the consumer freedom of drawdown, the total amount of credit shall be deemed to be drawn down immediately and in full.
		Annex I.II (additional assumptions) (b) If a credit agreement gives the consumer freedom of drawdown in general but imposes, amongst the different ways of drawdown, a limitation with regard to the amount of credit and period of time, the amount of credit shall be deemed to be drawn down on the earliest date provided for in the agreement and in accordance with those drawdown limits.
Duration and repayment		

		Annex I.II (additional assumptions) (d) In the case of an overdraft facility the total amount of credit shall be deemed to be drawn down in full and for the whole duration of the credit agreement. If the duration of the overdraft facility is not known the annual percentage rate of charge shall be calculated on the assumption that the duration of the credit is 3 months.
From 1990: Art. 1a (7) if there is no fixed timetable for repayment, and one cannot be deduced from the terms of the agreement and the means for repaying the credit granted, the duration of the credit shall be deemed to be one year;	Art. 12 (5) (b) if there is no fixed timetable for repayment, and one cannot be deduced from the terms of the agreement and the means for repaying the credit granted, the duration of the credit shall be deemed to be one year;	Annex I.II (additional assumptions) (e) In the case of an open-end credit agreement, other than an overdraft facility, it shall be assumed that: (i) the credit is provided for a period of 1 year starting from the date of the initial drawdown, and that the final payment made by the consumer clears the balance of capital, interest and other charge, if any; (ii) the capital is repaid by the consumer in equal monthly payments, commencing 1 month after the date of the initial drawdown. However, in cases where the capital must be repaid only in full, in a single payment, within each payment period, successive drawdowns and repayments of the entire capital by the consumer shall be assumed to occur over the period of 1 year. Interest and other charges shall be applied in accordance with those drawdowns and repayments of capital and as provided for in the credit agreement. For the purposes of this point, an open-end credit agreement is a credit agreement without fixed duration and includes credits which must be repaid in full within or after a period but, once repaid, become available to be drawn down again.

From 1990: Art. 1a (7) unless otherwise specified, where the contract provides for more than one repayment date, the credit will be made available and the repayments made at the earliest time provided for in the agreement'.	Art. 12 (5) (c) unless otherwise specified, where the agreement provides for more than one repayment date, the credit will be made available and the repayments made on the earliest date provided for in the agreement;	Annex I.II (additional assumptions) (f) In the case of credit agreements other than overdrafts and open-end credits as referred to in the assumptions set out in points (d) and (e): (i) if the date or amount of a repayment of capital to be made by the consumer cannot be ascertained, it shall be assumed that the repayment is made at the earliest date provided for in the credit agreement and is for the lowest amount for which the credit agreement provides; (ii) if the date of conclusion of the credit agreement is not known, the date of the initial drawdown shall be assumed to be the date which results in the shortest interval between that date and the date of the first payment to be made by the consumer.
		Annex I.II (additional assumptions) (g) Where the date or amount of a payment to be made by the consumer cannot be ascertained on the basis of the credit agreement or the assumptions set out in points (d), (e) or (f), it shall be assumed that the payment is made in accordance with the dates and conditions required by the creditor and, when these are unknown: (i) interest charges are paid together with the repayments of capital; (ii) a non-interest charge expressed as a single sum is paid at the date of the conclusion of the credit agreement; (iii) non-interest charges expressed as several payments are paid at regular intervals, commencing with the date of the first repayment of capital, and if the amount of such payments is not known they shall be assumed to be equal amounts; (iv) the final payment clears the balance of capital, interest and other charges, if any.

	Art. 12 (6) Where a credit agreement is drawn up in the form of a hire agreement with an option to purchase and the agreement provides for a number of dates on which the purchase option may be exercised, the annual percentage rate of charge shall be calculated for each of the these dates. Where the residual value cannot be determined, the goods hired shall be subject to linear amortisation that makes its value equal to zero at the end of the normal hire period laid down in the credit agreement.	
Rates and charges		
		Annex I.II (additional assumptions) (c) If a credit agreement provides different ways of drawdown with different charges or borrowing rates, the total amount of credit shall be deemed to be drawn down at the highest charge and borrowing rate applied to the most common drawdown mechanism for this type of credit agreement.
	Art. 14 (borrowing rate) (2) Where one or a number of fixed borrowing rates have been established, they shall apply for the duration of the period specified in the credit agreement.	Annex I.II (additional assumptions) (i) If different borrowing rates and charges are offered for a limited period or amount, the borrowing rate and the charges shall be deemed to be the highest rate for the whole duration of the credit agreement.
		Annex I.II (additional assumptions) (j) For consumer credit agreements for which a fixed borrowing rate is agreed in relation to the initial period, at the end of which a new borrowing rate is determined and subsequently periodically adjusted according to an agreed indicator, the calculation of the annual percentage rate shall be based on the assumption that, at the end of the fixed borrowing rate period, the borrowing rate is the same as at the time of calculating the annual percentage rate, based on the value of the agreed indicator at that time.

From 1990: Art. 1a (6) In the case of credit contracts containing clauses allowing variations in the rate of interest and the amount or level of other charges contained in the annual percentage rate of charge but unquantifiable at the time when it is calculated, the annual percentage rate of charge shall be calculated on the assumption that interest and other charges remain fixed and will apply until the end of the credit contract.	Art. 12 (4) In the case of credit agreements containing clauses allowing variations in the borrowing rate contained in the annual percentage rate of charge but unquantifiable at the time of calculation, the annual percentage rate of charge shall be calculated on the assumption that the borrowing rate and other charges will remain fixed in relation to the initial level and will remain applicable until the end of the credit agreement.	Art. 19 (4).In the case of credit agreements containing clauses allowing variations in the borrowing rate and, where applicable, charges contained in the annual percentage rate of charge but unquantifiable at the time of calculation, the annual percentage rate of charge shall be calculated on the assumption that the borrowing rate and other charges will remain fixed in relation to the initial level and will remain applicable until the end of the credit agreement.
Other		
	Art. 12 (7) Where a credit agreement provides for a prior or simultaneous constitution of savings and the borrowing rate is set in relation to these savings, the annual percentage rate of charge shall be calculated in accordance with the procedure set out in Annex III.	

FULFILMENT OF THE AGREEMENT

(19.3) The calculation of the annual percentage rate of charge shall be based on the assumption that the credit agreement is to remain valid for the period agreed and that the creditor and the consumer will fulfil their obligations under the terms and by the dates specified in the credit agreement

This first assumption of Article 19 was commented previously, because it is also related to the calculation of the TCC for the purpose of calculating the APR. Its implications are clear and do not require any additional comments. Needless to say, this assumption will be applied to every single credit product for the calculation of the APR.

AMOUNT

(h) If the ceiling applicable to the credit has not yet been agreed, that ceiling is assumed to be EUR 1500.

This assumption was first introduced in 1990, allowing the MS to determine their national ceiling which should not exceed €2000. Directive 2008/48/EC (as amended by Directive 2011/90/EU) eliminates this allowance and establishes a common ceiling of €1500.

This assumption is expected to be applied most likely to revolving credits. In particular to overdraft facilities where a limit is not provided and in revolving credit accounts and credit cards for consumers with high purchasing power where no limit is established. Also, as noted at the end of section 1.2, it might be appropriate to use this assumption in cases where the amount of credit can vary considerably and there are costs which are independent of the amount of credit, because under these costs the APR depends crucially on the amount of credit.

It could be argued that this limit might be too high for overdraft facilities given the transitory nature of these products. However, from our research of consumer credit products in the EU we conclude that it is not the case; in some cases the credit limit in overdraft facilities might amount to many more times that quantity.

DRAWDOWNS

<u>Freedom of drawdown without limits:</u> (a) If a credit agreement gives the consumer freedom of drawdown, the total amount of credit shall be deemed to be drawn down immediately and in full.

<u>Freedom of drawdown with limits with regard to the amount and period of time</u>: (b) If a credit agreement gives the consumer freedom of drawdown in general but imposes, amongst the different ways of drawdown, a limitation with regard to the amount of credit and period of

time, the amount of credit shall be deemed to be drawn down on the earliest date provided for in the agreement and in accordance with those drawdown limits.

Assumptions (a) and (b) have been introduced by Directive 2008/48/EC (as amended by Directive 2011/90/EU) and determine the scheme of drawdowns to be applied for the calculation of the APR when the credit agreement provides for freedom of drawdowns.

In accordance with assumption (a), where a consumer may draw down credit at any time and for any amount, it shall be assumed that the whole amount of the credit is drawn down immediately at the date of conclusion of the agreement. If the agreement establishes limits with regard to the amounts of drawdown and periods of time among the different drawdown mechanisms, these drawdown limits are to be respected and, in accordance with assumption (b), the amount of credit will be assumed to be drawn down on the earliest date (or dates) provided for in the agreement, using reasoning similar to assumption (a).

Assumption (a) will be applied frequently, because revolving credit agreements typically provide freedom of drawdown. As to assumption (b), we have found examples of situation described in credit cards and revolving credit accounts for balance transfers and also in overdraft facilities in form of limits to charges for direct debit and cards.

One example of the application of assumption (b) would be a revolving credit account which provides the consumer with freedom of drawdown but with the following limits in the first three months: during the first month no drawdown is possible, in the second month no more than one tenth of the amount of credit can be drawn down, in the third month drawdowns are possible up to a limit of 50% of the amount of the credit and from the fourth month no limitation exists. Assumption (b) implies that for the purpose of the calculation of the APR the following plan of drawdowns shall apply: a first drawdown at the beginning of the second month of 10% of the amount of the credit (this date is the earliest date of drawdown provided for in the agreement), a second drawdown of 40% at the beginning of the third month, and a final drawdown at the beginning of the fourth month of the remaining 50% of the credit.

Note that both assumptions (a) and (b) apply solely to agreements providing freedom of drawdown (typically open-end agreements). They do not apply to agreements where the consumer has no discretion as to the date or amount of drawdown since they are decided either by the creditor or as a result of external factors (such as the date of provision of services or delivery of goods). In such cases, Point (ii) of assumption (f) may apply instead of (a) or (b) (see Section 4.2.5. below).

Finally, the concept of additional drawdowns on the basis of the amount of the credit repaid (an option available in revolving credit agreements), is not a factor in the calculation of the APR unless it applies by virtue of assumption (e).

DURATION AND REPAYMENT

<u>Overdraft facilities</u>: (d) In the case of an overdraft facility, the total amount of credit shall be deemed to be drawn down in full and for the whole duration of the credit agreement. If the

duration of the overdraft facility is not known, the annual percentage rate of charge shall be calculated on the assumption that the duration of the credit is 3 months.

Open-end credits: (e) In the case of an open-end credit agreement, other than an overdraft facility, it shall be assumed that: (i) the credit is provided for a period of 1 year starting from the date of the initial drawdown, and that the final payment made by the consumer clears the balance of capital, interest and other charge, if any; (ii) the capital is repaid by the consumer in equal monthly payments, commencing 1 month after the date of the initial drawdown. However, in cases where the capital must be repaid only in full, in a single payment, within each payment period, successive drawdowns and repayments of the entire capital by the consumer shall be assumed to occur over the period of 1 year. Interest and other charges shall be applied in accordance with those drawdowns and repayments of capital and as provided for in the credit agreement. For the purposes of this point, an open-end credit agreement is a credit agreement without fixed duration and includes credits which must be repaid in full within or after a period but, once repaid, become available to be drawn down again.

Credits other than overdraft and open-end credits: (f) In the case of credit agreements other than overdrafts and open-end credits as referred to in the assumptions set out in points (d) and (e): (i) if the date or amount of a repayment of capital to be made by the consumer cannot be ascertained, it shall be assumed that the repayment is made at the earliest date provided for in the credit agreement and is for the lowest amount for which the credit agreement provides; (ii) if the date of conclusion of the credit agreement is not known, the date of the initial drawdown shall be assumed to be the date which results in the shortest interval between that date and the date of the first payment to be made by the consumer.

The date or amount of a payment still cannot be ascertained: (g) Where the date or amount of a payment to be made by the consumer cannot be ascertained on the basis of the credit agreement or the assumptions set out in points (d), (e) or (f), it shall be assumed that the payment is made in accordance with the dates and conditions required by the creditor and, when these are unknown: (i) interest charges are paid together with the repayments of capital; (ii) a non-interest charge expressed as a single sum is paid at the date of the conclusion of the credit agreement; (iii) non-interest charges expressed as several payments are paid at regular intervals, commencing with the date of the first repayment of capital, and if the amount of such payments is not known they shall be assumed to be equal amounts; (iv) the final payment clears the balance of capital, interest and other charges, if any.

Of this set of assumptions, only assumption (e) as regards the assumed duration of 1 year, and assumption (f) as to the assumed repayment dates, existed in the past, since 1990.

Assumption (d) establishes a special regime for overdrafts, according to which the total amount of the credit is presumed to be drawn down in full and to remain so for the duration of the agreement, which means that repayment of the credit only takes place at the end of the agreement.

If the overdraft facility has a fixed duration, and the credit must be repaid in full at the end (and is not available to be drawn down again), that fixed duration shall be taken into account. However in all other cases, the duration is assumed to be 3 months (even if it is known that the facility is likely to last longer). This differentiates the treatment of overdrafts from other open-end agreements (such as credit cards and lines of credit or other revolving credits), whose assumed duration is 1 year according to assumption (e), as is explained in the following. The shorter duration of overdrafts is justified by the transitory nature of these products.

Assumption (e) deals with open-end credit agreements other than overdrafts. The method of calculation of the APR in these agreements is not straightforward, for a number of reasons. Firstly, these agreements do not have a fixed duration, which makes it difficult to calculate an APR. Secondly, these agreements typically take the form of revolving credit agreements, meaning that the credit may be used repeatedly as the borrower repays the sum used. The borrower can choose how much to draw down each month, and usually he can also choose how much to repay. As a result, none of the features, i.e. the duration, the drawdowns, the repayments or the amount due at each moment in time are known in advance, as they are dependent on how the borrower uses the credit[44]. Examples of the cases of revolving credit agreements dealt with in this assumption include credit cards agreements, charge cards and lines of credit, but not overdrafts as they are explicitly excluded.

Therefore, the calculation of the APR in open-end credit agreements requires the application of assumptions concerning the duration, drawdowns and repayments, with due consideration to the terms of the agreement and the aim of homogeneity which promotes the comparability of the APR among products.

As indicated in the final paragraph of assumption (e), these agreements include cases where the credit must to be repaid in full within or after a period (meaning that there are maximum

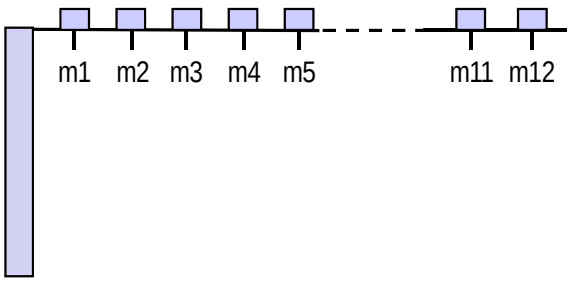
[44] The absence of a fixed duration is the element which triggers assumption (e), as stated in the final paragraph of the assumption. The other features mentioned typically accompany the absence of a fixed duration, but are neither necessary nor required for the application of assumption (e). For example, if a credit agreement provides for minimum repayments of the amount owed, then the credit becomes open-ended. This is because the duration of the credit becomes not fixed: the credit can last more or less depending on the repayments made by the borrower. Also note that in cases where the borrower can make additional drawdowns of the credit as he pays the sum used, the duration of the credit becomes not fixed. However, if the flexibility of repayments is combined with non-revolving features and the requirement of a final payment at a given date, then the credit has a fixed duration (see example 24 of calculation of the APR in chapter 3).

For a proper application of assumption (e) also distinguish maximum duration from fixed duration. A fixed duration implies not only a limited duration, but also the existence of a specific date of termination of the credit (in terms of drawdowns and repayments, which are the relevant elements for the APR). For example, credit cards have a maximum period of validity but the agreement is open-end and consequently the consumer can effect termination of the contract free of charge and at any time, provided that the credit has been repaid.

or a certain number of periods until full repayment) but, once repaid, the credit becomes available to be drawn down again. Therefore, such periods do not establish the duration of the agreement, because the credit revolves and can be used in successive new periods[45].

Point (i) of assumption (e) establishes an applicable duration of 1 year for open-end agreements (other than overdrafts), implying that APRs are obtained on the basis of this duration. This is appropriate given that the agreements are open-ended and the APR is intended to provide an annual cost comparator. The 1-year period starts at the date of the initial drawdown, so that the final payment is assumed to be made one year after the initial drawdown (e.g. if the initial drawdown takes place on January 5th of a given year, the final payment is made on January 5th of the following year). This overrides the terms of the agreement, which otherwise typically require minimum repayments until the balance is repaid.

Point (ii) determines the scheme of repayment of the amount of the credit within the 1 year period. In general, such a scheme will consist of equal monthly repayments of capital[46], starting one month after the date of the initial drawdown. This is illustrated in the figure below, which also assumes that the initial drawdown is for the total amount of the credit. This case illustrates a credit agreement with freedom of drawdown under assumption (a). As can be seen, for months 1 to 12, an equal repayment of 1/12 of the amount of the credit is assumed, resulting in full repayment of the amount of the credit in 1 year.



Compared to other schemes of repayments, such as minimum repayments or equal instalments comprised of capital and interest (or capital, interest and charges), this scheme of equal repayments of capital provides a relatively high level of APR compared with other options for the assumed duration of 1 year. Also, it is easy to understand for consumers, it does not encourage over-indebtedness, and facilitates the calculation of repayments and charges for the creditors[47].

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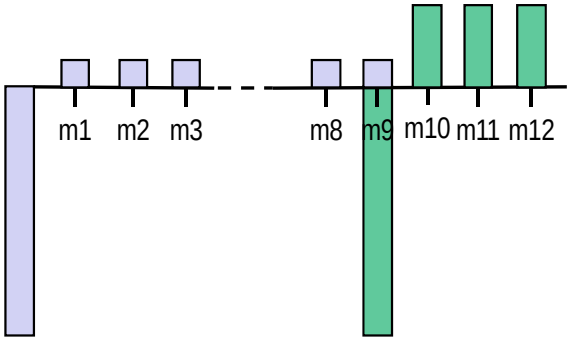
[45] Note that this final paragraph of assumption (e) specifically limits the applicability of the definition of open-end credit to that assumption. This is because this assumption is only relevant for the calculation of the APR (the definition focuses on the duration of the credit and the schemes of drawdown and repayment). These schemes are not relevant for Article 13.

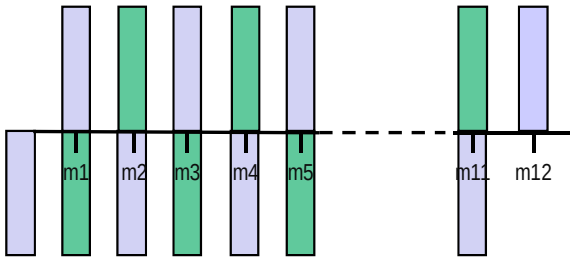
[46] The term 'capital' refers to the amount of credit drawn down, as distinct from interest and other charges payable on the credit.

[47] If the equal instalments were to comprise capital and interest, this would require an iterative process ('trial and error') to determine the amounts of repayments of capital which, taken together with interest payments (and any applicable charges), give rise to instalments of equal monthly value.

If the credit agreement establishes recurrent periods until full repayment which are shorter than 1 year, after each of which the credit becomes available to draw down again, these periods will be respected by assuming equal monthly payments of capital within the period until full repayment and again within the remaining period until 1-year is reached. This case is illustrated in the following figure, which assumes a maximum period until full repayment of 9 months, followed by another full repayment in the remaining period of 3 months. Each of these periods begins with the drawdown of the total amount of the credit, and obviously, the repayment instalment of capital are lower in the first period (the borrower has 9 months to make the payments) than they will be in the second (with only 3 months to make the repayments).



Finally, in cases such as charge cards, where the capital must be repaid only in full in respect of each payment period, but once repaid becomes available to be drawn down again in full, the assumption states that successive drawdowns and repayments of the entire capital will be assumed to occur over the period of one year. This is illustrated in the following figure, for the case of a credit agreement requiring repayments in full every month:



In relation to payments of interest and other charges, point (ii) of assumption (e) states that the amount will be obtained from the terms of the agreement and the relevant scheme relating to drawdown(s) and repayment of capital. For example, in the case of credit cards, drawdown(s) will be determined by assumption (a) or (b) and repayments by points (i) and (ii) of assumption (e). In the case of charge cards, successive drawdowns and repayments in full are assumed, as above. Whenever this does not suffice for obtaining the amount and/or date of a payment of interest or other charges, assumption (g) will apply. These payments, together with the repayments of capital, determine the sums to be paid by the consumer at each payment date. These sums are allocated firstly to paying interest and other charges and then capital (making them consistent with the way in which amortisation schedules are displayed).

Overdrafts and open-end credits are excluded from application of the next assumption, namely assumption (f). To illustrate the appropriateness of such exclusions, note for example that, as seen above, assumption (e) requires monthly and equal repayments of capital in open-end credit agreements (other than overdrafts). This means that minimum repayments or other repayment periods stipulated in assumption (f) would be contradictory and are not allowed, thereby restricting the repayment rules of assumption (f) to fixed duration credit agreements.

This assumption (f) covers three different situations:

Case 1. The date of a repayment of capital is not known (and cannot be ascertained) from the agreement. In this case, the payment will be presumed to be made at the earliest date provided for in the agreement, thus leading to the highest possible APR. For example, if the agreement allows the consumer to choose the date of repayment provided that it is no later than a specified date, the repayment is deemed to be made the day immediately following the date of drawdown. If on the other hand payment is required to be made on or after a specified date, then it is assumed to be made on that date.

Case 2. The amount of a repayment of capital is not known (and cannot be ascertained) from the agreement. In this case, the repayment will be presumed to be the lowest amount for which the agreement provides. For example, if the agreement requires the consumer to make a minimum monthly payment equal to 10% of the outstanding balance of capital and interest, the amount of capital to be repaid will be obtained by deducting the amount of charges payable each month from this minimum payment. This gives the figure for the minimum amount of repayment of capital. This choice of lowest repayments is preferable to requiring highest repayments as this could imply full repayment of the credit in a very short period which would be unrealistic. In this case of minimum payments, the final repayment would not be the minimum, but would be the residual amount by virtue of assumption (g). It should also be noted that when different schemes of repayments are available to the consumer, such as a minimum percentage of the amount of the credit, a minimum amount or equal instalments, only one of these schemes will be taken into account for the calculation of the APR. The choice of repayment scheme will be the one providing the lowest first repayment.

Case 3. The date the agreement is concluded is not known in advertising or at the pre-contractual stage and this has an effect on the length of the interval to the first payment to be made by the consumer. This idea also applies to situations where the date the agreement will be concluded is known but the date of the initial drawdown is not (as assumptions (a) and (b) do not apply and the date of drawdown cannot otherwise be ascertained). An example of this situation could be a linked credit agreement with an unknown delivery date of the financed good or the provision of a service, where the credit drawdown takes place or begins on the date of delivery[48].

Examples of such situations include:

[48] In this case, (f)(ii) refers to the date the good is delivered or service is provided rather than the date on which the agreement is entered into.

- Credit agreements where payments are required to be made on specific dates (e.g. the first day of each month) irrespective of when the agreement is entered into;
- Credit agreements where the interval to the first payment depends on the date of the initial drawdown. For example, the agreement could stipulate that a drawdown occurring before or upon the 15th day of a month implies that payment is due on the first calendar day of the following month. If the drawdown occurs after the 15th day of a month, then payment is due the first calendar day of the second following month.

According to assumption (f), when the date of the initial drawdown is not known, it shall be assumed to be the date which results in the shortest interval between that date and the date of the first payment by the consumer, thus leading to a highest possible APR.

For the first example above, i.e. payments on specific dates, this would mean that the date of the initial drawdown would be one day before the date of the first payment. For the second example, the shortest interval to the first repayment would be 14 days (assuming the shortest possible period, which is February 15th to March 1st in a non-leap year). This means that the initial drawdown would be assumed to occur on February 15th. These intervals of 1 day and 14 days, respectively, should be used at the advertising and pre-contractual stages for these agreements in order to obtain the interval to the first payment, provided that the terms of the agreement are coherent with such intervals[49]. The intervals for the next and following payments would be obtained by adding months to those first intervals, in accordance with remark (c).

Similar reasoning would apply to the case where payment dates are unknown (case 1 above) because they depend on the dates when statements are received. In this situation, unless otherwise specified, it will be assumed that the statement is received by the consumer on the first day after the end of the billing period, and the payment is made on that same date. Therefore, if the billing period ends at the end of the month, it shall be assumed that the consumer receives the statement on the first day of the following month and pays immediately.

The last assumption of this set, assumption (g), applies to all types of credit agreements, either open-end or non open- end (including overdraft facilities). Its purpose is to determine the date and/or amount of a payment of capital, interest or other charges where these are unknown and cannot be ascertained from the agreement, and where the previous assumptions do not provide a solution.

The need to determine these elements may arise when the credit agreement is silent about the date or amount of the payment. This could happen, for example, if the payment of a charge of €10 was required but the date of payment was not mentioned. Payment dates or

[49] When, for example, the duration of the credit is specified as exactly three years, payments are monthly, and the last payment clears the balance at the end of the third year, it is clear that the first payment is made one month after the date of the initial drawdown, and so assumption (f) is not needed.

amounts could also be at the discretion of the creditor, such as when the agreement provides for the issue of monthly statements with the payment date specified, but leaves some discretion to the creditor as to when each statement will be issued.

The first paragraph of assumption (g) specifies that the conditions required by the creditor will be respected before establishing any additional assumptions about dates or amounts. For the example regarding statements issued at the discretion of the creditor, if the billing period covers each calendar month and each monthly statement is issued on the 4th of the next month, specifying a due date falling on the 25th of that month, the consumer is assumed to make the payment on that date (even though it is not specified in the agreement itself). Similarly, a fee which falls due 14 days after the date of the statement is assumed to be paid at that date.

Points (i) and (iii) of the assumption are practical in nature and presume a regular payment of interest and other recurrent charges. The frequency of payment of interest charges is linked to the repayment of capital, given the interdependence of capital and interest charges. The amount of interest payable in each case will be the amount accrued up to the date of the repayment of capital, and this will be deemed to be paid together with the repayment of capital.

The frequency of payment of other, non-interest recurrent charges depends on the number of such charges. As to the amounts, if they are not known in the case of non- interest charges, equal payments are assumed. These may or may not correspond to the timing of repayments of capital, depending on the number of non-interest charges.

Point (ii) of the assumption, regarding single sum charges, leads to the highest possible APR.

Point (iv) ensures full repayment of the credit and all interest and non-interest charges at the end of the agreement. In the case of open-end agreements, other than overdraft facilities, this is also reflected in assumption (e)(i) to ensure full repayment at the end of the assumed duration of one year.

RATES AND CHARGES

<u>Different ways of drawdown with different charges or borrowing rates:</u> (c) If a credit agreement provides different ways of drawdown with different charges or borrowing rates, the total amount of credit shall be deemed to be drawn down at the highest charge and borrowing rate applied to the most common drawdown mechanism for this type of credit agreement.

<u>Different borrowing rates and charges offered for a limited period or amount</u>: (i) If different borrowing rates and charges are offered for a limited period or amount, the borrowing rate and the charges shall be deemed to be the highest rate for the whole duration of the credit agreement.

<u>Fixed borrowing rate for a initial period and later periodically adjustable borrowing rate according to an indicator:</u> (j): For consumer credit agreements for which a fixed borrowing rate

is agreed in relation to the initial period, at the end of which a new borrowing rate is determined and subsequently periodically adjusted according to an agreed indicator, the calculation of the annual percentage rate shall be based on the assumption that, at the end of the fixed borrowing rate period, the borrowing rate is the same as at the time of calculating the annual percentage rate, based on the value of the agreed indicator at that time.

Variable borrowing rate or charges: (19.4) In the case of credit agreements containing clauses allowing variations in the borrowing rate and, where applicable, charges contained in the annual percentage rate of charge but unquantifiable at the time of calculation, the annual percentage rate of charge shall be calculated on the assumption that the borrowing rate and other charges will remain fixed in relation to the initial level and will remain applicable until the end of the credit agreement.

Except for the assumption in the APR article, which appeared in Directive 90/88/EEC in the same terms, all the assumptions in this set are new.

Assumption (c) deals with the existence of different forms of drawdown of the amount of the credit[50] with different charges and/or borrowing rates. This situation usually occurs in the case of credit cards agreements because they typically distinguish between transactions such as cash advances, payments for purchases, balance transfers and foreign currency transactions and impose different rates and/or charges for each drawdown mechanism. Given that the application of different rates or charges, depending on the drawdown mechanism used, implies a different APR, the choice of the most appropriate drawdown mechanism for the calculation of the APR is a relevant issue.

The assumption mandates the use of the most common drawdown mechanism, but does not say how it is determined. Hence, MS may introduce provisions in this respect if they wish to guide creditors or they can leave the choice of the drawdown mechanism to each creditor. In the latter case, the assumption implies that the creditor should analyze the use of the different drawdown mechanisms by its customers for the type of credit product offered by him, (or likely to result from the advertising) and choose the most common drawdown mechanism based on reasonable expectations.

The determination of the most common mechanism could, for example, be established on the basis of different criteria such as the frequency of use or the total value of transactions within a given period. When the creditor is unable to identify the most common mechanism, and does not have a basis to reasonably determine such mechanism, a solution coherent with the assumption would be to choose the mechanism with the highest borrowing rate and charges.

[50] This assumption refers to mechanisms of drawdown of the credit (e.g. cash advances), and not drawdowns of the balance in the consumer's account (e.g. cash deposits with debit entry).

Assumption (i) applies where different borrowing rates and/or charges are offered for a limited period or in respect of different amounts of credit. These cases include products with reduced or even zero introductory interest rates, designed to attract customers, for example in the credit card market, or for small value credits, for example in overdraft facilities.

The assumption implies using the highest borrowing rate and charges and shall be applied when, at the date of the calculation of the APR, the relevant elements of the credit which determine the application and the effect on the APR of the different interest rates or charges are not known. For example, introductory rates or charges for a limited period shall not be taken into account for the calculation of the APR in open-end credit agreements, where the duration of the credit is not known at the date the APR is calculated or in cases where the amount of the credit is not known in advance. Another example could be the application of reduced rates or charges, which depend upon a specific pattern of drawdowns and/or repayments. A consumer may be offered a repayment schedule in the first three months or drawdowns within a certain period[51], and if he is not bound by such patterns, the lower rates or charges shall not be taken into account for the calculation of the APR.

The aim, in all cases, is to consider, for the calculation of the APR, only those benefits which are certain and quantifiable at the time the APR is calculated, thus providing a realistic measure of the costs of the credit and of the APR. When these benefits are not certain or quantifiable, the APR shall be obtained under a worst case scenario. In this scenario, such benefits are to be disregarded and are not included in the APR calculation.

Finally, note that assumption (i) refers to the "*whole duration of the credit agreement*". There may be cases where the agreement is open-ended but the credit is deemed to be repaid within a specified period, typically one year (by virtue of assumption (e)). Regardless of this, a higher borrowing rate or charge will be used under assumption (i) even if it is payable later than the assumed period of credit. For example, an annual fee may be waived in year 1 but becomes payable in year 2; if the amount of the fee in year 2 is known or can be ascertained, it must be used in the APR calculation.

Assumption (j) applies to those agreements where a fixed borrowing rate is agreed in relation to an initial period after which the borrowing rate is determined and subsequently adjusted according to an agreed indicator. This feature appears especially in instalment credits, some times also as a type of benefit to the borrower when the fixed rate is low in comparison with the variable rate. The assumption determines the rate following the end of the initial fixed-rate

[51] For example, a credit product which offers a zero borrowing rate for drawdowns in the first nine months. In this case, application of assumption (a) of immediate drawdown in full would imply presentation to the consumer of a sharply lower cost of the credit (and the APR). It might be unrealistic for a consumer to obtain this if he does not, in practice, drawdown the full amount. A similar example would be a credit, which provides a waiver of its annual fee if the consumer withdraws a given amount of credit in the first three months. Again, application of assumption (a) would imply a presentation of an extremely low cost of the credit (and the APR) which might not be obtained in reality by the consumer.

period. Specifically, after the initial fixed-rate period the borrowing rate will be assumed to be determined by the value of the agreed indicator at the time of calculating the APR.

It should be noted that assumption (j) may need to be applied in conjunction with assumption (i) in cases where both are relevant[52]. In other words, if an introductory rate or charge is being disregarded under assumption (i), on the basis that the benefit is not certain and quantifiable, then this assumption applies irrespective of whether the rate following the introductory period is specified in the agreement or is ascertainable using assumption (j).

For example, in the case of an open-end credit agreement (such as a credit card agreement or overdraft facility), the benefit derived from a lower fixed or variable rate is not certain and quantifiable, and should therefore be disregarded in the APR calculation by virtue of assumption (i). This is true irrespectively of whether the lower rate applies at the start of the agreement or subsequently.

To illustrate the simultaneous application of assumptions (i) and (j) in the case of open- end credit agreements, consider the case where the borrowing rate is fixed at 1% for 2 years, and after that it reverts to the (variable) Euribor rate plus 1%. If at the time the APR is calculated the Euribor rate is 2.1%, applying (j) means that the borrowing rate after the first 2 years is assumed to be 3.1% (i.e. 2.1% + 1%) and to be fixed at that level for the remainder of the agreement. This is higher than the initial fixed rate, which is therefore disregarded under (i). This means that the borrowing rate is assumed to be 3.1% for the whole duration of the agreement. On the other hand, if the borrowing rate is fixed at 4% for 2 years, and then reverts to Euribor plus 1%, the highest borrowing rate is 4% (not 3.1%) and this is assumed to apply for the whole duration of the agreement.

There may also be cases involving non open-end agreements where assumptions (i) and (j) apply simultaneously. For example, an agreement may have a fixed duration but the consumer may have freedom of drawdown and/or repayment (either completely or within limits), and so the amount of credit at any given time – and hence the amount to which the borrowing rate applies – is not ascertainable except by using assumptions in Annex I. In such a case, assumption (i) should apply, even if assumption (j) also applies.

On the other hand, if the amount and duration of credit are known then assumption (j) can apply irrespectively of assumption (i). For example, assume it is known that €2000 will be drawn down on 1 January, and will be repaid in monthly intervals, in amounts determined by the contract, for a total of three years. The borrowing rate in the first year is 5%, in the second year it will be Euribor plus 1%, and in the third year Euribor plus 2%. Suppose that Euribor is 6% when the agreement is entered into. Applying assumption (j), the rate in the second year will be 7% and in the third year it will be 8%. All other elements of the APR calculation are however known and quantifiable, so there is no need to apply assumption (i). In such a case, the lower rates in years 1 and 2 should be applied in the APR calculation.

[52] Note that neither of the assumptions excludes the application of the other.

In other words, if only assumption (j) of Annex I is used, there is no need to apply (i) in addition, but if any other assumption from Annex I is used (e.g. because the amount or duration of credit is unknown or if it varies), then this triggers assumption (i) in addition.

As to the interrelations between assumption (j) and Article 19(4), it should be noted that assumption (j) does not constitute an exception to the assumption in Article 19(4); rather, these assumptions complement each other.

Article 19(4) provides for the treatment of borrowing rates and charges that may vary in ways that are unquantifiable at the time of the calculation of the APR. In such cases, the rates and charges are assumed to remain fixed in relation to their initial level until the end of the agreement. Assumption (j) refers to those agreements where a fixed borrowing rate is agreed in relation to an initial period, after which the borrowing rate is variable (specifically, periodically adjusted according to an agreed indicator). This assumption (j) shows that the solution provided by Article 19(4) should be applied to the variable rate period (where charges vary and are unquantifiable at the time of the calculation of the APR). This means that the fixed rate applies for the initial period, followed by the variable rate for the remaining duration of the agreement as determined by the value of the indicator at the time the APR is calculated.

Article 19(4) also provides a solution in cases where the change of the rate is only a possibility (e.g. when the agreement stipulates that after the initial period of a fixed borrowing rate, a new fixed rate may be agreed instead of proceeding with a variable borrowing rate). In contrast, assumption (j) applies only when it is known that the rate will change.

There may be cases where it is known in advance that the rate will change and the extent of the change is ascertainable using assumption (j), but the timing of the change is not known and cannot be ascertained (e.g. the change occurs at the discretion of the creditor or is dependent upon external circumstances). In such cases, assumption (j) is applied to determine the new rate, and assumption (i) is then applied to ensure that the highest rate and charges apply for the whole duration of the agreement.

2. CONSUMER CREDIT AGREEMENTS IN THE EUROPEAN UNION

The second part of the study is devoted to the analysis of consumer credit agreements in the EU. This analysis is of interest for the two objectives of the study. Firstly, the adaptation of the APR examples should take into account the consumer credit market in the MS of the EU in order to guarantee that the examples cover the main products in the market and reflect their main characteristics. Secondly, the assessment of the assumptions used for the calculation of the APR carried out before was connected to our knowledge and findings about the market in respect to products and practices.

Motivated by those objectives, the focus of analysis is on elements which are of relevance for the calculation of the APR, such as the mechanism of drawdown and repayments, the existence of fees and charges, the temporal distribution of the cash flows of the credit and the existence of ancillary services and agreements connected with the credit.

The variety is huge due to the tendency of the market to provide more products more tailored to the needs of borrowers and lenders, and also because the study focus in the situation of the market in the first quarter of 2009, when the effects on consumer credit markets of the international financial and economic crisis only had began. This variety is of interest for the purposes of designing examples of calculation of the APR covering an ample range of products and features.

In order to contextualize the analysis, in section 2.1 we provide a brief snapshot of the market which highlights the two main features of the market, namely its dynamism until 2008 and its heterogeneity. Heterogeneity has been the main challenge for the analysis and has been taken into account both for the design of the strategy to collect information on the credit products marketed in the EU, explained in section 2.2, and subsequently for the description of the products. This description extends over two sections. The first offers a general overview of the types of consumer credit agreements and their general characteristics, and the second goes into the details of the credit products analysed.

2.1. A SNAPSHOT OF THE MARKET

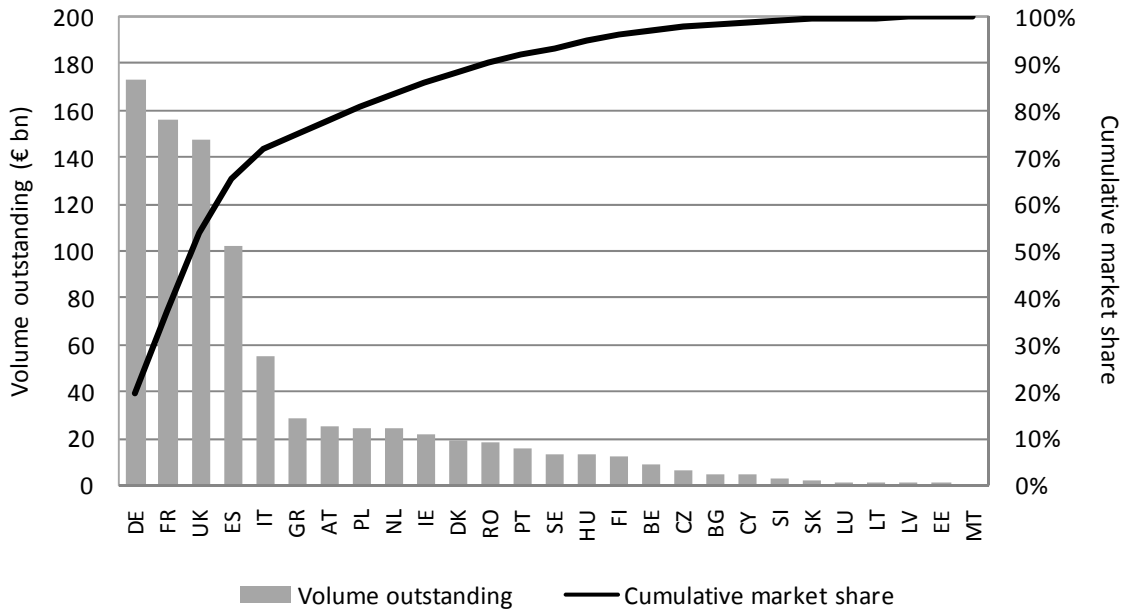
The consumer credit market boomed since the mid-nineties until 2008 due to the combination of international financial deregulation and continuous economic growth. According to data from the ECB[53], the outstanding amount of consumer credit provided by credit institutions (CI) in the EU27 increased from €697 bn in 2003 to €913 bn in 2007, which represents a compound annual growth rate average of 7%. The growth was more pronounced in Southern countries,

[53] ECB Statistical Data Warehouse (Money, banking and financial markets), available at: http://sdw.ecb.europa.eu/

such as Greece, Spain, Portugal and Italy, and the new members of Central and Eastern Europe (CEE), with younger credit markets. However, this trend was broken in 2008, when the situation of credit constraint linked to the financial turmoil initiated in 2007 reduced the amount outstanding to €884 bn.

As shown in Figure 3, the largest consumer credit markets correspond to the most mature economies of Germany, France, UK, Spain and Italy. These five countries accounted for 72% of the total volume. Among these countries, UK constitutes an important benchmark not only because its quantitative relevance but also because the range of credit products available to consumers is wide and constantly widening, and is a source for innovations in other European countries. Furthermore, UK laws for consumer credit have been modernized frequently after extensive market research and grant a high level of protection to consumers.

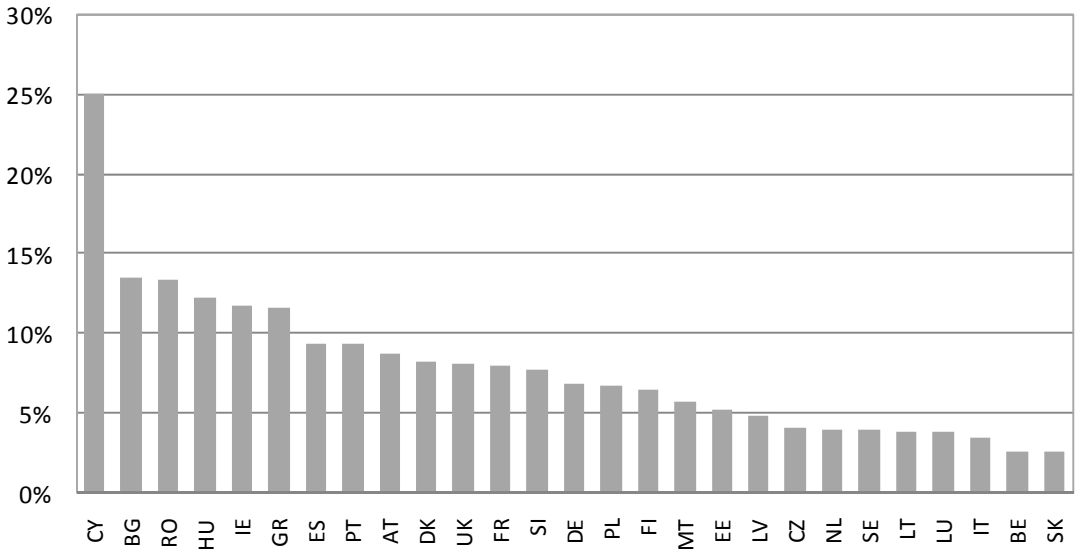
FIGURE 3. OUTSTANDING CONSUMER CREDIT PROVIDED BY CI IN UE27 MARKETS IN 2008



Source: ECB

If the relevance of national markets is measured by the ratio of outstanding consumer credit over gross domestic product (GDP), the figures change significantly. As shown in Figure 4, the ranking is headed by countries of the CEE followed by countries such as Ireland, Greece, Spain or Portugal whose performance in terms of growth exceeded the average.

FIGURE 4. OUTSTANDING CONSUMER CREDIT PROVIDED BY CI IN UE27 MARKETS IN 2008 AS A PERCENTAGE OF GPD

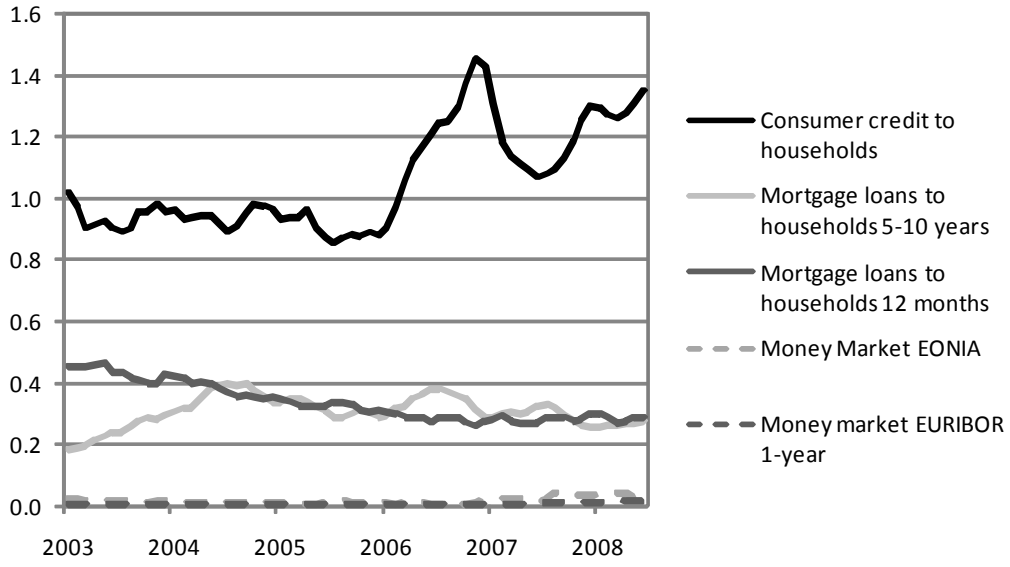


Source: ECB

These differences between countries constitute a first indicator that there is not a homogeneous consumer credit market in the EU. The reasons for this are various and have their roots in economic and social factors, such as differences in economic development, financial structures and consumer habits and attitudes toward credit products. Also, retail financial markets are shown to be far from being fully integrated, due to the existence of barriers to integration in the supply and the demand side of the market[54]. As shown in Figure 5, the cross-country standard deviation of interest rates on consumer credit in the Euro area stood at a high level of 1% on average over the period January 2003 to June 2008, even showing an increase in the last part of the period, while this same indicator amounted to 0.3% in lending for house purchases and was nearly negligible in wholesale banking.

[54] See, for example, ECRI (2008): EU Retail Financial Market Integration: Mirage or Reality?, Policy brief 3; Civic Consulting (2007): Broad economic analysis of the impact of the proposed Directive on consumer credit, Berlin (study requested by the European Parliament's committee on Internal Market and Consumer Protection; contract IP/A/IMCO/FWC/2005-058/LOT 4/SC1); Center for European Reform (2007): European retail banking: Will there ever be a single market?, Policy brief, December; or Centre for European Policy Studies (2004): Integration of the EU Consumer Credit Market: Proposal for a More Efficient Regulatory Model, CEPS Working Document No. 213/November 2004.

FIGURE 5. CROSS-COUNTRY STANDARD DEVIATION OF AVERAGE INTEREST RATES ON BANKING SEGMENTS IN THE EURO AREA (%)



Source: ECB

As mentioned, lending structures in the segment of consumer credit in the MS differ largely. While in countries like Germany, Greece, Ireland and Spain more than three quarters of the market is controlled directly by banks, in countries like France, Italy, Netherlands and United Kingdom non-bank institutions control more than a half of the market for consumer credit. As regard banks, typically the most important players in each country are the largest banks, which is not surprising given that European retail banking markets are fairly concentrated[55]. Among specialized companies, the main players in the European market are a relative low number of pan-European specialists which became huge due to mergers and acquisitions inside the industry. However, most of them belong to banking groups of the leading countries in the consumer credit market. This was the case, for example, of BNP Paribas Personal Finance, formerly Cetelem, owned by BNP Paribas (France), Sofinco, owned by Crédit Agricole (France), Santander Consumer Finance, owned by Banco Santander, and Unicredit Consumer Finance, owned by Unicredit Group (Italy). As a result, it can be said that with few exceptions banks, either directly or indirectly through bank-owned specialized companies, are the driving force of the consumer credit market in the EU.

When focusing on products, we also found huge changes in the range of products and significant differences between MS. Economic growth, changes in the attitude of consumers

[55] In January 2007 the European Commission published the conclusions of an enquiry into competition in retail banking in the EU (European Commission (2007): Sector Inquiry under Article 17 of Regulation (EC) No 1/2003 on retail banking, Final Report, January). According to these, the ratio of the MS population-weighted average concentration ratio of the three and five largest retail banks across all EU25 countries amounted to around 50% and 60% respectively. However, there was a significant number of countries (FI, NL, BE, SE, LT, DK and SK) where the concentration ratios stood above 70%.

towards borrowing, financial innovation and deregulation and increasing competition led to the appearance and spreading of new credit products and innovations on existing ones.

Originally, the consumer access to credit was limited to proximity relationships with family members or local merchants who had knowledge about the consumer's solvency or to burdensome financing such as pawnshops and loan sharks. Only in the 1920s did consumer credit start to become a reality for most consumers by means of some manufacturers of big-ticket items, especially car companies, who started to offer financing to their customers so that they did not need to pay the entire purchase price but only to make "a small down payment and easy monthly payments", as the ads used to say. This practice extended to other companies of different sectors and stores. Some retailers also started to issue credit cards but with very little flexibility and only a limited measure of convenience. For this reason, it can be said that until the 1960s instalment credit was nearly the only credit facility available to consumers. Things changed radically thereafter when financial innovation and changing consumer attitudes toward borrowing converged and banks entered into the business of credit cards by offering general-purpose cards that consumers could use in a wide variety of situations[56] and other new products such as overdraft facilities and revolving credit linked to bank accounts. Consumer acceptance of credit in its diverse forms has been such that more than half of the consumers in EU currently use consumer credit for funding purchases, seven in ten EU citizens have one or more bank or credit cards and about twenty percent have an overdraft facility on their bank accounts[57]. Moreover, in recent years creditors have put consumer credit products into perspective and taken them as a part of the financial plan for the consumer's life cycle and for a permanent relationship with the entity.

As can be expected from the differences in consumer preferences and economic and financial structures, the penetration of the various credit products in the national markets differs in MS. As shown in Figure 6, credit cards, for example, account for a large market share in UK, Greece, Ireland and France, while in countries such as Denmark, Austria or Finland the penetration of credit cards is very low.

Notwithstanding, Figure 6 clearly illustrates that the most common way of consumer financing are personal loans, with the only exceptions in the graph being Germany, Portugal and Italy,

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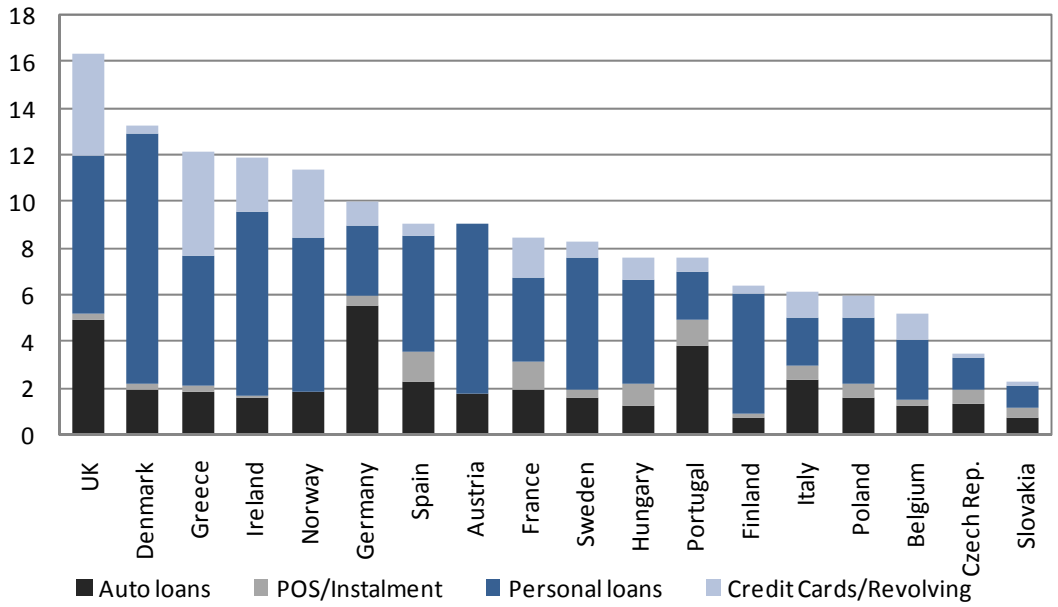
[56] Diners Club first introduced the concept of the dual-party card in 1949 in USA according to which the card issuer was a not the provider of the goods or services being purchased but it offered the card to vendors interested in participating in the credit card plan. US banks later adopted this innovation. Franklin National Bank was the first bank to introduce a card program in USA in 1951; a few years later Bank of America launched BankAmericard (now Visa) and Chase Manhattan Bank launched MasterCharge (now MasterCard). Although large retailers with well-established credit card programs of their own were initially reticent to these general-purpose cards and the banks faced the problems related to contacting and exchanging information with potential interested parties, the recognition that customer spending was higher using these cards and technological advances in the area of communications made it possible for general-purpose credit cards to spread rapidly among consumers, first in USA and later in EU markets.

[57] See Eurobarometer (special), August 2005: Public Opinion in Europe on Financial Services.

where vehicle financing plays a prominent role. Overall, vehicle financing constitutes the second means of financing, and it is followed by revolving credit, with or without the physical support of a credit card. Point of sale financing constitutes the least relevant source of financing for consumers.

FIGURE 6. MARKET PENETRATION PER CONSUMER CREDIT PRODUCT
IN SOME EUROPEAN COUNTRIES IN 2006 (VOLUME RELATIVE TO GDP IN %)



Source: Oliver Wyman Group (2008): Consumer Finance in Europe: Back to Reality.

The greater relevance of personal loans and revolving credit compared to vehicle loans and point of sale financing reveals that consumers tend to establish a direct relationship with the lending entity, and not with the merchant, and that the major part of the money lent is not linked specially to the purchase of a good or service. This is exactly the opposite scenario to that found in the origin of consumer credit financing and points to the success achieved by the general-purpose products offered by banks and specialized companies outside the sphere of vendors. Nevertheless, it should be highlighted that the separation between banks and specialized companies and vendors and their captive financial companies, on the one hand, and between vehicle and point of sale financing and general purpose financing, on the other, is less and less clear. Our research into the modalities of consumer credit agreements in the EU has revealed that banks and specialized companies frequently enter into the business of vehicle financing, that captive companies controlled by manufacturers and retailers were trying to expand their business by offering general-purpose credit cards and loans, and that agreements between banks or specialized companies and vendors are quite common.

2.2. COLLECTING INFORMATION

During the elaboration of this study we have gathered information about consumer credit products and agreements from different sources including banking supervisors, consumer agencies, associations of banks and consumers and financial advisors. The reports, studies and guides from these institutions have been of a great value in obtaining a general view of the structures, tendencies, players and products in the market, and also of the interests and positions of consumers and industry regarding consumer credit products and Directive 2008/48/EC. However, the design of the APR examples requires going into details about the structure and features of consumer credit products that are usually beyond the scope of these studies and analysis. For example, an industry report on consumer credit in EU cannot be expected to indicate the conditions governing the drawdown of all the forms of credit or the special features of some credit products offered as a part of marketing strategies to attract consumers. Besides, these studies and analyses, when they deal with consumer credit products, are usually specific to a spatial area in Europe (a country, such as UK or France, or a more homogeneous part of the European market, such as Central and Eastern countries) and a type of products (for example, credit cards or payment protection insurance) or, in contrast, they deal with the market as a whole without entering into the specific details of the different countries and products. In short, there is no reasonable guarantee that they cover the different features and detailed characteristics of consumer credit agreements which are relevant for the calculus of the APR in all the countries of the EU.

For these reasons, we perceived the need to collect information about the products selling on the market from their original source, that is, from the credit providers themselves. However, this raised some difficulties.

Firstly, there is a problem of dimension: the number of MS is large (27 MS in 2009) and for each country there is a wide range of consumer credit products (specific-purpose, personal or secured loans, revolving credit with or without the support of credit cards, different types of bank cards and store cards, overdraft facilities, hire-purchase agreements, etc.). Some of these products are frequently tailored to the needs of specific groups of consumers (e.g. students, young people or women), and also to different credit providers (commercial banks, mutual and cooperative banks, savings banks, vendor-captive or independent specialized companies).

Secondly, there are difficulties related to the language and terms used in the different MS. Besides the burden of different languages, there are cases in which critical financial terms are used differently among MS. The confusion about the terms hire-purchase, leasing and renting agreements can illustrate this issue. Although the term 'renting' unequivocally refers to those agreements where the consumer is not able to acquire the property of the goods rented (e.g. a car), not all the countries use it, and use the term 'leasing' to refer to these agreements. However, sometimes 'leasing' is also used for agreements that give the consumer the option to acquire the property by paying the residual value of the good. When this is not the case, the term 'hire-purchase' refers to these agreements, but there are also countries in which 'hire-purchase' agreements oblige the consumer to acquire the ownership of the good. As a result, although only those agreements where the consumer has an obligation to purchase the object of the agreement are included in the scope of the Directive 2008/48/EC, we have collected

information about both leasing and hire-purchase agreements and to check for the existence of such obligation in every single case.

Finally, the complexity of consumer credit agreements is also a difficulty. Consumer credit agreements include a large number of clauses, conditions and circumstances which are necessary for regulating the relations between the parties for the duration of the agreement. These include the amount of credit, the duration of the credit agreement, the conditions governing the drawdown of the credit, the amount, number and frequency of repayments, special payments at the beginning or the end of the agreement, the borrowing rate and the conditions governing the application of this rate and the periods, conditions and procedures for varying the borrowing rate, additional charges and fees either recurrent or non recurrent and for any reason (administrative charges, maintenance charges, fees linked to payment transactions and drawdowns, etc.), the sureties and insurance required and their handling and costs, etc. Each of these aspects, in turn, is characterised by all kinds of different possibilities as a result of modern procedures, competition and consumer tailoring. Moreover, although the Directive 2008/48/EC compels the provision of this information in Standard European Consumer Credit Information form, in the first quarter of 2009 this obligation was scarcely present in national laws, nor followed by credit providers of their own free will. As a result, this information appeared in different ways and might be hard to find. Sometimes there was lack of information (especially related to sureties and guarantees and mandatory ancillary services and costs), at other times the information was too profuse (for instance, when various examples are provided), and in some cases it was unclear and hard to understand. Besides, given the economic and temporal dimension of this study, it is obvious that the use of surveys among banks, specialized companies and retail vendors which would allow us to obtain detailed information in a homogenous and consistent manner is beyond its reach.

In order to adapt to these circumstances and with a view to the characteristics of the consumer credit market in EU, our strategy for collecting information followed two criteria: selection and ordering.

The criterion of selection applies to the elements which define the credit products and the sources of information. Regarding the former, our interest has been restricted to all those clauses and conditions which affect the APR in consumer credit products. Consequently, we have dismissed any information regarding non-compliance with the terms of the agreement, early repayment of the credit and any condition or clause referring to elements without an effect on the number, timing, frequency or quantity of the cash flows (drawdowns, repayments, charges and fees) generated either directly or indirectly by the credit. As regards the sources of information, given that our interest is in the credit products effectively being offered in the market, we have resorted to the original sources of information, that is, to the banking system, specialized companies and vendors. Also, we have collected the relevant information from the products they market on Internet, in recognition that Internet is one of the most transparent and fastest sources of information nowadays and that the higher level of competition which characterises this channel favours the obtaining of enhanced information about new structures and designs in consumer credit products. As a shortcoming, it is evident that we have not been able to obtain the detailed and organized type of information which could be collected by surveys or interviews, but given the low number of responses to surveys

in sensitive issues and the tendency at times to hide relevant information involving costs and obligations, by using Internet we can be sure that at least we obtain a response.

In order to achieve the objective of a proper identification of the main consumer credit products marketed in the 27 MS, we have taken into account the characteristics of the market in respect to the relevance of the different countries and credit providers to create a sample of credit providers that covers every single MS, but in different depth.

At the kick-off meeting hold in January 2009 the Commission suggested including savings banks in Germany and credit unions in Ireland in the analysis given their economic relevance. To comply with this requirement, and also to cover other countries where a similar but less known situation exists, we were especially careful in choosing our sources of information about the banking system in the EU. After reviewing different databases, we chose Bankscope (www.bvdep.com/en/bankscope.html). Bankscope is a comprehensive database maintained by Bureau van Dijk Electronic Publishing which contains information on 29,000 public and private banks around the world. Bankscope presents two features of interest for our study. First, the list of banks not only includes commercial banks, but also other types of institutions, including savings banks and cooperative banks. And second, it provides world and country rankings for the major institutions in each country which can guide us in the selection of the institutions. In order to check if the database was reliable in respect to savings and cooperative banks, we have compared the relevance of these institutions in each country in terms of their share in assets with the information provided by ESBG, the European Savings Banks Group (www.esbg.eu), and the EACB, the European Associations of Cooperative Banks (www.eurocoopbanks.coop). We have found out that Bankscope is a reliable source of information for the countries in the EU15[58]. However, there is a full or partial lack of information about savings and cooperative banks in some of the countries of the remaining UE12 group. Also, the institutions of some of these countries are not even members of the corresponding European association. Given that information obtained from other sources reveals that the economic relevance of savings and cooperative banks is scarce in these countries[59], we have decided to exclude them from the analysis. For each MS in the EU15, we have analyzed savings and/or cooperative banks when the share in assets of each type of

[58] The only exception comes precisely from Ireland for savings and cooperative banks. Bankscope does not include a single institution of either type. Furthermore, these institutions are not members of the corresponding European associations. However, cooperative banks in Ireland, which take the form of mutual banks, have been included in the analysis given the requirement of the Commission.

[59] For the ten MS of the 2004 enlargement, the ECB reports that in some countries (Cyprus, Hungary and Poland) there is a significant number of small cooperative banks, but the market share in assets of these institutions, and also of savings banks, did not reach the 10% level in any of these countries. Also, it is worth highlighting that the presence of foreign banks was very large in most of these countries. On average, more than 70% of bank assets were foreign-owned, basically by EU banks and in the form of subsidiaries. Besides, the four or five largest banks in each country are all foreign-controlled, with the only exceptions of Cyprus, Latvia and Slovenia, which were the countries where the share of foreign banks assets was lower than 50%. (ECB (2005): Banking Structures in the New EU Member States, January)

institutions to the total assets of the bank system in the country has surpassed a threshold of 10%.

In conclusion, our strategy to collect information about consumer credit products in the UE27 can be described as follows:

- Firstly, given the primacy of the banking system in the market for consumer credits, we have analyzed the complete range of consumer credit products offered by the largest ten banking institutions in the EU, according to the value of their assets at the end of 2007 from the information provided by Bankscope[60].

- Secondly, we have carried out extensive research on the consumer credit products offered in the five major markets of UK, Germany, France, Spain and Italy covering the full range of consumer credit products offered not only by the main banking institutions, but also by the major specialized consumer credit companies, automotive dealers, hypermarkets and department stores in these countries. The sample of banking institutions includes the main commercial banks for the five countries and savings banks and/or cooperative banks for those countries in which these institutions are relevant, as explained above. The selection of the non-banking companies has followed a criterion of size of sales. For example, for the car sector we have ranked world manufacturers according to the number of car sales in the EU based on the information by JATO (www.jato.com), which is a recognized provider of information and services to the automotive industry worldwide whose head office is located in UK. For department stores we have used the information from IADS, the International Association of Department Stores (www.iads.org). The ranking of specialized consumer credit companies has been taken from a report of Unicredit (www.unicredit.com). The analysis of the full range of consumer credit products marketed by these institutions and companies has allowed us to obtain a well-defined view of the kind of products available in these five major markets and of the structure and the elements of those products which are relevant for the calculation of the APR.

- Thirdly, we have collected information about the full range of consumer credit products offered by the main banking institutions in the rest of MS in the UE15. Using the same criterion applied to the five former countries, the list of banking institutions examined has always included commercial banks and savings banks and/or cooperative banks if they are relevant in the country analyzed. This information has allowed us to basically reinforce the conclusions drawn from the previous stage and cover gaps, but to a minor extent.

[60] Banks significantly affected in 2009 by the financial turmoil initiated in 2007 have been excluded from the analysis for this and the remaining stages. The only exception is Dexia Banque Internationale à Luxembourg, which has been included because the banks with retail banking activities in the top five in Luxemburg (Dexia and Fortis) were in similar conditions. The rest of the banks in this group are devoted to investment and private banking.

- Finally, for the remaining MS of the EU27, we have gathered information about the full range of consumer credit products, but only that offered by the main commercial banks in these countries. Again, the conclusions from previous stages have been supported to a large extent and only few additional pieces of information have been obtained.

It should be pointed out that our strategy for collecting information is consistent with the fact that our source of information is Internet, given that the major players in the different national markets have a significant presence in Internet[61].

The information collected from the different sources (banking institutions in the form of commercial, savings and cooperative banks, specialized companies, manufacturer dealers and vendors) has been combined in order to identify the characteristics of the main consumer credit products offered in the EU market which are relevant for the calculation of the APR.

The information from all these sources can be integrated because there is no division of products by type of credit provider, but merely a specialization of credit providers in certain types of products, customer segments, or a special focus on some characteristics of the products. What is more, our research has revealed that in some cases there is a tendency towards convergence of the products marketed by credit providers of different types.

To illustrate this, let us first consider the cases of savings and cooperative banks. A distinguishing feature of both types of institutions when compared to commercial banks is their emphasis on retail banking and their more intense connection with local and regional communities. The closer ties with the territory, which are usually derived from the fact that they usually belong to the communities in which they exercise their activities, allows increasing banking access in areas or markets where the presence of commercial banks is lower, such as Small & Medium Enterprises (SMEs), low income households in urban areas or farmers in rural areas.

Savings banks are different from the rest of banking institutions in that their objective, from their origins, has been to provide accessible financial products (saving products originally) to all the segments of the population. Consequently, their main concern, even nowadays, is to fight against the economic and social exclusion of the less favoured collectives of society. Apart from this, the range of products they offer the typical customer is similar to that offered by banks in retail activities. It includes payment services, savings products, credits in all different forms and insurance. Moreover, the success achieved by some saving banks in countries such as ES, SE and PT have allowed them to expand their activities and physical presence and climb to the top positions in the ranking of banks.

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[61] There are differences among countries and creditors. For example, rather limited information is provided in Internet in countries such as Austria, Belgium and Germany compared with other countries. Also, small cooperative and savings banks, as might be expected, provide scarce information about the specific characteristics of the products they offer.

Cooperative banks, on the other hand, are institutions whose target clientele is not society in general, but the owners (or members) of the institution. The members usually belong to the same local or professional community or share a common interest, and they create the cooperative bank in order to receive a range of banking and financial services adapted to their needs. As a consequence, the main objective of cooperative banks is not to maximise profit, like commercial banks, or to avoid financial exclusion, like saving banks, but to provide the best possible products and services to its members. In fact, some cooperative banks only lend to their members. This is especially true for the case of the small cooperative banking institutions which operate in countries like Ireland and UK as Credit Unions, and the cooperative banks in Germany. In all these cases, the members benefit from a special treatment which, in the case of consumer credit, is embodied in lower fees, lower interest rates, flexibility in payments and personal tailored solutions in case of difficulties to meet repayment commitments. However, in other countries where the presence of cooperative banks is relevant such as France and Italy, cooperative banks have become large institutions which provide all kinds of financial services to non-members as well as members.

Competitive pressure has also motivated the creation of associations of savings banks or cooperative banks whose aim is to support their partners by providing them with specialized services (such as clearing services, liquidity management or risk management, etc) and, what is of more interest to us, with the full range of banking products and services demanded by households and SMEs.

In respect to the captive financial companies created by car dealers, these obviously specialize in car loans and hire-purchases. In this market segment, where banks also participate, these companies have introduced attractive innovations, especially those companies belonging to countries such as Germany or Italy where car financing represents a large part of the consumer credit market. In fact, from our research it can be concluded that the range of products offered by these companies depends directly on the significance of the segment of car financing. Thus, in Germany and Italy, it is not uncommon to find among the offers general-purpose credit cards with special benefits for car drivers, such as discounts when refueling, rebates when travelling or promotions in car hire.

An even more interesting case is that of the financial companies linked to the major hypermarkets and department stores. Even when there is a dependence relation with the stores, they usually include among their products general-purpose loans and credit cards which provide financing not connected with purchases in the commercial establishment.

The arguments above confirm that the appropriate unit of the analysis for this study are the credit products themselves, and that our coverage of different credit providers is able to introduce new elements in these products.

2.3. GENERAL FEATURES OF CONSUMER CREDIT AGREEMENTS

The objective of this section to provide an overview of the types of consumer credit agreements and their general characteristics. The exposition is kept quite general because it

accommodates the consumer credit products found in our research of the market and provides a consistent framework for the elements of consumer credit products which will be described and detailed in the next section.

The picture is adapted to the objectives of this study and to the Consumer Credit Directive. For this reason our classification of the credit products and the elements we analyze may be different to those analyzed usually.

For example, in market analysis it is usual to distinguish between car loans, personal loans, revolving credit and point of sale financing. However, from the point of view of the calculation of the APR, this classification is of scarce interest. Car loans, for example, if paid by regular instalments are no different in structure from general-purpose loans also paid by instalments. Point of sale financing could take different forms, such as instalment loans, store cards or revolving credit accounts, but the calculation of the APR does not differ from comparable products offered by banks and specialized credit companies.

In particular, our attention is directed specially to drawdown and repayment mechanisms, the existence of fees and charges, the temporal distribution of the cash flows corresponding to withdrawals, repayments, charges and fees and the existence of sureties, insurance and other ancillary services and agreements which might be required in connection with the credit.

TYPES OF CONSUMER CREDIT PRODUCTS

Credit products are typically classified into two groups according to their basic structure and functioning: instalment credit and revolving credit.

INSTALMENT CREDIT

Instalment credit is a type of credit with provides the borrower with a fixed amount to be repaid over a given period by a fixed number of payments, called instalments. The instalments comprise repayment of the capital owed and interest charges and are paid regularly during the life of the credit. Interest charges are calculated over the capital owed in each period.

Forms of instalment credit include personal loans, leasing and hire-purchase agreements, and in general any form of credit which complies with the definition above.

In instalment credits, a part of the principal could be paid by means of an initial payment (also named down payment or advance payment) and/or a final payment. For example, in balloon-type credits, the borrower is required to pay low regular instalments and make a big payment, for example for an amount of 20 or 30% of the capital, at the end of the term of the credit. In hire-purchase type credits, both the down payment and the final payment could be very significant.

An initial payment has the effect of reducing the capital owed and thus also the charges for interest. Consequently, the amount of the regular instalments will be lower. A final payment

has exactly the contrary effect on interest charges because the part of the capital whose reimbursement is postponed will generate interest during all the term of the credit. Then, the amount of the regular instalments might increase (as a result of the higher interest charges) or decrease (as a result of the lower reimbursement of capital).

Instalments can be determined using different schemes, or amortisation methods. The main amortisation methods are:

- Constant instalments (French amortisation plan): This method is the most widely used. Instalments are of an equal amount during the life of the credit (if the borrowing rate is variable, they are constant during the periods in which the borrowing rate does not change). Each instalment comprises the interest charged during the period in full and the remaining part of the instalment reduces the capital owed. Since the capital owed decreases as new instalments are paid, and hence interest charges decreases, the new instalments include a lower quota of interest and a higher quota of capital repayment.

- Increasing instalments: instalments increase in a given percentage or amount at chosen intervals, for example each year. The lower instalments at the beginning imply a lower financial effort for the borrower at the cost of higher instalments in the future. The risk of this method for a borrower comes from the fact that it might happen that the first instalments, because of their low amount, do not pay interest charges in full. The pending interest charges would then be added to the capital owed, increasing it, which means that higher interest charges will have to be paid in subsequent instalments.

- Decreasing instalments: is the contrary scheme to the above, so instalments decrease in a given percentage or amount at chosen intervals.

In an attempt to meet borrower requirements, other methods can be applied. For example:

- First instalments consisting exclusively of interest: in this case, the first instalments consisting exclusively of interests are particularly low, while the later ones, which would include the repayment of capital are particularly high. Likewise, the total cost of the credit increases as a result of the postponement in repayment of the capital.

- Instalments with constant capital: each instalment comprises a constant quota of capital and the full charges for interest. Since charges for interest are lower as the capital owed decreases, this method implies that instalments decrease as time goes.

- Flexible repayment of the capital: here, the instalments include the interest charges generated in each period and the repayment of the capital is left to the discretion of the borrower, usually within the limits of a pre-established grid. For example, the borrower is required to reimburse 20% of the capital by year 2 (or at least 20%), 30% by year 3, 50% by year 4, and so on.

In general, it can be said any method is possible provided that at the end of the agreement the amount of the credit is reimbursed together with the interest charges generated by the capital owed in each period. In this way, if interest charges generated in a period are not paid as a

part of the instalment, they will be added to the capital owed, which imply that a higher amount of capital has to be reimbursed and higher interests will be charged. It is also clear that the existence of different schemes allows borrowers to choose the scheme that best fits their needs and their expected pattern of income.

REVOLVING CREDIT

Revolving credit has the following characteristics:

- Instead of borrowing a fixed amount as in instalment credit, the borrower may use or withdraw funds up to a pre-approved credit limit. Hence, the credit may be used repeatedly until the credit limit is reached. In this way, it is said that the credit 'revolves'.
- The borrower makes payments of interest and capital based only on the amount he has actually used or withdrawn.
- The amount of available credit decreases and increases as funds are borrowed and then repaid and interest charges are paid or added to capital borrowed.
- Revolving credit might have a fixed term, like instalment credits, or not.

Other names for revolving credit are 'line of credit' (emphasising the existence of a credit limit), or 'running account credit' (emphasising the permanent nature of the credit). Forms of revolving credit include lines of credit supported by accounts or cards (credit cards) and overdraft facilities.

The mechanism of repayment in revolving credits can take different forms. In particular, the borrower might be required to pay regularly:

- a percentage of the outstanding balance due, with or without a minimum amount,
- a fixed amount, or
- interest charges in full, so that the reimbursement of the capital is postponed

Furthermore, a requirement of regular payments might not exist, so repayments are determined by the borrower of his own free will, provided that at the end of the contract the outstanding balance is set to 0.

Also, in the first two repayment schemes, there are cases where interest charges have to be paid in full and cases where they are not, so these are included as a part of the outstanding balance (which would include in these cases capital and interest) and financed to the extent in which they are not paid by the regular repayments.

Among these options, the most common is the requirement of a minimum percentage of the outstanding balance. With regard to this repayment mechanism, it should be noted that when the outstanding balance decreases, so does the minimum payment, leading to the

consequence that making the minimum payments the period needed to repay the debt in full is very long compared with an instalment credit for the same amount. Obviously, a longer period implies a higher cost for the credit, as illustrated in Table 10.

However, in this type of credits, borrower is allowed to pay more than the due repayment without incurring in early repayment costs, which contributes to shortening the duration of the credit and its costs in absence of additional drawdowns.

TABLE 10. COMPARISON OF INSTALMENT AND REVOLVING CREDITS

	Instalment credit	Revolving credit		
Credit amount	€1000	€1000	€1000	€1000
Borrowing rate (effective)	12%	12%	12%	12%
Monthly payment	€96.17	5% of the balance with a minimum of €5	10% of the balance with a minimum of €10	20% of the balance with a minimum of €20
Months to full repayment	11	78	35	16
Cost of the credit	€57.83	€219.77	€98.94	€47.31

FEES AND CHARGES

Credit products can include a huge variety of fees and charges which increase the cost of the credit to the borrower.

INTEREST CHARGES

Interest charges are the charges for interest on a credit. These charges depend on the borrowing rate applied to the credit, the amount of funds borrowed and the period over which the funds are borrowed.

Article 3(j) defines the borrowing rate as "*the interest rate expressed as a fixed or variable percentage applied on an annual basis to the amount of credit drawn down*". Therefore, the borrowing rate can be obtained internally from the interest charges related to the amount of credit draw down (the sum of all the draw downs give the total amount of credit). In practical terms, the borrowing rate can be obtained solving the question: how much does the creditor charges for 1 euro draw down now and being payable in 1 year? For example, if for an amount of credit €1000 the borrower has to pay €90 in one year, the borrowing rate is 90/1000=9%[62].

[62] Defining or obtaining the borrowing rate in this way does not preclude using this rate (or other rate or a fixed amount) to the costs financed with the credit to compensate the creditor for the postponement of such charges.

The circumstances that determine the borrowing rate are diverse. Firstly, the characteristics of the credit, the personal circumstances of the borrower and even the type of creditor (bank, store department, ..) have an influence on the borrowing rate. For example, long term credits usually have a higher borrowing rate, and credit agreements which include sureties and insurances have lower borrowing rates, given that the credit risk faced by the creditor is lower. Personal circumstances of the borrower in respect to his probably of default, the existence of other agreements with the creditor (accounts, investments, etc), are also elements which might affect the borrowing rate.

Secondly, the borrowing rate could be fixed or variable. It is said to be fixed when it is given as a specific percentage which applies for the entire duration of the credit or as several specific percentages which apply to different periods. If, on the contrary, the borrowing rate is not fully established at the conclusion of the credit agreement, because it might change according to an index or reference rate or other events, it is said to be variable[63].

Finally, there are credit products which offer a low borrowing rate at the beginning or for limited amounts, and even grace periods, in which the borrowing rate is 0%.

As regards the calculation of interest charges, there are notable differences between instalment credits and revolving credits. While in instalment credits the single drawdown and the regularity of payments make it possible to calculate interest on the outstanding balance at the beginning of each repayment period, the higher flexibility of revolving credit in respect to drawdowns implies that the outstanding balance will vary continuously. As a consequence, interest charges in revolving credit are usually calculated daily taking into account the time each drawdown has taken place. In other cases, however, they are calculated monthly using the average daily balance or just the balance outstanding at the beginning of the repayment period. In whatever case, as in instalment credit, interest charges are usually debited monthly.

In the case of credit cards, which in countries like UK and Ireland are a complicated financial instrument, the calculation of interest charges might present special difficulties due to the existence of multiple balance segments (for purchases, cash advances, balance transfers, money transfers) each with a different borrowing rate or with separate credit limits and grace periods applicable to the various balance segments. The effect of interest charges on the balance outstanding is not straightforward either because in the event that several borrowing rates apply to various balance segments, payment allocation is generally at the discretion of the issuing bank, and payments will therefore usually be allocated towards the lower rate balances until paid in full, before any money is paid towards higher rate balances. As a result, interest charges can vary considerably from card to card depending on the existence of compartmentalization and the use the consumer makes of the credit card.

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[63] These definitions are consistent with the definition of 'fixed borrowing rate' in Article 3 (k) of Directive 2008/48/EC. Regarding variable borrowing rates, it is worth highlighting that the Directive does not restrict a variable borrowing rate to change only in line with the agreed index or reference rate, as was regulated in Article 19 of the Commission proposal of 2002. There is also an obligation to include the periods, conditions and procedure for changing the borrowing rate in the pre-contractual information and the credit agreement.

OTHER CHARGES AND FEES

Although interest charges are usually the most important part of the cost of the credit, there are other charges and fees involved in a credit agreement. Although the list of fees and charges can be very long, but in broad terms we may distinguish the following:

(i) Administrative fees linked to set-up costs (loan preparation, study and autorisation of the credit, issue of a credit card..) and maintenance costs (fees for credit or credit card maintenance, for providing account statements, for postage, etc),

(ii) Fees linked to payment transactions and drawdowns (fees for recording transactions, for the transfer of funds or balances, fees for cash advances, currency conversion fees and fees for transactions in foreign currencies, for using specific means of payment, for arranging direct debit in other entities, etc).

(iii) Fees for early repayment, cancellation of the credit, and changes in the contractual terms and conditions of the credit agreement at the consumer's request.

(iv) Fees and charges for failures to comply with the terms of the agreement (late payment charges in the form of interest and penalties, charges for exceeding the credit limit, charges for returned payments, charges for collection of unpaid debts, calls to pay due amounts or fulfil other obligations, etc).

(v) Fees and charges for sureties and ancillary services (assessment of sureties, insurance premiums, membership fees, charges for maintaining accounts for recording of payment transactions and drawdowns, etc.)

The list is not exhaustive, and some specific credit facilities might include additional costs. For example, in revolving credit facilities supported by credit accounts (without a credit card) the borrower might be required to pay a fee for not using the credit, calculated as a percentage of the amount of credit available to be borrowed. Other credit products include only a small number of fees and charges, such as is the case of overdraft facilities. Finally, it is worth mentioning that these cost elements have very different names among countries and creditors, which makes it difficult to identify comparable elements.

As we discussed before, not all these costs are included in the total cost of the credit for the purpose of calculating the APR, but a significant part of them are. Among those included, we can find different payment schemes with a different effect on the APR. For example, set-up costs are usually expressed as a percentage of the amount of the credit, and they are usually paid up-front, which tends to increase the APR. However, maintenance costs are payable at regular intervals. Also, there are costs, such as single sum (lump sum) insurance costs, which are sometimes financed with the credit, increasing the amount owed and hence the payments for capital and interest. Flat fees are also of special interest, because they mean the APR depends significantly on the amount of the credit. For example, for an instalment credit with 12 monthly repayments and a borrowing rate (nominal rate) of 12%, a fee of €60 will alter the APR between 14.8% if €6,000 is borrowed to 26.7% if the amount is €1,000.

SURETIES

As stated above, sureties might have an effect on borrowing rates, by reducing them, or they might even be mandatory to obtain the credit. Unlike in mortgage credits, sureties in consumer credit agreements are more the exception than the rule, but they can appear in these agreements as we will see in the next section.

The existence of sureties allows us to distinguish between secured credit and unsecured credit agreements. In general, a secured credit is a credit in which the borrower pledges some asset as collateral for the credit. Hence, if the borrower defaults on the credit, the creditor would have the right to avail of the pledged assets to repay the outstanding balance due.

Also, from a regulatory perspective, it is important to distinguish between non-recourse secured credits, where the creditor's recovery is limited to the collateral, and recourse credits, which entitle the creditor to seek financial recourse upon the default of the borrower. This is because non-recourse credits are outside the scope of the Directive 2008/48/EC, as explained in section 1.2.

Another form of secured credit which is not regulated by the Directive either, even if its purpose is consumption financing, is that of credits guaranteed by immovable property or by a right related to it. These credits have appeared recently in Europe and are offered in the form of loans (home equity loans, or HELs) and lines of credit (home equity lines of credit, or HELOCs), especially to consumers with debt problems, or for debt consolidation purposes.

However, credits guaranteed with other assets, such as accounts and deposits, financial securities or cars, in which the creditor has a right to recourse are regulated by the Directive. According to it, if they are mandatory to obtain the credit or to obtain it in the marketed conditions, the cost of the surety should be included in the APR.

Finally, if the surety does not refer to existing assets, and hence takes the form of an ancillary service according to which it is mandatory, for example, to open an account or deposit and keep funds in it, both the credit facility and the ancillary service should be taken together in order to calculate the cost of the credit and the APR. In specific cases, the impact of the ancillary service on the APR could be very significant. For example, in secured credit cards offered to consumer who do not have access to unsecured credits because of their poor credit history and who are required to open a deposit or savings account where the cardholder must deposit an amount which matches or even exceeds the total amount of credit desired and for which he receives only a modest rate from the creditor.

INSURANCE AND OTHER ANCILLARY SERVICES

The provision of ancillary services connected to credit agreements has been a strategy followed by creditors in order to increase their benefits and charge additional costs to the consumer. For this reason, Directive 2008/48/EC obliges the costs of these ancillary services to

be included in the cost of the credit to the consumer and the APR if they are compulsory in order to obtain the credit or to obtain it in the terms and conditions marketed.

According to our research, in the EU the most common ancillary services connected to credit agreements and required frequently by creditors as a condition to grant the credit are to open an account with the entity and to take out insurance.

In accordance with the Directive, if the opening of the account is mandatory, its maintenance costs should be included in the APR. If it is optional, there is also a requirement to include them if the costs of the account have not *been clearly and separately shown in the credit agreement or in any other agreement concluded with the consumer*. In our view, this should act as a stimulus for creditors to provide clear and complete information about the products they offer to their customers.

Insurance premiums, on the other hand, are cost elements which can have a very significant effect on the APR, as reported by Reifner in his study, where they were estimated to increase the APR by about 20%. Moreover, they are not simple products, as banks accounts are. This justifies going into greater detail in the following.

Subsequently, we will deal with agreements according to which the payments made by the borrower do not give rise to an immediate corresponding amortisation of the total amount of credit, but are used to constitute capital whose objective is to repay the credit in part or in full when the credit agreement comes to term. These products appeared more frequently in the past, and during our research we have not found credit agreements including this feature. However, we discuss them briefly in this section because the Directive makes a special reference to them.

CREDIT INSURANCE AND PAYMENT PROTECTION INSURANCE

Today there are two types of insurance in connection with the repayment of a credit: credit insurance and payment protection insurance (PPI).

Credit insurance was the traditional form of insurance. According to this, the insurance will pay off the outstanding balance usually in the event of the death or disability of the borrower. Compared to general life insurance, credit insurance differs in the use of the benefit payment (to satisfy a debt) and the person which receives the benefit (the creditor).

PPI appeared in 1990s as a means to provide an income to maintain a borrower's debt repayments upon the occurrence of specific events. Initially PPI covered the risk of accident or sickness; later, to these risks were added unemployment and redundancy insurance. Sometimes, PPI also covers the risk of accidental death, in which case the insurance will generally pay off the balance of the debt covered.

The success of PPI has been such that nowadays PPI is the most common form of insurance connected with credit and it has become an important source of income for banks in some countries with mature markets such as Germany, France, Spain and UK although the

conditions and costs relating to the product have sometimes given rise to controversy. As reported by Reifner, although the inclusion of the costs of mandatory PPI in the total cost of the credit has been required from 1990, most banks do not include them because they argue that it is optional, even though it does not always seem to be the case.

As regard the payment of the premium, PPI might be paid by regular premiums or by a single up-front premium. A single premium pays for payment protection insurance over the entire life of the credit (although cover might only exist for the first years), while each regular premium covers each regular repayment of the credit. PPI insurance in revolving credits is usually paid by regular premiums while in instalment credits PPI is usually paid by a single premium if PPI is included in the credit agreement. When the PPI agreement is concluded after the conclusion of the credit, the PPI is normally a regular premium product. When the consumer pays a single premium at conclusion of the agreement, the creditor usually finances it, meaning that the amount of the premium is added to the amount owed and the consumer is charged for the financing the same rate as the credit. Also, in credit cards it is quite usual for PPI to be added to the outstanding balance on the credit card, also meaning that interest on the insurance premium will be paid at the rate charged on the credit card.

As stated above, if PPI is compulsory for the consumer in order to obtain the credit or to obtain it on the terms and conditions marketed by the creditor, insurance premiums should be included in the TCC and the APR.

CONSTITUTION OF A CAPITAL

We now refer to a situation where the payments made by the borrower do not give rise to an immediate corresponding amortisation of the total amount of credit, but are used to constitute a capital that will grow according to the return obtained by the funds. The objective is that the investment made will be sufficient to repay the credit (including its costs) usually in full at the end of the term, and it might even create a surplus.

These agreements, in the form of endowment insurance policies, were quite popular until the mid 1990s in mortgage credits in countries like USA, UK and Germany. Their popularity was justified by the existence of some tax advantages and, mainly, because the premise which makes these agreements beneficial to borrowers was true until that time: the rate of growth of investments was able to exceed the rate of interest charged on mortgage credits. However, the decrease in the expected growth of rate of financial investments from the mid 1990s, linked to a new economic context of lower interest rates and inflation rates, made this premise fail. As a result, borrowers who noticed that their investments were not able to repay their credits got involved in complaints of mis-selling against insurers and banks and regulators required institutions to alert about the risk of these products. The continuing of the context of low rates and returns made endowment mortgages an infrequent product from the beginning of this century. It should also be noted that endowment products are even more disadvantageous in combination with consumer credits because of the higher interest rates of consumer credits in relation to mortgage credits.

The reaction of the European Commission to these products was emphatic in Commission proposal of 2002. Article 20 stated:

> *"1. If payments made by the consumer do not give rise to an immediate corresponding amortisation of the total amount of credit, but are used to constitute capital during periods and under conditions laid down in the credit agreement, such constitution of capital shall be based on an ancillary agreement attached to the credit agreement.*
>
> *2. The ancillary agreement referred to in paragraph 1 shall provide for an unconditional guarantee of repayment of the total amount of credit drawn down. If the third party providing constitution of capital fails to comply with his obligations, the creditor shall assume the risk.*
>
> *3. Payments, premiums and recurrent or non-recurrent charges payable by the consumer under the ancillary agreement referred to in paragraph 1, together with interest and charges under the credit agreement, shall constitute the total cost of the credit. The annual percentage rate of charge and the total lending rate shall be calculated on the basis of the total commitment subscribed to by the consumer."*

That is, these products, when required by the creditor, should not only be included as a part of the agreement for the calculation of the APR, but should also be considered as an unconditional guarantee of repayment of the total amount of credit.

Directive 2008/48/EC, however, relaxes this posture, and refers to them in the requirements of pre-contractual and contractual information in the following terms (Articles 5.5 and 10.4):

> *"In the case of a credit agreement under which payments made by the consumer do not give rise to an immediate corresponding amortisation of the total amount of credit, but are used to constitute capital during periods and under conditions laid down in the credit agreement or in an ancillary agreement, the information required under paragraph 2 shall include a clear and concise statement that such credit agreements do not provide for a guarantee of repayment of the total amount of credit drawn down under the credit agreement, unless such a guarantee is given."*

That is, the consumer should be informed of the risk that the capital might not provide a guarantee of repayment of the credit. It is worth mentioning that although in Directive 2008/48/EC there is no explicit reference to them for the determination of the cost of the credit, the wide definition of the TCC implies their inclusion if they are mandatory to obtain the credit or to obtain it in the conditions marketed.

2.4. SPECIFIC FEATURES OF CONSUMER CREDIT PRODUCTS

This section presents the main features of the consumer credit agreements collected and analyzed for this study using a classification which distinguishes five type of consumer credit products: personal loans and hire-purchase agreements (which are forms of instalment credit) and revolving credit accounts, credit cards and overdraft facilities (which are forms of revolving credit). We have tried to be rigorous, clear and comprehensive in this classification. For this reason, at the beginning of each section we define each product and, where necessary, clarify any ambiguities that might appear. It is worth mentioning that banks, as universal scope entities, usually offer the full range of products (exceptions in some cases are hire-purchase agreements). However, specialist companies are more focused on loans and credit cards, financial companies of car dealers specialize in car loans and hire-purchase agreements, and stores concentrate on loans and credit cards for purchases in their store chains and also outside. Overall, the most common products are loans and credit cards.

Our presentation focuses on the elements which are of relevance for the calculation of the APR. Consequently, we have dismissed any information regarding non-compliance with the terms of the agreements, early repayment of the credit, and any feature with no effect on the cash flows of the credit.

We have omitted overrunning facilities, because the APR is not disclosed for these products according to Directive 2008/48/EC, as well as any type of credit not regulated by this law. The only exception is leasing agreements with an option but no obligation to purchase the object of the agreement. These are briefly analysed because they share many elements in common with hire-purchase agreements including such an obligation and because they are much more common. Despite this, only the agreements including the obligation to acquire the item are regulated by the Directive.

PERSONAL LOANS

A loan is the most typical form of instalment credit. Accordingly, a loan agreement is an agreement between two parties where one party (the debtor) receives a sum of money from other party (the creditor) and promises to return it to the creditor in parts over a fixed period of time by means of instalments. The word 'credit', however, usually has a wider definition and it may cover both loans and lines of credit. The word 'personal' makes it clear that the debtor is a physical person and that the objective of the loan is to finance personal needs. In this way, home or land loans are not forms of personal loans. However, automobile loans, student loans or vacation loans, for example, are forms of personal loans.

The major findings derived from our analysis of this credit product are[64]:

[64] To save space and for easier readability, in this section we use country codes. A legend is included at the beginning of the study.

- FREQUENCY: Loans are the most typical product for consumer financing in the banking industry. They are present in any single country of the UE27, although in some countries such as AT or NL, the offer of loans by banking institutions is scarce. Moreover, specialized credit companies and captive financial companies are very active in offering loans[65].

- PURPOSE: Although the offer always include general-purpose loans, in most cases there are also specific loans for specific people (especially students) and specific purposes (usually cars, home appliances, to a lower extent, and in countries such as FR, IT, MT, and PT there are loans for financing projects related to energy savings and renewable sources of energy). Also, in countries like ES, IT and MT, banks offer loans linked to permanent sources of income such as salary or pensions, which are repaid in fixed amounts or as a percentage of the salary or pension.

- AMOUNT: The amount of the credit varies greatly from country to country and from creditor to creditor, although there is some similarity between the different specialized companies operating in the same country. Minimum amounts could be as low as €100 or €200, and maximum amounts depend largely on the country and the purpose of the loan. The lowest amounts are usually linked to short term credits, whose duration can be as short as a few days or weeks[66]. Loans for energy projects can amount to €100,000, and also in some countries there are specific loans for a very large amount[67]. In countries like EE, DE, MT and NL the maximum amount could easily be around €60,000 while in countries such as BG, EE, PT or SI it barely exceeds €15,000. On average, maximum amounts are about €25,000. It is worth pointing out that in some new MS of Central and Eastern Europe outside the European Monetary

[65] Interestingly, some specialized credit companies such as Cetelem and Unicredit can offer a huge range of loans for different purposes, but behind them there is usually only a small number of concrete loans for a given term and amount. The same applies for revolving credit. For example, during the elaboration of this study, Cetelem, in its native country FR, was offering up to 11 credit facilities for different leisure activities. Of these, five loans (loans for travel, marriage, celebrations, health and well-being, and a general-purpose personal loan) were a loan for an amount from €5,000 to €40,000 for a term from 4 to 48 months and with monthly instalments, and 4 credit lines (for computer, image and sound, birth, and anniversary), were a line of credit for up to €3,000 (or €6,000 if a Cetelem card was contracted) for a renewable period of 1 year and a minimum monthly repayment of 3% of the outstanding balance with a minimum of €15.24.

[66] Payday loans are an example of these small, very short term personal loans. Although these loans represent only a minor fraction of the credit market, they are growing rapidly in the last years, especially in countries like UK and IE. The APR of these loans is usually very high, due to the combination of the very short duration and low amount with costs amounting to several euros.

[67] For example, in IT, CrediExpress Top of Unicredit Bank is a personal loan repayable over 10 years with a fixed borrowing rate for financing spending on consumer goods, durable goods such as a boat, and also buildings for an amount of up to €100,000. In MT, Bank of Valletta offers a loan for boat and yacht purchasing with repayments spread over a period of 10 years for loans of up to €233,000, or up to 12 years for loans in excess of €233,000.

Union it is usual to grant credit in foreign currencies. For example, besides their own local currencies, banks in RO routinely use EUR, in BG and LV they use EUR and USD, in HU they use EUR and CHF, and in PL they use EUR, USD and CHF. This applies not only to personal loans but also to other types of credit.

- TERM: The differences between countries and creditors in loan term are smaller than those in amounts. Loan term usually ranges from a minimum of 1 year to a maximum of 5 to 7 years. However, in countries like AT, BG, ES, RO, SE and SK the term of the loan can stretch to 10 years or even longer.

- CHARGES AND FEES: As regards interest charges and borrowing rates, although in some countries there is a tendency to fixed (e.g. FR) or variable (e.g. BG, EE, PT) borrowing rates, in general creditors offer fixed and variable borrowing rates. Even, in some cases (e.g. banks in GR, LV, PL, RO or SI) both fixed and variable rates are offered simultaneously for the same loan. Shorter term loans usually have fixed borrowing rates. The level of the borrowing rate is more similar among the countries in the European Monetary Union but in any case depends largely on the term of the loan, the appearance of insurance or sureties, and the existence of other agreements between the consumer and the creditor. There are also loans where the borrowing rate shows special features such as an initial fixed and low borrowing rate during a limited period, after which the borrowing rate becomes variable or a sequence of lower rates as repayments are made. Typically, interest is calculated monthly and also charged monthly; less common charging frequencies are 3, 6 and 12 months. With regard to non-interest charges, there are ample differences between countries, ranging from the case of no charges in UK to numerous and high charges in ES, which can even be financed with the loan.

- REPAYMENT: Apart from the typical instalment credit, we found some mechanisms of flexibility in repayments and special repayment structures in certain loans in the market. On the one hand, some **car loans** allow deferment of the repayment of a significant part of the principal (e.g. 30%) to the end of the term of the loan. Meanwhile, other car loans are more stringent than general purpose loans and either require a significant initial payment (20%) or in countries such as DK or FI a lien on the car, other assets or a personal guarantor; these additional requirements are inspired by hire-purchase agreements, where initial payments typically exist and ownership of the car by the creditor constitutes a guarantee of the agreement. On the other hand, loans for **special groups**, like students (highly frequent in most of the countries of the EU) or women with children present a series of advantages such as grace periods without repayment of interest and principal, low (and even 0) borrowing rates[68] or postponement of repayments for several years, usually covering the training period and 1 or 2 additional years up to the time the student starts working. Finally, **general-**

[68] An interesting case is that of BRE Bank in PL, which offers university students a loan called Kredyty na naukę dla studentów whose borrowing rate depends on their success in their studies, with higher average rating meaning a lower rate.

purpose loans offered to the general public may also include flexibility in repayment by allowing postponement of capital repayment for 1 or 2 years, or of capital and interest for a few months, allowing a few number of instalments to be posponed (e.g. 1 or 2 instalments each year), or by changing the amount of the instalments by changing the term of the loan, the frequency of the instalments, changing between fixed and variable borrowing rate, and early repayment without cost. We have also found a number of loans with increasing and decreasing instalments. Usually, the instalments are paid at regular periods from the beginning of agreement, but UK constitutes a clear exception to this and the first payment can become due before the regular period of 1 month (e.g. in 21 days, or 3 weeks) or later (e.g. 42 days, or 6 weeks).

- SURETIES AND INSURANCE: As regards sureties, it should be mentioned that most of the loans marketed are unsecured loans, but there are cases in which a guarantee is implicitly given (for example, the loans on salary or pension mentioned above) or is required (for example, in some car loans as explained above, in general-purpose loans in countries such as ES, GR, HU, IT or SI where deposits or investments sometimes appear as required collateral, and in countries such as EE, LT, LV or RO where guarantees in the form of savings, investments or real estate are needed to gain access to higher amounts of credit or longer terms). As regards insurance, PPI is much more frequent than credit life insurance and appears in the offers of any type of creditors (banks, specialized companies, automotive, and at a lesser extent in commercial stores). In fact PPI is offered in the majority of countries of the EU15, and it is frequently offered together with the loan in DE, ES, FR, GR, NL and PT. However, only in FR have we seen numerical examples of the cost of the loan including PPI. PPI is less frequent in the new MS of Central and Eastern Europe, with two clear exceptions being SI and SK. Insurance, in the form of life insurance or PPI, is indicated as mandatory for some loan agreements in BG, ES, NL, PT and RO.

- OTHER ANCILLARY SERVICES: The most common requirement when contracting a loan is the existence of an account with the entity when the creditor is a bank. This requirement appears frequently in countries like CZ, DE, EE, ES, GR, IT, LV, PL, SI and SK. Despite this, there a few countries (BE and NL), where the usual practice for consumers is to have a single bank account for their operations in the banking system. For this reason, banks in these countries tend to offer complete packages covering all the consumer's banking needs thus including a bank account, a debit and a credit card, Internet banking, and discounts on various insurance policies.

In conclusion, we found that the two most outstanding features in loans are the provision of insurance in form of PPI, especially in the EU15, and an ample variety of repayment schemes and special features in borrowing rates which mainly derive from the creation of products with greater repayment flexibility and segment-specific targeting by clientele (mainly students) and loan purpose (mainly car loans). The existence of means of flexibility in repayments would require the application of assumption (f) and the treatment of special borrowing rates will be subject to assumption (i) for the calculation of the APR.

HIRE-PURCHASE AGREEMENTS

Our second type of credit product is hire-purchase agreements. We use the term 'hire-purchase' because Directive 2008/48/EC excludes from the scope "*hiring or leasing agreements where an obligation to purchase the object of the agreement is not laid down either by the agreement itself or by any separate agreement; such an obligation shall be deemed to exist if it is so decided unilaterally by the creditor*" (Article 2 (d)). That is, only those contracts where an obligation to purchase the object of the agreement exits are inside the scope of the Directive. The term that unambiguously refers to these contracts is 'hire-purchase' agreements since it clearly states the existence of a 'purchase' obtained by means of 'hiring'. However, the term 'leasing' is more general and can also refer to contracts where either there is no possibility of purchase (renting agreements) or there is an option for the consumer (no obligation) to purchase[69]. Despite only hire-purchases being inside the scope of the Directive, in the following we will also refer to leasing agreements understood as agreements with an option of purchasing. This is for two reasons. First, given the mixing of the terms in our research we have needed to go over them to detect the existence or not of an obligation to purchase the object of the contract. And second, because they share many elements in common with hire-purchase agreements.

In hire-purchase and leasing agreements there is a party which makes regular payments in return for enjoying the use of the object during the term of the agreement; the other party, who receives these payments, is the owner of the object. If the first party complies with all the regular payment commitments and pays (in hire-purchase) or decides to pay (in leasing) the final payment for the residual value of the object (that is, the part of the price still not paid), it receives the ownership of the object.

This establishes a big difference from a loan, because while in a loan the property of the object belongs to the borrower from the beginning, in hire-purchase agreements ownership is postponed to the end of the contract. However, given that the ultimate objective of both the loan and the hire-purchase agreement is to obtain the property of the object, it is not surprising that the former has evolved to structures which reproduce those of a hire-purchase agreement. As seen before, the requirement of an initial payment or a final payment are features which occur in car loans. Also, the requirement of a pledge on the car or on other assets in a car loan is intended to constitute a collateral which exists in the case of hire-purchase agreements in the form of the ownership of the car by the creditor.

The main findings obtained from our analysis of hire-purchase and leasing agreements are:

- FREQUENCY: Hire-purchase agreements and leasing agreements are only typical products among vehicle dealers, and are occasional products for banks. Also, leasing agreements are much more common than hire-purchases. In fact, not all vehicle

[69] See the discussion of the terms in section 2.2.

dealers offer agreements which stipulate an obligation to buy the object of the contract.

- PURPOSE: These products are usually linked to the purchase of a car, and to a much lesser extent to other vehicles such as motorcycles, caravans, snowmobiles or boats. Exceptions are EE and LV, since major stores in these countries accept hire-purchase as a way of purchasing virtually all kinds of goods and services including home appliances, leisure and fashion items, electronics, and even travel packages or medical care.

- AMOUNT: Obviously, the price of the vehicle determines the financing. Car prices range, on average, between €15,000 and €30,000, although not all the price is financed when, as usual, an initial payment exists.

- TERM: The duration of hire purchase agreements is usually higher than in leasing agreements, and it is similar to comparable car loans. Hence, while leasing agreements are usually for 2 to 4 years, hire-purchase agreements can easily extend for 5 or even 7 years.

- BORROWING RATE: In hire-purchase and leasing agreements the borrowing rate is usually given as a fixed rate, and hence the instalments have a fixed amount. However, in some northern countries such as DK and FI variable borrowing rates are sometimes offered either from the beginning or as an option when interest rates fall.

- REPAYMENT: The mechanism of repayments in vehicle financing typically consists of a large initial payment (up to 50-60% in hire-purchase but lower percentages in leasing agreements) of the price of the object, a series of regular instalments, and final payment for the residual value of the object which could amount to 2-25% of its price. Instalments are always present[70]. However, competition and marketing have led to a series of deviations from this general pattern. Specifically, creditors try to attract consumers by offering a lower initial payment and higher or lower final payment. In this way, it is not difficult to find in some countries with a large tradition in car financing such as IT or PT initial payments of only 10-20% and final payments as low as 0 or as high as 35% of the price of the vehicle. For financing of lower amounts, for example in the mentioned cases of multi-purpose hire-purchases in EE and LV the initial payment depends on the item purchased and its price and may be as low as 10% or even 0%, and the final payment might also not exist, which convert these agreements into substitutes of personal loans on the part of the consumers.

- SURETIES AND INSURANCE: The guarantee to the creditor provided by the ownership of the object of the agreement until it is transferred to the consumer at the end of the agreement implies that no other additional collateral is required. However, insurance in the form of optional PPI is sometimes offered by creditors, especially in countries such as ES and UK.

[70] This is the reason why hire-purchase agreements in USA are known as instalment plans, avoiding use of the word 'hire', which is more connected to labor relationships.

- OTHER ANCILLARY SERVICES: While in leasing agreements the consumer is required to contract maintenance, repair services and other services related to the preservation of the object, because it might remain in the hands of the creditor when the agreement comes to an end, in hire-purchase agreements these services are usually offered as an option for the consumer and may be offered inside package deals including financing, maintenance contracts and insurance policies. When they are contracted, as happens in leasing agreements, their costs are usually included in the regular instalment.

In short, our examination of hire-purchase agreements in EU leads us to conclusions which are similar to those obtained for loans: recent tendencies in the market point to an increasing appearance of PPI and a higher flexibility of repayments.

However, it should be highlighted that the presence of hire-purchases agreement with an obligation to purchase has been rather scarce up to now in EU, which contrasts with the dominance of leasing agreements with an option to purchase.

REVOLVING CREDIT ACCOUNTS

Revolving credit accounts are the simplest form of revolving credit. In fact, they can be simply defined as accounts with a permanent credit facility in the form of revolving credit.

Our analysis of these products in the EU reveals:

- FREQUENCY: These are frequent products in business activities, but are less common as a product for consumers. This is because the relatively low amounts of credit provided to consumers can also be obtained using credit cards which, although more expensive, also provide additional flexibility and services. For this reason, revolving credit accounts are only common in some countries, like FR, GR and NL, where this product is seen as a substitute for loan agreements.

- PURPOSE: In the market we can find revolving credit accounts for specific purposes (e.g. financing of vehicles, home appliances, and special events such as family celebrations) and also general-purpose accounts. However, it is usually assumed that the credit will have a specific allocation or will be used to restructure debts; as mentioned, for day-to-day expenses credit cards are a more suitable product. Special products can also be found on the market which take advantage of the special features of revolving credit. For example, Rabobank Nederland has a product called Studenten Krediet for students whereby during the educational period no capital or interest are paid, and interest charges are added to the amount of the credit at a low rate; later, when training ends, it converts into a revolving credit account.

- AMOUNT: Except for specific purposes where significant amounts are required (e.g. car purchases) the credit limit is similar to credit cards, with common amounts being between €3,000 and €6,000.

- TERM: Typical term is one year renewable.

- CHARGES AND FEES: Borrowing rate is usually fixed for the term of the credit, and renewals are sometimes used to adjust the borrowing rate to current market conditions. As regard charges, a specific cost for this type of credits refers to the requirement of a fee for not using the credit. This fee is asked for by most creditors, calculated as a percentage of the amount of credit available to borrow, and charged periodically. Also, unlike loans but similar to other revolving credit products, the borrower is allowed to repay the credit early without incurring in costs.

- REPAYMENT: The most usual scheme of repayment consists of a minimum payment given as a percentage of the balance outstanding (usually between 3 to 15%) with a minimum fixed amount of a few Euros (e.g. €10 to €30), which is similar to credit cards. Sometimes interest charges are required to be paid in full so that the outstanding balance only includes capital, and at others they are included in the outstanding balance, which would thus include capital plus interest. There are also cases in which different options with different percentages and minimum amounts are offered to the consumer. There are also cases where the borrower is only required to pay interest charges or to make regular constant payments before the end of the contract, but these are much less frequent. Finally, as mentioned above, the borrower can pay any amount above the minimum repayment without incurring charges for early repayment.

- SURETIES AND INSURANCE: The low amount of the credit in this type of product makes sureties uncommon, although products can be found where some collateral is required, usually in the form of deposits or investments. Insurance also tends to be offered to a lesser extent than in other types of credits, including credit cards.

The main conclusion we can extract from these lines is that revolving credit accounts as a way of consumer financing seem to be fading in favor of credit cards, which have been revealed as a more flexible and practical form of credit for European consumers. The only clear advantages offered by revolving credit accounts are their lower costs, because credit cards are prolific in these, and their higher simplicity. This higher simplicity translates into APR figures closer to the effective cost paid by the consumer because the number of assumptions which are required to be applied for the calculation of the APR in revolving credit accounts will be typically lower than in credit cards.

CREDIT CARDS

Credit cards are the most common form of revolving credit. They differ from revolving credit accounts in the following features:

- Credit cards have the physical support of a card.

- Usually, they include a huge range of additional services such as emergency help services, purchase insurance, travel insurance or legal advice, together with other benefits such as promotions, discounts and cash-back on purchases.

- Credit cards are not only credit facilities, but also a means of payment.

It is worth mentioning is that not all cards are credit cards. Concretely, pay-in-advance cards (prepaid cards) and pay-now cards (debit cards) are not a form of credit. Charge cards (or deferred debit cards), however, constitute a form of credit, as they provide a form of pay later facility. Usually, the balance in a charge card must be paid in a short period (usually each month) without paying any interest. Due to this, some charge cards might be excepted from the scope of the Directive on the basis of Article 2 (f): "[…] *credit agreements under the terms of which the credit has to be repaid within three months and only insignificant charges are payable*". However, charge cards with significant charges[71] or with a period to repayment exceeding three months are regulated by the Directive.

In the following we focus on typical credit cards, but in a broad sense. That is, not only including credit cards offered by banks and specialized companies, but also by stores and car dealers whenever a credit facility in the form of revolving credit is provided in their cards. In fact, there is a tendency among stores to move from the typical instalment loan to credit cards as a way of simplifying the credit-granting process and maximising customer maintenance while also offering a wider range of services to them.

The main features of credit cards identified from the study of these products in the EU are the following:

- FREQUENCY: Nowadays credit cards are as common as loans in the range of products offered by banks and specialized credit companies. They are also frequently offered by stores, and even some car dealers in some countries include credit cards among their financial services. Credit cars are not only as common as loans, but also the variety of credit cards is much wider in a large number of countries. The reason is that the range of credit cards marketed include cards with different gradation (classic/green, gold, black/platinum, infinite/centurion) which differ in the limit of the credit and the variety of added services and insurance coverage related to the use of the card (e.g. travel, purchases, robbery), cards with their own trademark and issued in partnership with a different association or companies (e.g. companies operating in the areas of services, insurance, travel and tourism, telecommunications, distribution, leisure or culture). There are also cards with different packages of services (e.g. insurance in purchases, home assistance, legal advisor), cards for specific collectives (e.g. young people), cards with diverse benefits for shopping (e.g. discounts, reward points, cash back, lower borrowing rates), and even cards whose design can be personalized.

- PURPOSE: In view of this variety, it is obvious that credit cards try to gain advantage from tailoring to consumers' habits and preferences. Despite this, most credit cards constitute a general-purpose form of credit, as can be evidenced from the tendency of stores to offer broad-use credit cards and the high propensity of all types of creditors to offer credit cards operating in the networks of Mastercard, VISA, or American

[71] The Guidelines on the application of Directive 2008/48/EC clarify the meaning of 'insignificant charges'.

Express at a lower extent. Also, in countries such as ES, GR, IE and UK credit cards have increased the range of mechanisms to drawdown by providing credit not only for purchases and cash advances, but also allowing balance transfers and, more recently, money transfers (in UK or CZ)[72].

- AMOUNT: The credit limit in credit cards depends crucially on the specific card and, particularly, on the gradation. In fact, top cards such as VISA Infinite or American Express Centurion might have no pre-set credit limit. The target public and the specialization of the card (e.g. purchases or balance transfers) also have an influence on the credit limit. Among basic cards, the credit limit could amount to between €3,000 and €6,000 on average.

- TERM: Most credit cards have a period of validity of a few years (1-3 years) after which they are usually renewed automatically unless the borrower indicates otherwise. However, the issuer usually withholds the right to terminate the agreement if the borrower fails in the fulfilment of his commitments.

- CHARGES AND FEES: Charges and fees also differ depending on the card, the creditor, and the country. In respect to the borrowing rate, it is typically defined as a variable rate which is charged monthly (a weekly frequency has been found in a few cases). The procedure for the calculation of interest charges depends largely on the usual practice in the country, and may range from the charge of interest from the date of drawdown to the accumulation of drawdowns at the end of each monthly period, charging interest from that moment on. Different countries also show different practices in the charging of non-interest charges and fees: for example, in UK most cards do not require charges for issue and maintenance, while in ES they are quite usual. Usually, the level of maintenance fees depends on the range of non-financial services offered by the card. Despite this, there are other charges universally accepted, with this being the case of the fees for transactions in a foreign currency (amounting to about 3%) and exchange rate loading fees. Another interesting feature of the cards is the distinction between the drawdown mechanism in respect to the borrowing rate, introductory offers and charges and fees. In general, it can be said that purchases are the cheapest mechanism, followed by balance transfers and finally by cash advances. Usually, purchases benefit from interest free periods, which might last between one or two months, after which interest starts to be charged. Purchases and balance transfers are usually charged with the same borrowing rate, and also benefit in some countries by introductory rates (even 0 rates) over a period of a few months, but balance transfers become more expensive because they usually are charged with a fee of about 3% of the amount transferred, with a minimum fixed amount. Cash advances are penalized

[72] These mechanisms can be briefly described as follows. Purchases: paying for items using the card. Cash advances: obtaining cash on the spot by using the card at a bank or an ATM. Balance transfers: moving an outstanding balance or loan from one account or card to another (for restructuring pre-existing debts). Money transfers: transferring money from one account or card to another.

with higher rates in some countries (such as GR, IE and UK) and cash advance fees of about 3% with a minimum fixed amount nearly always.

- REPAYMENT: Similar to revolving credit accounts, the most usual scheme of repayments consists of the repayment of a minimum percentage of the outstanding balance (usually between 3% to 15%) with a minimum fixed amount (around €10 to €30). Other options include minimum fixed monthly payments (e.g. in ES and IT) or even payment in instalments (in EE, LT and LV, where a distinction is made between revolving credit cards where payment is given as a minimum percentage and fixed payment credit cards where repayment is made by fixed instalments). Like revolving credit accounts, interest charges are sometimes required to be paid in full (outstanding balance only includes capital) and at others they are included in the outstanding balance (outstanding balance includes capital plus interest). However, with credit cards it is not possible to pay only the interest charges regularly. In return, in some countries (e.g. ES or IT) it is common to allow the borrower to change the scheme of repayments. We have even found cases where the borrower is offered the choice between specific purchases and pay them in instalments without changing the general repayment scheme. Another feature about repayments in cards with a distinction between drawdown mechanisms is the selective allocation of repayments. In particular, in countries such as UK or IE the borrower is informed that repayments will be allocated first to default charges, secondly to promotions, thirdly to interest and non-interest charges, and finally to regular drawdowns in such a way that cash advances, which are the most expensive for the consumer (most beneficial to creditors) in terms of borrowing rate, are the last to be paid.

- SURETIES AND INSURANCE: In our research we have only found requirements for sureties in credit cards in some credit cards in LV and for gaining access to higher amounts in RO[73]. However, PPI is frequently offered in some mature markets in the EU15.

- OTHER ANCILLARY SERVICES: Beyond the optional provision of enhanced services related to the use of the card, it is rather uncommon to find a requirement of ancillary services. The exceptions come from credit cards which target a specific public (such as young people or preferential clients) to whom it is mandatory to have clientele-specific current accounts.

The main conclusion we obtain from our review is that the functional nature and higher sophistication of credit cards has made them complex products with different drawdown mechanisms, limits for amount and periods, different charges, intricate conditions and requirements, which usually derive in higher costs for the consumer and always in additional difficulties for the calculation of the APR. Undoubtedly, credit cards are, in general, the type of product where a higher number of assumptions will have to be applied for the calculation of

[73] In UK we have found credit cards covered by mortgage, but these are outside the scope of Directive 2008/48/EC by virtue of Article 2(2)(a).

the APR, especially those referring to drawdowns, duration and repayments, and rates and charges.

OVERDRAFT FACILITIES

Overdraft facilities and overrunning are related to different products. Both are inside the scope of the Directive, which define these agreements in the following terms: "*overdraft facility means an explicit credit agreement whereby a creditor makes available to a consumer funds which exceed the current balance in the consumer's current account* "(Article 3 (d)); overrunning *"means a tacitly accepted overdraft whereby a creditor makes available to a consumer funds which exceed the current balance in the consumer's current account or the agreed overdraft facility"* (Article 3 (e)).

Therefore, overdraft facilities differ from overrunning in the fact that the former are an arranged agreement, while the latter is a tacit credit facility provided at the discretion of the creditor. Hence, while transactions made by the consumer are always paid if an overdraft facility has been arranged and its limit is not exceeded, in case of overrunning they can be returned as unpaid at the discretion of the entity and always implying additional charges and fees[74].

From a regulatory perspective, it should be mentioned that both definitions are restrictive in view of the products available on the market. This is because although typically overdrafts and overrunning are linked to current accounts, two deviations can appear.

On the one hand, overdraft and overrunning might appear in other types of accounts, concretely in savings accounts, and having similar treatment to those facilities connected to current accounts. This is especially true in countries like Spain, with a long tradition on savings accounts.

On the other hand, and related to credit products, there are cases in which the consumer might exceed the credit limit. This might happen in revolving credits but not in loans, because in this latter case the amount of the credit is fixed. Although typically there is not an explicit mention of overdraft facilities or overrunning in revolving credit accounts and credit card advertising, reality shows that these excesses over the credit limit might appear, and creditors even foresee the repayment of these excesses in payment schemes and establish costs for these excesses which differ from the schemes and costs associated to default situations.

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[74] Interestingly, financial innovation has led to products marketed as half-way solutions between overdraft and overrunning. For example, Barclays in UK offers a credit facility called Personal Reserve whereby clients are granted an agreed extra amount of credit for those small transactions in which they need to overdraw or exceed the agreed overdraft limit. As benefits, the Personal Reserve avoids having transactions returned unpaid and the associated fees of unarranged overdraft. Also, the borrowing rate is 0, although the consumer is charged a reserve usage fee of 22 pounds when he makes use of the Reserve and every 5 days if the Reserve is not repaid. From a regulatory point of view, this product should be considered as an overdraft given the arranged nature of the credit.

Even more, it might be expected overdraft facilities to adopt different (and complex) schemes in the future. For example, in US, overdrafts in bank accounts are sometimes supported by linked accounts, such as savings accounts, credit cards, or lines of credit. Thus, when overdraft appears it is covered by the funds available in these instruments, and a fee is charged together with the cost of the instrument itself. At a regulatory EU level, these practices might give rise to some doubts about whether or not these overdraft facilities constitute credit agreements and about the identification of their costs.

In sum, in view of the legal definitions of the Directive, it is unclear whether some deviations from typical products can be defined as overdraft facilities and overrunning. What is undeniable is that they fall under the definition of a credit agreement (Article 3 (c)) and hence, they are subjected to the Directive. For this reason, we have opted to include them in our research. However, we do not refer to overrunning in the following because the disclosure of the APR is only required for overdraft facilities and our research is limited to these.

From a financial point of view, overdraft facilities are a special type of revolving credit. They really show the features of revolving credit: funds can be withdrawn up to the agreed credit limit; interest is charged only on the amount used; any amount repaid can be drawn down again as long as the total outstanding amount is within the credit limit granted; and the credit can be repaid at anytime without early repayment costs. However, overdraft facilities also present some special features. Concretely, the credit might be recallable on demand if the agreement so states. Higher borrowing rates and even additional fees are charged, and they are considered a form of transitory financing. Also, overdrafts are linked typically to current accounts, and when this is the case they are not subject to any repayment as long as the amount used is within the credit limit and thus no regular repayments are required, and the credit is automatically repaid with income entries into the account (e.g. salaries or wages). This indicates the adequacy of assumption (d) for the calculation of the APR as regards the fact that overdrafts are assumed to be drawn down in full for the whole duration of the agreement.

Also, the functioning of overdraft facilities differs from other forms of credit in several features. On the one hand, in overdrafts, the credit facility is only used when the consumer exceeds the balance in his account, while in credit cards and revolving credit accounts the credit exists permanently, regardless of the balance in any linked account. Further differences between overdrafts and credit cards include the following: 1) when an overdraft is provided, the consumer's account can be overdrawn for different reasons, including transactions related to cash, payment instruments (e.g. debit cards) and credit instruments (repayments and payment of charges of loans, credit cards or other forms of credit); however, in credit cards only payments made with the card can constitute drawdowns of the credit; 2) the credit limit in a credit card does not have a one-to-one correspondence with the balance in the consumer's account; in fact, the type of card which might show this correspondence is a debit card, and not a credit card.

Our analysis of these products in the EU market reveals the following additional features:

- FREQUENCY: Overdraft facilities linked to current accounts are offered by all banking institutions, although not for all current accounts. Overdrafts in credit cards and revolving credit accounts are arranged only sporadically.

- PURPOSE: The financing is not related to a specific purpose, but simply to expenses outside the normal budget.
- AMOUNT: Connected to the purpose, the credit limit is typically lower than in any other credit product.
- TERM: Also consistent with their purpose, overdraft facilities are a source of exceptional and very short financing. As such, repayment on demand is frequent, and when duration is specified it rarely exceeds 1 year. However, there are striking exceptions to this. For example, the National Bank of Greece offers students overdraft facilities whereby a credit limit of up to €500 can be maintained up to 4 years without interest charges. Even more outstanding, in DK, Danske Bank offers female students with children the Danske ForældreStudielånoverdraft, whereby they have at their disposal an overdraft of DKK1,000 each month during the period of education; over this period and also for two more years no repayment is required and the borrowing rate is very low (annual nominal rate of 2.2%); later, the debt should be repaid over a period of 2 to 6 years for which the borrowing rate increases to 7.56%.
- CHARGES AND FEES: If the overdraft is arranged for a pre-set short period, the borrowing rate may be fixed, but for the rest of the cases it is typically variable and changes at the discretion of the creditor. Non-interest charges generally include setting-up charges and in some cases maintenance fees; also, although seldom, there might be charges every time the credit limit is reached. Finally, it is worth mentioning that in overdrafts in current accounts the level of the borrowing rate and non-interest charges and the existence of maximum amounts which do not earn interest (usually around €200 to €500 when they exist) depend heavily on the type of the account they are linked to, which is also connected to the target public (e.g. accounts for students, preferred clients, or special accounts).
- REPAYMENT: As stated above, a typical feature of overdraft facilities is the lack of a requirement of regular repayments. Usually repayments are left to the discretion of the consumer or the creditor (if repayment on demand is agreed). However, as always, exceptions can be found. For example, overdraft facilities in Banca Comerciale Romana in RO require the payment of interest monthly and a minimum repayment of a 5% of the credit ceiling, while in CSOB in CZ, monthly turnover of the account should amount to at least 50% of the credit.
- SURETIES, INSURANCE AND OTHER ANCILLARY SERVICES: Given their special nature, overdraft facilities are not accompanied by sureties[75], insurance or other ancillary services.

We finally conclude from our examination that overdrafts have become very popular products as a source of short-term financing whose repayment is left to the consumers' choice. Like

[75] The only exceptions found correspond to BG, where securities are required, and MT, where securities are optional.

loans, they may include special benefits in terms of fees and charges for sensitive clients, and it is for some of these clients that we find overdraft facilities which deviate largely from the typical facility. From a regulatory perspective, these deviations point to the need to maintain the reference to the duration of the agreement in order to allow the application of light regulatory regimes. As regard assumptions, we have already valued assumption (d), specific to overdraft facilities, as highly convenient insofar as it refers the disposal of the credit limit over the whole duration of the agreement. Moreover, from our research the assumed duration of 3 months is shown to be realistic. Finally, it should be noted that the existence of charges every time the credit limit is reached should be treated with caution for the calculation of the APR. When these charges appear, since assumption (d) implies that the credit limit is reached for the whole duration of the agreement, the charges should be computed with observance to this situation[76]

3. EXAMPLES OF THE CALCULATION OF THE APR

3.1. INTRODUCTION

The aim of the examples of the calculation of the APR is to illustrate the application of the regulation on the APR as regards the formula, the conventions and the assumptions used for the calculation of this rate. Using the examples, interested parties can also ensure that its methods of resolution give an identical result.

Examples of the calculation of the APR first appeared in Directive 90/88/EEC, following the Annex with the mathematical formula of the APR which was introduced then. In 1998 the initial set of 4 examples was doubled to 8 examples as a sole result of the introduction of further details in the convention for the measurement of time, which provided two alternative approaches (the calendar basis and the standard year). In fact, the 4 examples of 1990 were retained and solved under the two new conventions.

The Commission Proposal of 2002 implied a dramatic change in the set of examples. Compared to the simple examples in the previous Directives, the Proposal included up to 20 examples reflecting different financial structures and characteristics of credit products in Annex II. Using the distinction between open-end and non open-end credits which is relevant in terms of the application of the assumptions for the calculation of the APR, the set of 20 examples included 17 examples of non open-end credits with different frequencies of repayments, repayments of different amounts (equal payments, balloon-type credits, credits with advance payments, increasing and decreasing payments, credits with instalments with choice of amount and

[76] The effect on the APR depends on the characteristics of these charges. For example, the creditor might require the payment of the fee only when the credit limit is reached but not for the period over which this situation is maintained or it might require the payment of the fee every period (day, week, or month) the credit amounts to its limit. Compliance with the Directive requires including all the fees required for the calculation of the APR.

credits where the capital is paid at the end) and different charges (fixed and variable borrowing rates, administrative charges payable at the conclusion of the agreement or spread over its duration, and regular insurance costs given by a fixed amount). The set was completed with 3 examples of open-end credits with different frequencies of repayment, repayments of different amounts (regular payments of only the cost of the credit, and payments given by a percentage of the outstanding balance including capital and interest), and different charges (charges at conclusion, paid regularly, and different borrowing rates); one of these open-end credits was an overdraft facility. The 2002 Proposal also included an additional annex (Annex III) of examples, with 3 examples in which the credit agreement was accompanied by savings and 1 example of a credit agreement with endowment insurance.

It is worth highlighting that an examination of the examples reveals that, except for a few cases, there is no one-to-one correspondence between the different credit products available on the market and the different examples. This can be justified by the fact that different products can share common elements (administrative charges, some schemes of repayment, changing borrowing rates or other features). Moreover, creditors have ample leeway to design their products and it is not unusual for them to export profitable or attractive practices born in one product to other products and so borrowers get used to them. Insurance is probably the most recent example of this. For these reasons, we do believe that the examples of the calculation of the APR should be general enough to avoid losing its suitability in a context where consumer credit markets are evolving continuously, but also specific enough to be able to reflect the main types of consumer credit agreement and the different elements which might appear in them. Also, the focus should be on the effect of these structures and elements on the calculation of the APR, which is what we seek to illustrate. We believe the examples of the Proposal followed these guidelines, as is our intention.

The revision of the examples in the Proposal, which is one of the objectives of this study, is justified by the regulatory changes introduced by Directive 2008/48/EC (as amended by Directive 2011/90/EU), the enlargement of the EU including additional countries from Central and Eastern Europe with special features from an economic and social point of view, and the significant innovation in consumer credit markets during the last decade. Also note that, as mentioned in the Introduction of the study, the original version of the study offered a set of examples which is different to those included in this version, because Directive 2011/90/EU has implied relevant changes in the assumptions for the calculation of the APR.

3.2. CHANGES IN THE EXAMPLES

Our analysis of the regulatory and market spheres carried out in previous chapters of this study points out the need to introduce several modifications in the examples of the Proposal, which we describe in detail in the following.

The impact of Directive 2008/48/EC and Directive2011/90/EU on the examples can be summarized in the following points:

- The changes in the scope of the Directive as regards credit products regulated by the law makes necessary: (i) the replacement of the leasing product in example 15 by a hire-purchase product with an obligation to purchase the object of the contract[77], because only the latter is regulated by the Directive, and (ii) the replacement in example 20 of the product defined as an "advance on a current account" by an "overdraft", which is the term used in the Directive.

- The changes in the provisions about the borrowing rate imply the exclusion of examples 13 and 14, which illustrate the change in the APR when the borrowing rate is defined as a variable rate and it changes. These examples are no longer needed because a comparison of Article 14 (4) of the Proposal and Article 11 of the Directive, both referred to the borrowing rate, reveals that the obligation stated in the Proposal to report to the consumer the new APR resulting from the new borrowing rate is not envisaged under the Directive. Furthermore, the problems in the interpretation of the APR once the credit is running explained in chapter 1 (see comments about the assumption of the starting date), in particular the loss of comparability of this APR to the APRs of new and substitute credit agreements together with the lack of any obligation in the Directive to report the APR once the credit is running, recommend the exclusion of these two examples, and also of examples 11 and 12. Among these four examples, we only maintain example 13 in the new set of examples in order to illustrate the application of different fixed borrowing rates in a non open-end credit.

- The changes in the cost elements to include in the basis cost and the conditions under which they are included imply changes in the explanations provided in examples 5 and 6. Both examples include insurance costs in the calculation of the APR, based on the argument that it is taken out when the credit agreement is concluded. We have replaced this reason, which is not valid under the Directive, by the compulsory nature of insurance.

- The changes in the assumptions for the calculation of the APR imply changes in the content of examples 18, 19 and 20. Examples 18 and 19 are cases of open-end credit agreements, and assumption (e) of Directive 2011/90/EU establishes a specific scheme of repayments different from previous regulation. Also, example 19 adds to example 18 the application of a lower borrowing rate for the first repayment. Under assumption (i) the use of special rates or charges offered for a limited period or amount for the calculation of the APR is not possible when, at the date of the calculation of the APR, the relevant elements of the credit which determine the application and the effect on the APR of different interest rates or charges are not known. Example 20 is also affected by a new assumption, concretely by assumption

[77] As representative of a hire-purchase agreement we have selected an adaptation of example 15 instead of example 16 because we have usually found both advance and final payments in marketed hire-purchase agreements. In any case, example 16, as explained below, is split into two examples, one with only an advance payment, which would be representative of both a hire-purchase agreement with a zero final payment and other vendor-type credits.

(d), which regulates the duration, drawdown and repayment in overdraft facilities when these elements are not stated in the agreement. The new assumption means the replacement of the assumed general duration of 1 year by the assumed overdraft-specific duration of 3 months.

- The aim of covering all the assumptions of the Directives and relevant clarifications in relation to remarks and assumptions stated in the Guidelines on the application of Directive 2008/48/EC has motivated the inclusion of new examples. Specifically, example 4 illustrates the clarification of remark (c) and can be seen as an extension of example 16 of the Proposal in what respect to the treatment of days, example 31 illustrates the application of Article 19 (4) of Directive 2008/48/EC, example 36 illustrates the application of assumption (b), example 38 illustrates assumption (c), example 41 illustrates the application of assumption (d) in an overdraft facility with a fixed duration thus complementing example 40, examples 34 and 35 illustrates specific cases covered by assumption (e), example 27 illustrates assumption (f)(ii), example 28 covers assumption (g), example 30 illustrates the application of assumption (j) in isolation, and examples 32 and 37 use assumption (j) in conjunction with assumption (i).

From the analysis of the consumer credit products marketed in the 27 EU MS, we infer that in order to cover the main products available in the EU, it is necessary to use new examples to illustrate the following features of credit products:

- The existence of charges given by a single sum which are financed with the credit, thus increasing the amount owed. The novelty here is the financing of the charges, a practice which sometimes appears in lump sum insurance costs in this type of credits. The new example including this feature is example 8. With the inclusion of these charges, the range of costs covered by the examples includes costs payable at the conclusion of the agreement, whether financed or not, and costs payable regularly.

- New schemes of repayment of the credit. The examples in the Proposal cover repayments in equal, increasing and decreasing instalments, regular payment of charges and payment of the capital at the end, and regular repayment of a minimum percentage of the outstanding balance of capital and interest. New examples complete the range of schemes as follows: repayment in a single instalment (example 1), regular payment of a fixed amount known in advance (example 16), regular payment of charges and a fixed amount known in advance (example 17), payment of charges and capital at the end (examples 10 and 19), regular payment of interest and equal amounts of capital (example 20), regular payment of charges plus a fixed percentage of the balance outstanding of capital (example 21), regular payment of a fixed percentage of the outstanding balance of capital and interest (example 22), and regular payment of charges and a minimum percentage of the outstanding balance of capital (example 26). These complete the existing schemes so giving a complete view of the most usual schemes of repayment.

- Flexibility in repayments. Schemes of repayment consisting on minimum amounts or percentages of the balance outstanding are a form of flexibility, but there are also

other forms addressed in the examples. From the examples in the Proposal, example 10 (now example 24) illustrates the case where the consumer can choose the amounts between two options. New example 25 considers the possibility to postpone the payment of capital and/or charges within certain limits. Assumptions (f) and (g) are relevant in these cases for the calculation of the APR.

Also related to the adaptation of the examples to the products available in the market, we have evaluated the amounts of the credits, the borrowing rates, the charges and the repayments used in the examples in view of the levels existing on the market. We have also taken into account the benefits in terms of simplicity and homogeneity of using round and similar figures throughout the examples of the same type of credits, an approach which is possible given that the examples are expressed in general terms and refer to basic structures, as indicated above. From this analysis we have adopted the following decisions:

- Amount: In open-end credits and overdraft facilities we assume an amount of credit of €1000, reflecting the lower amounts usually provided in this type of credits and replacing the amounts of 700 and 2500 used in the examples in the Proposal by an intermediate amount which is reasonable for this type of credits. For the rest of credits, we assume that the total amount of the credit is €6000, which is the amount most frequently used in the examples in the Proposal. The exceptions to this rule are the example of the payday loan (example 10) for which a credit of €100 is assumed, the hire-purchase agreement (example 13) for which a credit of €20000 is assumed (it is more in line with market levels), the examples of credits where repayments are given as a percentage of the balance outstanding (examples 21, 22, 26, 32) (in order to limit the duration of the credit to a convenient number of periods), the example of a credit with a few number of repayments and high charges (example 23) and the example with choice of amounts (example 24), for which we assume a credit of €1000. Also, example 39 is silent about the amount of the credit, in order to illustrate the application of assumption (h).

- Term: Our aim to show the corresponding amortisation tables for the examples have led us to decrease the typical duration from the 4 years (with monthly repayments) used in the Proposal to 2 years (with monthly repayments), which implies a full repayment of the credit in 24 periods instead of in 48. Both durations are inside the usual market range for duration. This duration has been used for non open-end credits with an explicit duration. In cases where the duration is obtained implicitly from the scheme of repayments (i.e. those credits whose repayments are given as a percentage of the balance outstanding or as a constant amount known in advance), we have limited the duration to a convenient number of periods by a sensible choice of the amount of the repayments (e.g. using a percentage of the 20% of the balance outstanding, with a minimum of €20, values which are reasonable in the market). The exceptions to this rule are the first two examples, the example with non regular periods of repayment (example 4), the example of a payday loan (example 10), the example of a credit with a few number of repayments and high charges (example 23), one of the examples of credits with flexibility of repayment of capital (example 26), the example where the length of the interval to the first repayment depends on the date

the agreement is concluded (example 27), and the example where the timing of the change from a fixed-rate period to a variable-rate period is unknown (example 32). On the other hand, in open-end credits other than overdraft facilities the duration is assumed to be 1 year by virtue of assumption (e)(i). Finally, the examples of overdraft facilities cover the case of an overdraft with an unknown duration, for which assumption (d) establishes an assumed duration of 3 months, and an overdraft with a pre-established duration of 6 months. As regards the frequency of payments, similar to the examples in the Proposal, we have used monthly payments. The only exceptions are the first two examples, one of the cases analyzed in the example with non regular periods of repayment (case 3 of example 4), the example with choice of amounts (example 24), and the example of the overdraft with a pre-established duration (example 41).

- Special payments: In the examples illustrating the existence of a down payment or a final payment, we have changed their amount from 30% and 20% of the credit limit, respectively, to a same percentage of 25%, which is also reasonable. Finally, in the example of the hire-purchase credit, we have used realistic values of 50% and 10% for the down and final payments, respectively.

- Borrowing rates: As assumed in most of the examples of the Proposal, we use a nominal rate of 9% in non open-end credits and an effective rate of 12% in open-end credits and overdraft facilities. Although there are significant differences between countries and products, these rates, already used frequently in the examples of the Proposal, are able to reflect the market in normal circumstances. Moreover, they are coherent with the typical higher rate applicable in revolving credits. The exceptions are the payday loan (example 10), the example of a credit with a few number of repayments and high charges (example 23), the example with choice of amounts (example 24), and those examples where the borrowing rate changes or there are different borrowing rates (examples 29 to 32, and 37 to 39; nevertheless, in most of these examples one the rates is set to the general level).

- Other charges: In credits for a total amount of €6000 we have assumed administrative costs of €60, if any. This was the level used in most of the examples of this type of the Proposal. In credits for a total amount of €1000 we have assumed administrative costs of €25, if any. Similarly, the annual costs of cards is assumed to be €25 for credit cards, although a higher value of €50 per year has been used for the charge (or deferred debit) card of example 35 in exchange to the lack of interest charges. For insurance we have taken market levels as our base to assume a cost given by the 5% of the credit which could be paid as single sum or spread over the duration of the credit. The exceptions are the payday loan (example 10), the example of a credit with a few number of repayments and high charges (example 23), the example which illustrates the application of assumption (g) because it considers a variety of costs (example 28), and the overdraft facility of example 40, which considers a cost of €2.5 per month.

A last guideline we have followed during the revision has been the provision of instructive examples. In this regard we have used three tactics:

- Introduce changes in a progressive way throughout the examples, trying to go from the basics to the most complicated agreements and avoiding the simultaneous appearance of multiple variations which might hinder a simple and proper identification and valuation of them. This has provoked a reordering of the examples and the splitting of the example 16 of the Proposal (which included an advance payment and the measurement of days) in the new examples 10 and 4.

- Provide self-contained examples, in the sense that any information needed to calculate the examples is supplied. This feature should be considered a requirement because it is desirable for the reader to be able to replicate all the examples using the Excel simulator. In this regard, unlike some examples in the Proposal, the repayments of the credit are given endogenously (as those payments which provide the full repayment of the credit at the end of the agreement) and not exogenously. Moreover, further details about the calculations can be obtained using the Excel simulator.

- Move mathematical efficiency to a second place in favour of financial reasoning. With this aim, we have changed the order of the extended and compact formulae used in the examples. While the examples in the Proposal first showed the compact formula, our examples first show the more meaningful extended formula, and to later show the compact formula. In the preliminary remarks a brief explanation of the compact formula is also provided.

Finally, during the revision we have also detected a few errors which have been solved when the examples have remained within our set of examples. These errors affected examples 6, 13, 16 and 18 of the Proposal.

Table 11 shows the new set of examples including a brief description of them, their most distinguishing features, the assumptions used and the relationship of the examples with the examples in the Proposal.

TABLE 11. SET OF EXAMPLES

Number	2002 Proposal	Description	Feature	Assumptions used
Credit agreements with a fixed duration other than overdraft facilities				
1	–	Credit with a single repayment	Single payment	
2	1	Credit with annual instalments	Regular payments	
3	2	Credit with monthly instalments	Default example in the Excel simulator	
4	16	Credit with non regular periods of repayment	Non regular periods of payment	
5	3	Credit with single sum cost	Single sum cost	
6	4	Credit with regular charges	Regular charges	
7	5	Credit with single sum cost and regular insurance premiums	Regular insurance premiums	
8	–	Credit with single sum cost and single-sum insurance premium which is financed	Financed cost	
9	–	Credit with single sum cost and a 0% borrowing rate	Interest-free	
10	–	Payday loan with single sum cost	Daily interest (converted to an effective rate)	
11	6	Balloon-type credit with single sum cost and regular insurance premiums	Balloon payment	
12	16	Credit with single sum cost and an advance payment	Advance payment	
13	15	Hire-purchase agreement	Advance payment plus final payment	
14	8	Credit with single sum cost and increasing instalments	Increasing instalments	
15	7	Credit with single sum cost and decreasing instalments	Decreasing instalments	
16	–	Credit with single sum cost and regular payment of a fixed amount known in advance	Regular payment of a fixed amount known in advance	
17	–	Credit with single sum cost and regular payment of interest and a fixed amount known in	Regular payment of interest and a fixed amount known in	

		advance	advance	
18	17	Credit with single sum cost, regular payment of interest and repayment of capital at the end	Regular payment of interest and repayment of capital at the end	
19	–	Credit with single sum cost and payment of interest and capital at the end	Payment of interest and capital at the end	
20	–	Credit with single sum cost and regular payment of interest plus equal amounts of capital	Regular payment of interest and equal amounts of capital	
21	–	Credit with single sum cost and regular payment of interest plus a percentage of the balance outstanding of capital	Regular payment of interest plus a percentage of the balance outstanding of capital	
22	–	Credit with single sum cost and regular repayment of a percentage of the balance outstanding of capital plus interest	Regular payment of a percentage of the balance outstanding of capital plus interest	
23	9	Credit with a few number of repayments and high charges	Few number of repayments and high charges	
24	10	Credit with flexibility in the amount of the instalments	Flexibility in the amount of the instalments	(f)(i)
25	–	Credit with single sum cost, regular payment of interest plus equal amounts of capital and with the possibility to postpone the payments within certain limits	Flexibility in the dates of payment of capital and interest	(f)(i) and (g)(i)
26	–	Credit with single sum cost, regular payment of interest plus a minimum percentage of the balance outstanding of capital and a final payment	Flexibility in the amounts of the repayments of capital	(f)(i)
27	–	Credit with single sum cost and equal instalments, where the length of the interval to the first repayment depends on the date the agreement is concluded	Unknown length of the interval to the first repayment	(f)(ii)
28	–	Credit with equal repayments of capital and with costs whose date of payment is unknown	Unknown date of payment of charges	(g)
29	13	Credit with single sum cost, monthly instalments and different borrowing rates	Different borrowing rates	

30	–	Credit with single sum cost and monthly instalments, where the borrowing rate is fixed for an initial period and subsequently it is periodically adjusted according to an agreed indicator	Fixed borrowing rate period followed by a variable rate period	(j)
31	–	Credit with single sum cost and monthly instalments, where the borrowing rate is fixed for an initial period after which a new fixed rate may be agreed instead of proceed with a variable rate	Fixed borrowing rate period which might be followed by a period with a variable rate or a new fixed rate	Article 19 (4)
32	–	Credit with single sum cost, regular payment of interest plus a minimum percentage of the balance outstanding of capital and a final payment, where the borrowing rate changes from a fixed to a variable rate when the outstanding balance reduces to less of a half of the initial amount of the credit	The change from a fixed-rate period to a variable-rate period is known but the timing is unknown	(i) and (j)
Open-end credit agreements other than overdraft facilities				
33	18	Open-end credit with single sum cost, freedom of drawdown and regular repayment of a minimum percentage of the balance outstanding of capital plus interest	Open-end credit with freedom of drawdown	(a) and (e)
34	–	Open-end credit with single sum cost and freedom of drawdown and repayment but with maximum periods until full repayment	Maximum periods until full repayment and unknown dates and amounts of interest charges	(a), (e) and (g)(i)
35	–	Open-end credit with annual costs and freedom of drawdown where the capital must be repaid only in full in respect of each payment period (charge/deferred debit card)	Capital repayable only in full in respect of each payment period	(a) and (e)
36	–	Open-end credit with single sum cost, drawdown limits and regular repayment of a minimum percentage of the balance outstanding of capital plus interest	Drawdown limits with regard to the amount of credit and the period of time	(b) and (e)

37	–	Open-end credit with single sum cost and freedom of drawdown, where the borrowing rate is fixed for an initial period and subsequently it is periodically adjusted according to an agreed indicator	Fixed borrowing rate period followed by a variable rate period	(a), (e), (i) and (j)
38	–	Credit card with annual costs, different forms of drawdown with different charges and borrowing rates and regular repayment of a minimum percentage of the balance outstanding of capital plus interest	Different forms of drawdown with different charges and borrowing rates and unknown date of payment of annual costs	(a), (c), (e) and g(iii)
39	19	Credit card for an amount not specified and with annual costs, an initial interest-free period and regular repayment of a minimum percentage of the balance outstanding of capital plus interest	Ceiling of the credit not specified, initial interest-free period and unknown date of payment of annual costs	(a), (e), (g)(iii), (h) and (i)
Overdraft facilities				
40	20	Overdraft facility with an unknown duration and regular payment of costs of the credit	Overdraft facility with an unknown duration	(d)
41	–	Overdraft facility with a fixed duration and unknown date of payment of interest charges	Unknown date of payment of interest charges	(d) and (g)(i)

3.3. NEW SET OF EXAMPLES

PRELIMINARY REMARKS

The following examples illustrate the calculation of the APR on consumer credit products tailored to Directive 2008/48/EC[78], Directive 2011/90/EU[79] and the Guidelines on the application of Directive 2008/48/EC as amended by Directive 2011/90/EU[80]. The examples cover a wide range of elements and characteristics found in these products. They should be interpreted as notional examples in the sense that the amounts, charges or interest rates assumed are only illustrative of the market, and market products might combine the elements of different examples.

As regards borrowing rates, the examples of credit agreements with a fixed duration other than overdraft facilities (examples 1 to 32), unless otherwise stated, assume a nominal annual rate of 9% which is charged periodically using a proportional conversion method, and the examples of open-end credit agreements and overdraft facilities (examples 33 to 41), unless otherwise stated, use an effective annual rate of 12% which is charged periodically using the corresponding compounding frequency. For example, the nominal rate of 9% implies monthly interest charges of 9/12=0.750% on capital, and the effective rate of 12% implies monthly interest charges of (1+0.12)^(1/12)-1=0.949% on capital. In general, if *n* is the number of periods of payment in a year, the periodic rate is given by *i*/*n* or (1+*r*)^(1/*n*)-1, where *i* and *r* are the nominal and effective rate, respectively. The use of these rates and methods is only hypothetical. The Directive seeks to separate any further regulation of borrowing rates from the regulation of effective or nominal rates.

The explanations and mathematical and financial developments have followed a criterion of simplicity. However, for completeness and comprehension and in order to facilitate the replication of the examples using the Excel simulator, this section finalizes showing the information to be entered into the simulator to obtain the solution for each example and the amortisation table of the credit. It should be noted that calculations using the precision of the numbers as shown in the examples might lead to small differences in the results.

Finally, whenever possible the basic equation which establishes the APR formula is simplified using the formula for a geometric series (i.e., the sum of the numbers in a geometric progression). A geometric series of scale factor *s* and common ratio *c* is given as:

$$sc^k + sc^{k+1} + \ldots + sc^{k+n} = s\frac{c^k - c^{k+n}c}{1-c}$$

[78] Directive 2008/48/EC of the European Parliament and of the Council of 23 April 2008 on credit agreements for consumers and repealing Council Directive 87/102/EEC, OJ L 133, 22 May 2008.

[79] Commission Directive 2011/90/EU of 14 November 2011 amending Part II of Annex I to the Directive 2008/48/EC, OJ L 296, 15.11.2011.

[80] SWD(2012) 128 final 8.05.2012.

This is very convenient in credits payable in equal instalments because the sum of the present value of *N* equal instalments of amount *A* payable at a frequency of *f* instalments per year can be given as:

$$A\frac{1}{(1+X)^{1/f}}+A\frac{1}{(1+X)^{2/f}}+\ldots+A\frac{1}{(1+X)^{N/f}}=A\frac{1-\frac{1}{(1+X)^{N/f}}}{(1+X)^{1/f}-1}$$

EXAMPLES

EXAMPLE 1

Credit agreement for a total amount of credit of €6000 repayable in a single instalment in six months. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%.

The instalment which provides full repayment of the credit is €6270.

The equation becomes:

$$6000=6270\frac{1}{(1+X)^{6/12}}$$

giving X=9.202500%, i.e. an APR of 9.2%.

EXAMPLE 2

Credit agreement for a total amount of credit of €6000 repayable in 4 equal annual instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%.

The annual instalment which provides full repayment of the credit is €1852.01.

The equation becomes:

$$6000=1852.01\frac{1}{(1+X)^{1}}+1852.01\frac{1}{(1+X)^{2}}+1852.01\frac{1}{(1+X)^{3}}+1852.01\frac{1}{(1+X)^{4}}$$

or:

$$6000=1852.01\frac{1-\frac{1}{(1+X)^{4}}}{X}$$

giving X=8.999951%, i.e. an APR of 9.0%.

EXAMPLE 3

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%.

The monthly instalment which provides full repayment of the credit is €274.11

The equation becomes:

$$6000 = 274.11\frac{1}{(1+X)^{1/12}} + 274.11\frac{1}{(1+X)^{2/12}} + \ldots + 274.11\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 274.11\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 9.381299%, i.e. an APR of 9.4%.

EXAMPLE 4

Credit agreement for a total amount of credit of €6000 repayable in 3 equal instalments, where the intervals between dates cannot be expressed as a whole number of weeks, months or years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%.

Remark (c) of part I of Annex I of Directive 2008/48/EC deals with the measurement of the intervals between dates used in the calculation of the APR. With the aim of providing a uniform application of this remark, the Guidelines on the application of Directive 2008/48/EC provides the following clarification:

Only when an interval between dates used in the calculation cannot be expressed as a whole number of years, months or weeks, the interval shall be expressed as a whole number of one of these periods in combination with a number of days. For the choice among years, months or weeks, consideration shall be given to the frequency of drawdowns and payments. When using days:

(i) Every day shall be counted, including weekends and holidays;

(ii) Equal periods and then days shall be counted backwards to the date of the initial drawdown; and

(iii) The length of a period of days shall be obtained excluding the first day and including the last day (simple subtraction of dates), and shall be expressed in years by dividing this period by the number of days (365 or 366 days) of the complete year counted backwards from the last day to the same day of the previous year.

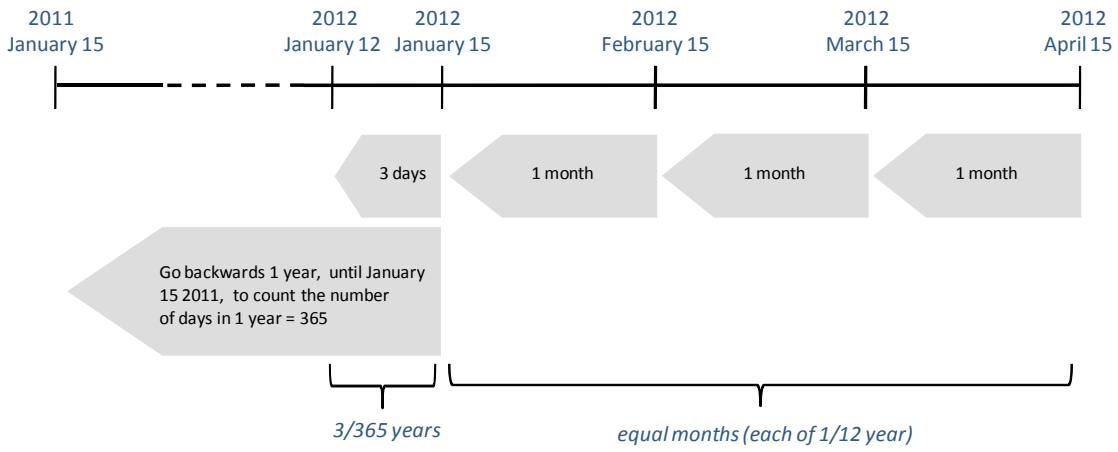
In the previous examples, the intervals between dates could be obtained using a whole number of regular periods (weeks, months or years), and accordingly the APR was calculated using them. In this example, this clarification provides a precise method to obtain the intervals between dates using regular periods in combination with a number of days. Three different cases are exemplified in the following.

Case 1. The agreement is signed on January 12 2012 and payments are to be made on the 15th of each of the 3 succeeding months, from February to April.

For this agreement, as the frequency of repayments is monthly, regular periods are given as months, and the intervals between the date of the first drawdown and the successive payments are expressed as a combination of months and days:

- Payment on February 15 2012: the interval is expressed as 3/365+1/12 (1 month from February 15 2012 to January 15 2012 plus 3 days from January 15 2012 to January 12 2012 within a year from January 15 2012 to January 15 2011 with 365 days).
- Payment on March 15 2012: 3/365+2/12 (2 months from March 15 2012 to January 15 2012 plus 3 days from January 15 2012 to January 12 2012 within a year from January 15 2012 to January 15 2011 with 365 days; equivalently, it can be obtained adding 1 month to the interval of the previous payment to obtain March 15 2012).
- Payment on April 15 2012: 3/365+3/12 (add 1 month to the interval of the previous payment to obtain April 15 2012).

These intervals are shown in the following scheme:



The monthly instalment which provides full repayment of the credit is €2031.57, and the equation becomes:

$$6000 = 2031.57\frac{1}{(1+X)^{3/365+1/12}} + 2031.57\frac{1}{(1+X)^{3/365+2/12}} + 2031.57\frac{1}{(1+X)^{3/365+3/12}} =$$
$$= \frac{1}{(1+X)^{3/365}}\left[2031.57\frac{1}{(1+X)^{1/12}} + 2031.57\frac{1}{(1+X)^{2/12}} + 2031.57\frac{1}{(1+X)^{3/12}}\right]$$

or:

$$6000 = 2031.57 \times \frac{1}{(1+X)^{3/365}} \times \frac{1-\frac{1}{(1+X)^{3/12}}}{(1+X)^{1/12}-1}$$

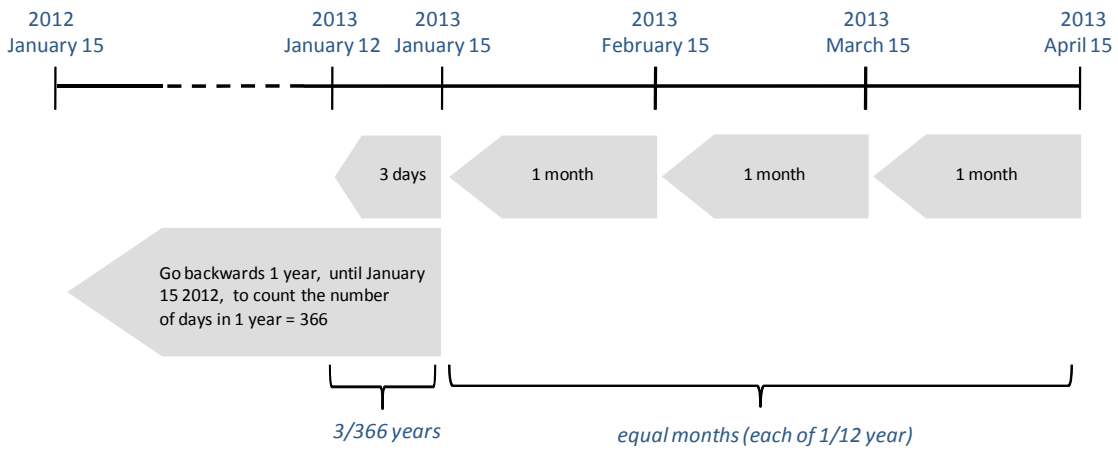
giving X= 9.380218%, i.e. an APR of 9.4%.

Case 2. The agreement is signed one year later, on January 12 2013 and payments are to be made again on the 15th of each of the 3 succeeding months, from February to April.

In this case, the period of days belongs to a leap year. Specifically, the intervals between the date of the first drawdown and the successive payments are:

- Payment on February 15 2013: the interval is expressed as 3/366+1/12 (1 month from February 15 2013 to January 15 2013 plus 3 days from January 15 2013 to January 12 2013 within a year from January 15 2013 to January 15 2012 with 366 days).
- Payment on March 15 2013: 3/366+2/12 (add 1 month to the interval of the previous payment to obtain March 15 2013).
- Payment on April 15 2013: 3/366+3/12 (add 1 month to the interval of the previous payment to obtain April 15 2013).

These intervals are shown in the following scheme:



The monthly instalment becomes 1 cent lower, and amounts to €2031.56. The new equation becomes:

$$6000 = 2031.56\frac{1}{(1+X)^{3/366+1/12}} + 2031.56\frac{1}{(1+X)^{3/366+2/12}} + 2031.56\frac{1}{(1+X)^{3/366+3/12}} =$$
$$= \frac{1}{(1+X)^{3/366}}\left[2031.56\frac{1}{(1+X)^{1/12}} + 2031.56\frac{1}{(1+X)^{2/12}} + 2031.56\frac{1}{(1+X)^{3/12}}\right]$$

or:

$$6000 = 2031.56 \times \frac{1}{(1+X)^{3/366}} \times \frac{1-\frac{1}{(1+X)^{3/12}}}{(1+X)^{1/12}-1}$$

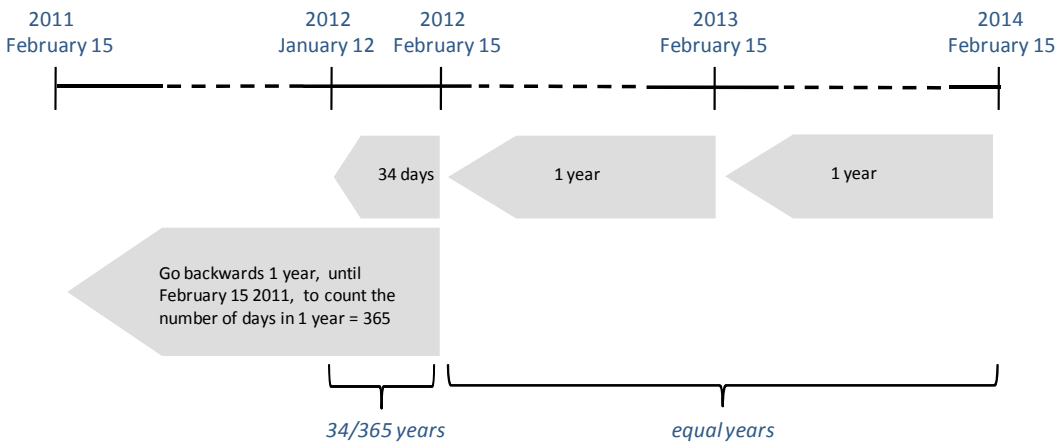
giving X= 9.378394%, i.e. an APR of 9.4%.

Case 3. The agreement is signed on January 12 2012, as in case 1, but payments are to be made now yearly, being due on the 15th of February of each year from 2012 to 2014.

For this agreement, as the frequency of repayments is yearly, regular periods are given as years, and the intervals between the date of the first drawdown and the successive payments are expressed as a combination of years and days:

- Payment on February 15 2012: the interval is expressed as 34/365 (34 days from February 15 2012 to January 12 2012 within a year from February 15 2012 to February 15 2011 with 365 days).
- Payment on February 15 2013: 34/365+1 (add 1 year to the interval of the previous payment to obtain February 15 2013).
- Payment on February 15 2014: 34/365+2 (add 1 year to the interval of the previous payment to obtain February 15 2014).

These intervals are shown in the following scheme:



The yearly instalment is significantly higher, reflecting the higher interest charges due to the longer duration of the credit, and amounts to €2192.84. The equation becomes:

$$6000 = 2192.84\frac{1}{(1+X)^{34/365}} + 2192.84\frac{1}{(1+X)^{34/365+1}} + 2192.84\frac{1}{(1+X)^{34/365+2}} =$$
$$= \frac{1}{(1+X)^{34/365-1}}\left[2192.84\frac{1}{(1+X)} + 2192.84\frac{1}{(1+X)^2} + 2192.84\frac{1}{(1+X)^3}\right]$$

or:

$$6000 = 2192.84 \times \frac{1}{(1+X)^{34/365-1}} \times \frac{1-\frac{1}{(1+X)^3}}{X} = 2192.84 \times \frac{1-\frac{1}{(1+X)^3}}{X(1+X)^{34/365-1}}$$

giving X= 9.033590%, i.e. an APR of 9.0%.

EXAMPLE 5

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%.Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The monthly instalment which provides full repayment of the credit is €274.11.

The equation becomes:

$$6000 = 60 + 274.11\frac{1}{(1+X)^{1/12}} + 274.11\frac{1}{(1+X)^{2/12}} + \ldots + 274.11\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 274.11\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 10.474957%, i.e. an APR of 10.5%.

Compared to example 3, the APR increases as a result of the additional costs.

EXAMPLE 6

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Administrative charges of €60 spread over the repayments.

The monthly instalment which provides full repayment of the credit is €274.11, and the monthly payment including administrative charges becomes:

$$A = 274.11 + \frac{60}{24} = 274.11 + 2.50 = €276.61$$

The equation becomes:

$$6000 = 276.61\frac{1}{(1+X)^{1/12}} + 276.61\frac{1}{(1+X)^{2/12}} + \ldots + 276.61\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 276.61\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 10.368635%, i.e. an APR of 10.4%.

Compared to example 5, the APR decreases as a result of the distribution of the payment of the costs over time.

EXAMPLE 7

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement plus insurance costs of 5% of the total amount of credit spread over the repayments.

The costs associated with insurance premiums must be included in the total cost of the credit if insurance is compulsory in order to obtain the credit or to obtain it on the terms and conditions marketed. It is assumed this is the case.

The monthly instalment which provides full repayment of the credit is €274.11, and the monthly payment including insurance costs becomes:

$$A = 274.11 + \frac{5\% \times 6000}{24} = 274.11 + 2.0833333\% \times 6000 = €286.61$$

The equation becomes:

$$6000 = 60 + 286.61\frac{1}{(1+X)^{1/12}} + 286.61\frac{1}{(1+X)^{2/12}} + \ldots + 286.61\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 286.61\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 15.506941%, i.e. an APR of 15.5%.

EXAMPLE 8

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement plus single-sum insurance costs of 5% of the total amount of credit which are financed.

The costs associated with insurance premiums must be included in the total cost of the credit if insurance is compulsory in order to obtain the credit or to obtain it on the terms and conditions marketed. It is assumed this is the case.

The amount owed is given by the sum of the amount of the credit and the insurance costs:

$$6000 + 5\% \times 6000 = €6300$$

This amount increased by the financed cost should not be identified with the total amount of credit because in coherence with Article 3 points g, h and l, the total amount of credit does not include the amounts devoted to the payment of charges. In fact, these amounts are costs of the credit by virtue of Article 3(g). Also, Article 3(h) defines the total amount payable by the consumer as total amount of the credit plus total cost of the credit; thus these amounts cannot be included in both terms otherwise they would be counted twice to obtain the amount payable by the consumer (i.e., the consumer would have to pay them twice). And finally, these amounts are not available to the consumer, and hence are not included in the total amount of credit as defined by Article 3(l).

The monthly instalment which provides full repayment of the amount financed is €287.81.

The equation becomes:

$$6000 = 60 + 287.81\frac{1}{(1+X)^{1/12}} + 287.81\frac{1}{(1+X)^{2/12}} + \ldots + 287.81\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 287.81\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 15.993938%, i.e. an APR of 16.0%.

Compared to example 7, both the instalments and the APR are higher reflecting the financing costs of insurance.

EXAMPLE 9

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 0%.Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The monthly instalment which provides full repayment of the credit is €250 (6000/24 because there are no interest charges).

The equation becomes:

$$6000 = 60 + 250\frac{1}{(1+X)^{1/12}} + 250\frac{1}{(1+X)^{2/12}} + \ldots + 250\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 250\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 0.971008%, i.e. an APR of 1.0%.

Compared to example 5, the APR is lower because of the credit is interest-free. However, the existence of other costs leads to a positive APR.

EXAMPLE 10

Credit agreement for a total amount of credit of €100 for a period of 20 days. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. Interest is charged daily at a rate of 1% per day, but the credit agreement provides for payment of the balance outstanding of capital and interest at the end of the agreement. Single sum (lump sum) cost of €5 payable on conclusion of the agreement.

As interest charges are debited daily but are not paid, they increase the balance outstanding every day. This balance amounts to:

$$100(1+1\%)^{20} = €122.02$$

at the end of the 20-day period, being the amount to pay at that time.

The equation becomes:

$$100 = 5 + 122.02 \frac{1}{(1+X)^{20/365}}$$

giving X= 95.362856%, i.e. an APR of 9536.3%.

This example is representative of payday loans, which are short-term loans that charge daily interest on a low fixed sum. The high borrowing rate and the high fee in relation to the low amount of credit might lead to very high APRs.

EXAMPLE 11

Balloon-type credit agreement for a total amount of credit of €6000 repayable in 23 equal monthly instalments plus a final payment in month 24th representing 25% of the total amount of credit. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement plus insurance costs of 5% of the total amount of credit spread over the repayments.

The costs associated with insurance premiums must be included in the total cost of the credit if insurance is compulsory in order to obtain the credit or to obtain it on the terms and conditions marketed. It is assumed this is the case.

The monthly instalment which provides full repayment of the credit is €225.44. The monthly payment for the first 23 months including insurance costs then becomes:

$$A_{1-23} = 225.44 + \frac{5\% \times 6000}{24} = 225.44 + 2.0833333\% \times 6000 = €237.94$$

and the payment in month 24 is:

$$A_{24} = 25\% \times 6000 + \frac{5\% \times 6000}{24} = 25\% \times 6000 + 2.0833333\% \times 6000 = €1512.50$$

The equation becomes:

$$6000 = 60 + 237.94 \frac{1}{(1+X)^{1/12}} + 237.94 \frac{1}{(1+X)^{2/12}} + \ldots + 237.94 \frac{1}{(1+X)^{23/12}} + 1512.50 \frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 237.94 \frac{1 - \frac{1}{(1+X)^{23/12}}}{(1+X)^{1/12} - 1} + 1512.50 \frac{1}{(1+X)^{24/12}}$$

giving X= 14.610574%, i.e. an APR of 14.6%.

This example illustrates the case of credits which offer the postponement of the repayment of a large part of the credit to the end of the agreement. The higher credit risk due to the huge last payment can justify the requirement of insurance.

EXAMPLE 12

Credit agreement for an amount of €6000 repayable in 24 equal monthly instalments with an advance payment representing 25% of such amount. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The advance payment is never a part of the financing operation. The amount of the credit is then:

$$6000 - 25\% \times 6000 = €4500$$

The monthly instalment which provides full repayment of the credit is €205.58.

The equation becomes:

$$4500 = 60 + 205.58\frac{1}{(1+X)^{1/12}} + 205.58\frac{1}{(1+X)^{2/12}} + \ldots + 205.58\frac{1}{(1+X)^{24/12}}$$

or:

$$4500 = 60 + 205.58\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 10.843883%, i.e. an APR of 10.8%.

This example illustrates hire-purchases agreements without a special final payment and also practices used by certain specialist "vendor-credit" establishments.

EXAMPLE 13

Credit agreement of the hire-purchase type for goods with a price of €20000 over a period of 2 years. The agreement stipulates an advance payment of 50% of the price, 23 monthly instalments plus a final payment of 10% of the price. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The advance payment is never a part of the financing operation. The amount of the credit is then:

$$20000 - 50\% \times 20000 = €10000$$

The payment in month 24 is:

$$A_{24} = 10\% \times 20000 = €2000$$

For the rest of months, the monthly instalment which provides full repayment of the credit is €395.58.

The equation becomes:

$$10000 = 60 + 395.58\frac{1}{(1+X)^{1/12}} + 395.58\frac{1}{(1+X)^{2/12}} + \ldots + 395.58\frac{1}{(1+X)^{23/12}} + 2000\frac{1}{(1+X)^{24/12}}$$

or:

$$10000 = 60 + 395.58\frac{1-\frac{1}{(1+X)^{23/12}}}{(1+X)^{1/12}-1} + 2000\frac{1}{(1+X)^{24/12}}$$

giving X= 9.957314%, i.e. an APR of 10.0%.

This example combines the two special payments from the two previous examples.

EXAMPLE 14

Credit agreement for a total amount of credit of €6000 repayable in 24 monthly instalments, being the instalments during the second year 60% higher than the instalments during the first year. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The monthly instalments which provide full repayment of the credit are €213.06 for the first year and €340.89 for the second year.

The equation becomes:

$$6000 = 60 + 213.06\frac{1}{(1+X)^{1/12}} + \ldots + 213.06\frac{1}{(1+X)^{12/12}} + 340.89\frac{1}{(1+X)^{13/12}} + \ldots + 340.89\frac{1}{(1+X)^{24/12}} =$$

$$= 60 + 213.06\frac{1}{(1+X)^{1/12}} + \ldots + 213.06\frac{1}{(1+X)^{12/12}} + \frac{1}{(1+X)^{12/12}}\left[340.89\frac{1}{(1+X)^{1/12}} + \ldots + 340.89\frac{1}{(1+X)^{12/12}}\right]$$

or:

$$6000 = 60 + 213.06\frac{1-\frac{1}{(1+X)}}{(1+X)^{1/12}-1} + 340.89\frac{1}{(1+X)} \times \frac{1-\frac{1}{(1+X)}}{(1+X)^{1/12}-1} =$$

$$= 60 + \left(213.06 + 340.89\frac{1}{(1+X)}\right) \times \frac{1-\frac{1}{(1+X)}}{(1+X)^{1/12}-1}$$

giving X= 10.361780%, i.e. an APR of 10.4%.

EXAMPLE 15

Credit agreement for a total amount of credit of €6000 repayable in 24 monthly instalments, being the instalments during the second year 40% lower than the instalments during the first year. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) costs of €60 payable on conclusion of the agreement.

The monthly instalments which provide full repayment of the credit are €338.84 for the first year and €203.30 for the second year.

The equation becomes:

$$6000 = 60 + 338.84\frac{1}{(1+X)^{1/12}} + \ldots + 338.84\frac{1}{(1+X)^{12/12}} + 203.30\frac{1}{(1+X)^{13/12}} + \ldots + 203.30\frac{1}{(1+X)^{24/12}} =$$

$$= 60 + 338.84\frac{1}{(1+X)^{1/12}} + \ldots + 338.84\frac{1}{(1+X)^{12/12}} + \frac{1}{(1+X)^{12/12}}\left[203.30\frac{1}{(1+X)^{1/12}} + \ldots + 203.30\frac{1}{(1+X)^{12/12}}\right]$$

or:

$$6000 = 60 + 338.84\frac{1-\frac{1}{(1+X)}}{(1+X)^{1/12}-1} + 203.30\frac{1}{(1+X)} \times \frac{1-\frac{1}{(1+X)}}{(1+X)^{1/12}-1} =$$

$$= 60 + \left(338.84 + 203.30\frac{1}{(1+X)}\right) \times \frac{1-\frac{1}{(1+X)}}{(1+X)^{1/12}-1}$$

giving X= 10.626495%%, i.e. an APR of 10.6%.

EXAMPLE 16

Credit agreement for a total amount of credit of €6000 to be draw down immediately and in full on conclusion of the agreement; further drawdowns are not allowed. The credit agreement provides for payment of a fixed amount specified in advance of €300 every month until the complete repayment of the credit is made. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The scheme of the repayments determines that the credit is completely repaid in 22 months. According to the amortisation table, the amount of the last payment is only A22=225.31, which corresponds to the amount owed at the end of month 22.

The equation becomes:

$$6000 = 60 + 300\frac{1}{(1+X)^{1/12}} + 300\frac{1}{(1+X)^{2/12}} + \ldots + 300\frac{1}{(1+X)^{21/12}} + 225.31\frac{1}{(1+X)^{22/12}}$$

or:

$$6000 = 60 + 300\frac{1-\frac{1}{(1+X)^{21/12}}}{(1+X)^{1/12}-1} + 225.31\frac{1}{(1+X)^{22/12}}$$

giving X= 10.579073%, i.e. an APR of 10.6%.

EXAMPLE 17

Credit agreement for a total amount of credit of €6000 to be draw down immediately and in full on conclusion of the agreement; further drawdowns are not allowed. The credit agreement provides for payment of interest plus a fixed amount specified in advance of €300 every month until the complete repayment of the credit is made. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The scheme of payments determines that the credit is completely repaid in 20 months. The monthly payments can be obtained from the amortisation table, being A1 = 345.00, A2 = 342.75, A3 = 340.50, A4 = 338.25, A5 = 336.00, A6 = 333.75, A7 = 331.50, A8 = 329.25, A9 = 327.00, A10 = 324.75, A11 = 322.50, A12 = 320.25, A13 = 318.00, A14 = 315.75, A15 = 313.50, A16 = 311.25, A17 = 309.00, A18 = 306.75, A19 = 304.50, A20 = 302.25. Note that the last payment might be lower than the fixed amount of €300 if the amount owed is lower than such amount.

The equation becomes:

$$6000 = 60 + 345.00\frac{1}{(1+X)^{1/12}} + 342.75\frac{1}{(1+X)^{2/12}} + \ldots + 304.50\frac{1}{(1+X)^{19/12}} + 302.25\frac{1}{(1+X)^{20/12}}$$

giving X= 10.707248%, i.e. an APR of 10.7%.

EXAMPLE 18

Credit agreement for a total amount of credit of €6000 for a period of two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The credit agreement provides for payment of interest charges every month and repayment of the total amount of the credit at the end of the agreement. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

Given that the amount of capital remains constant over the duration of the agreement, interest charges are also a constant amount. The monthly payment of interest charges is:

$$A = 6000 \times \frac{9\%}{12} = €45$$

The equation becomes:

$$6000 = 60 + 45\frac{1}{(1+X)^{1/12}} + 45\frac{1}{(1+X)^{2/12}} + \ldots + 45\frac{1}{(1+X)^{23/12}} + (45+6000)\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 45\frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1} + 6000\frac{1}{(1+X)^{24/12}}$$

giving X= 9.980669%, i.e. an APR of 10.0%.

EXAMPLE 19

Credit agreement for a total amount of credit of €6000 for a period of two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. Interest is charged monthly, but the credit agreement provides for payment of the balance outstanding of capital and interest at the end of the agreement. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

As interest charges are debited monthly but are not paid, they increase the balance outstanding every month. This balance amounts to

$$6000\left(1+\frac{9\%}{12}\right)^{24} = €7178.48$$

at the end of the 2-year period, being the amount to pay at that time.

The equation becomes:

$$6000 = 60 + 7178.48 \frac{1}{(1+X)^2}$$

giving X= 9.931716%, i.e. an APR of 9.9%.

Compared to example 18, the APR is lower due to the postponement of payments to the end of the agreement. However, the accumulation of interest charges to the balance outstanding implies that interest is charged on interest, leading to a higher cost of the credit. The total cost of the credit in this example is 60+1178.48 = €1238.48, while in example 18 is 60 + 45 x 24 = €1140.00.

EXAMPLE 20

Credit agreement for a total amount of credit of €6000 for a period of two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The credit agreement provides for payment of interest and equal repayments of capital every month. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The 24 monthly payments are comprised of a constant quota of capital of 6000/24 = €250 and the interest charges generated each month, which are of a decreasing amount. The payments can be obtained from the amortisation table, being A1 = 295.00, A2 = 293.13, A3 = 291.25, A4 = 289.38, A5 = 287.50, A6 = 285.63, A7 = 283.75, A8 = 281.88, A9 = 280.00, A10 = 278.13, A11 = 276.25, A12 = 274.38, A13 = 272.50, A14 = 270.63, A15 = 268.75, A16 = 266.88, A17 = 265.00, A18 = 263.13, A19 = 261.25, A20 = 259.38, A21 = 257.50, A22 = 255.63, A23 = 253.75, A24 = 251.88.

The equation becomes:

$$6000 = 60 + 295 \frac{1}{(1+X)^{1/12}} + 293.13 \frac{1}{(1+X)^{2/12}} + \ldots + 253.75 \frac{1}{(1+X)^{23/12}} + 251.88 \frac{1}{(1+X)^{24/12}}$$

giving X= 10.505901%, i.e. an APR of 10.5%.

Compared to example 18, the APR is higher due to the earlier repayments of capital. However, charging interest on a lower balance outstanding implies a lower cost of the credit. The total cost of the credit in this example is 60+562.56 = €622.56, while in example 18 is 60 + 45 x 24 = €1140.00.

EXAMPLE 21

Credit agreement for a total amount of credit of €1000 to be draw down immediately and in full on conclusion of the agreement; further drawdowns are not allowed. The credit agreement provides for payment of interest every month plus a monthly payment of 20% of the outstanding balance of capital with a minimum of €20. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

The scheme of payments determines that the credit is completely repaid in 16 months. The monthly payments can be obtained from the amortisation table, being A1 = 207.50, A2 = 166.00, A3 = 132.80, A4 = 106.24, A5 = 84.99, A6 = 67.99, A7 = 54.39, A8 = 43.52, A9 = 34.81, A10 = 27.85, A11 = 22.28, A12 = 20.64, A13 = 20.49, A14 = 20.34, A15 = 20.19, A16 = 5.94. Note that the last repayment might be lower than the minimum amount if the amount owed is lower than the minimum amount.

The equation becomes:

$$1000 = 25 + 207.50\frac{1}{(1+X)^{1/12}} + 166\frac{1}{(1+X)^{2/12}} + \ldots + 20.19\frac{1}{(1+X)^{15/12}} + 5.94\frac{1}{(1+X)^{16/12}}$$

giving X= 16.768604%, i.e. an APR of 16.8%.

EXAMPLE 22

Credit agreement for a total amount of credit of €1000 to be draw down immediately and in full on conclusion of the agreement; further drawdowns are not allowed. The credit agreement provides for a monthly payment of 20% of the outstanding balance of capital and interest with a minimum of €20. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

The scheme of payments determines that the credit is completely repaid in 16 months. The monthly payments can be obtained from the amortisation table, being A1 = 201.50, A2 = 162.41, A3 = 130.90, A4 = 105.51, A5 = 85.04, A6 = 68.54, A7 = 55.24, A8 = 44.53, A9 = 35.89, A10 = 28.93, A11 = 23.31, A12 = 20.00, A13 = 20.00, A14 = 20.00, A15 = 20.00, A16 = 15.30. Note that the last repayment might be lower than the minimum amount if the amount owed is lower than the minimum amount.

The equation becomes:

$$1000 = 25 + 201.50\frac{1}{(1+X)^{1/12}} + 162.41\frac{1}{(1+X)^{2/12}} + \ldots + 20.00\frac{1}{(1+X)^{15/12}} + 15.30\frac{1}{(1+X)^{16/12}}$$

giving X= 16.560857%, i.e. an APR of 16.6%.

EXAMPLE 23

Credit agreement for a total amount of credit of €1000 repayable in four equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is 18%. Administrative charges of €60 spread over the payments.

The monthly instalment which provides full repayment of the credit is €259.44, and the monthly payment including administrative charges becomes:

$$A = 259.44 + \frac{60}{4} = 259.44 + 15 = €274.44$$

The equation becomes:

$$1000 = 274.44\frac{1}{(1+X)^{1/12}} + 274.44\frac{1}{(1+X)^{2/12}} + 274.44\frac{1}{(1+X)^{3/12}} + 274.44\frac{1}{(1+X)^{4/12}}$$

or:

$$1000 = 274.44\frac{1-\frac{1}{(1+X)^{4/12}}}{(1+X)^{1/12}-1}$$

giving X= 57.138738%, i.e. an APR of 57.1%.

This example typifies practices still used by certain specialist "vendor-credit" establishments.

EXAMPLE 24

Credit agreement for a total amount of credit of €1000 repayable in two instalments of either €700 after one year and €500 after two years, or €500 after one year and €700 after two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed.

In the first case the equation becomes:

$$1000 = 700\frac{1}{(1+X)^{1}} + 500\frac{1}{(1+X)^{2}}$$

giving X = 13.898667%.

In the second case the equation becomes:

$$1000 = 500\frac{1}{(1+X)^{1}} + 700\frac{1}{(1+X)^{2}}$$

giving X = 12.321246%.

Assumption (f)(i) states that in the case of credit agreements other than overdrafts and open-end credits, if the date or amount of a repayment of capital to be made by the consumer cannot be ascertained, it shall be assumed that the repayment is made at the earliest date provided for in the credit agreement and is for the lowest amount for which the credit agreement provides. Hence, 500 (the lowest amount) should be chosen as the first repayment, meaning that the APR is that of the second case, i.e. an APR of 12.3%.

This example shows that the annual percentage rate of charge depends on the payment scheme and that stating the total cost of the credit in the prior information or in the credit agreement does not provide complete information on costs. Despite the total cost of credit being € 200 in both cases, the rates are different.

EXAMPLE 25

Credit agreement for a total amount of credit of €6000 for a period of two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The credit agreement provides for payment of interest and equal repayments of capital every month, but the borrower is allowed to postpone each year two monthly payments of capital, interest or both for three months without costs. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

This example differs from example 20 in the flexibility in payments. In order to determine the dates of the payments in this credit agreement with fixed duration (not open-end), assumptions (f)(i) and (g)(i) should be applied. According to assumption (f)(i), the dates of the repayments of capital shall be deemed to be the earliest dates provided for in the credit agreement. According to assumption (g)(i), the interest charges shall be deemed to be paid together with the repayments of capital. Therefore, the postponement of payments is discarded for the calculation of the APR and the calculations coincide with example 20, which provided an APR of 10.5%.

EXAMPLE 26

Credit agreement for a total amount of credit of €1000 for a period of one year. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The credit agreement provides for payment of interest every month plus a minimum monthly repayment of 20% of the outstanding balance of capital with a minimum of €20. A final payment at the end of the year is compulsory and must provide full repayment of the credit. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

This example differs from example 21 in the flexibility in the repayments of capital, now established as minimum repayments, and the duration of the credit, which decreases to one year to accommodate the possibility of higher repayments. In order to determine the amounts of the repayments of capital in this credit agreement with fixed duration (not open-end), assumption (f)(i) should be applied. Accordingly, these amounts shall be deemed to be the lowest amounts for which the credit agreement provides, that is, 20% of the outstanding balance of capital with a minimum of €20 for the first eleven months and the residual payment which clears the balance for the last month.

The payments can be obtained from the amortisation table, being A1 = 207.50, A2 = 166.00, A3 = 132.80, A4 = 106.24, A5 = 84.99, A6 = 67.99, A7 = 54.39, A8 = 43.52, A9 = 34.81, A10 = 27.85, A11 = 22.28, A12 = 86.54. The first eleven payments coincide with those of example 19.

The equation becomes:

$$1000 = 25 + 207.50\frac{1}{(1+X)^{1/12}} + 166\frac{1}{(1+X)^{2/12}} + \ldots + 22.28\frac{1}{(1+X)^{11/12}} + 86.54\frac{1}{(1+X)^{12/12}}$$

giving X= 16.985065%, i.e. an APR of 17.0%.

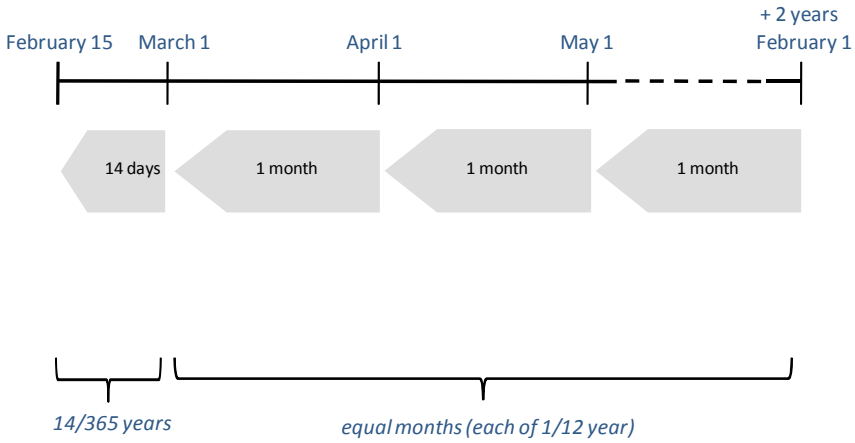
EXAMPLE 27

Credit agreement for a total amount of credit of €6000 repayable in 24 equal monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. If the drawdown occurs before or upon the 15th day of a month the first instalment is due on the first calendar day of the following month; otherwise the first instalment is due the first calendar day of the second following month. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

In this example, the length of the interval to the first instalment is only known when the agreement is concluded (and the drawdown is made). For earlier stages (in advertising or at the pre-contractual stage), assumption (f)(ii) should be used to determine the length of such an interval.

Case 1. Advertising and pre-contractual stage.

According to assumption f(ii), when the date of the initial drawdown is not known, it shall be assumed to be the date which results in the shortest interval between that date and the date of the first payment by the consumer. The shortest interval is 14 days (as the shortest possible period is February 15 to March 1 in a non-leap year). This interval should be used for the first instalment and the remaining intervals are obtained adding 1 month successively, in coherence with the clarification of remark (c) in the Guidelines on the application of Directive 2008/48/EC and as shown in the figure.



The monthly instalment which provides full repayment of the credit is €273.01

The equation becomes:

$$6000 = 60 + 273.01\frac{1}{(1+X)^{14/365}} + 273.01\frac{1}{(1+X)^{14/365+1/12}} + \cdots + 273.01\frac{1}{(1+X)^{14/365+23/12}} =$$

$$= 60 + (1+X)^{1/2-14/365}\left[273.01\frac{1}{(1+X)^{1/12}} + 273.01\frac{1}{(1+X)^{2/12}} + \cdots + 273.01\frac{1}{(1+X)^{24/12}}\right]$$

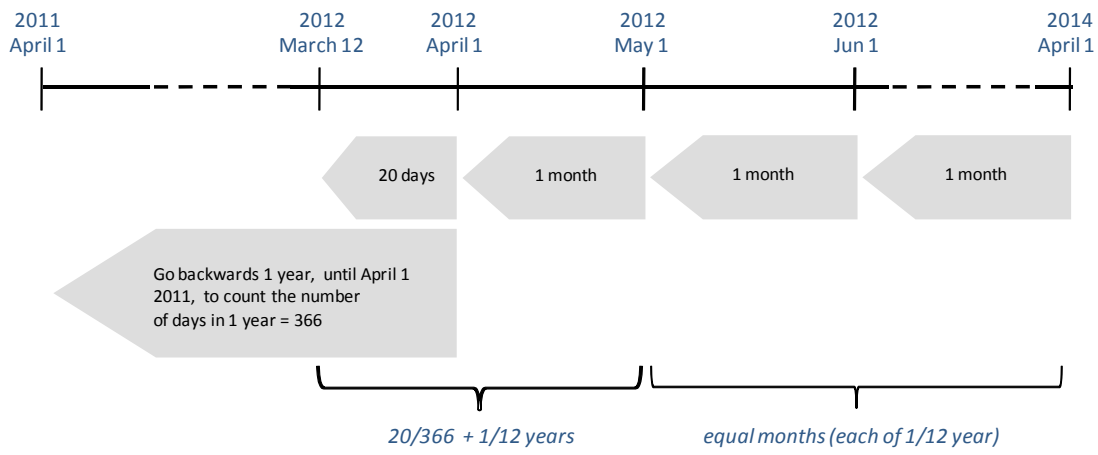
or:

$$6000 = 60 + 273.01 \times (1+X)^{1/2-14/365} \times \frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 10.527657%, i.e. an APR of 10.5%.

Case 2. Contractual stage

At the contractual stage, the date of drawdown becomes known, and the length of the interval to the first instalment is obtained from it. For example, if the agreement is signed on March 12 2012, the date of drawdown is that same date; and as the drawdown occurs before the 15th of the month, the first instalment becomes due the first calendar day of the second following month, on the 1st of May. The length of the first interval is then 20/366 + 1/12 years (1 month from May 1 2012 to April 1 2012 plus 20 days from April 1 2012 to March 12 2012 within a year from April 1 2012 to April 1 2011 with 366 days). The remaining 23 instalments are payable at monthly intervals from May 1 2012 to April 1 2014, as shown in the figure:



The monthly instalment which provides full repayment of the credit is €275.45

The equation becomes:

$$6000 = 60 + 275.45\frac{1}{(1+X)^{20/366+1/12}} + 275.45\frac{1}{(1+X)^{20/366+2/12}} + \cdots + 275.45\frac{1}{(1+X)^{20/366+24/12}} =$$

$$= 60 + \frac{1}{(1+X)^{20/366}}\left[275.45\frac{1}{(1+X)^{1/12}} + 275.45\frac{1}{(1+X)^{2/12}} + \cdots + 275.45\frac{1}{(1+X)^{24/12}}\right]$$

or:

$$6000 = 60 + 275.45 \times \frac{1}{(1+X)^{20/366}} \times \frac{1-\frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12}-1}$$

giving X= 10.416060%, i.e. an APR of 10.4%.

EXAMPLE 28

Credit agreement for a total amount of credit of €6000 for a period of two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The credit agreement provides for equal repayments of capital every month but is silent about the date of payment of charges, consisting of interest calculated by applying a borrowing rate (nominal rate) of 9%, a single sum (lump sum) cost of €60 and four costs of €25.

The dates of the payment of charges are determined by assumption (g). Specifically, according to (g)(i), interest charges shall be deemed to be paid together with the repayments of capital (i.e. monthly); the single sum cost of €60 shall be deemed to be paid at the date of the conclusion of the credit agreement by virtue of (g)(ii); and according to (g)(iii) the four costs of €25 shall be deemed to be paid at regular intervals, commencing with the date of the first repayment of capital (as the remaining duration of the credit starting and including the month

of the first repayment is 24 months and 24/4 = 6 months, these costs are paid half-yearly in months 1, 7, 13 and 19).

The payments can be obtained from the amortisation table, being A1 = 320.00, A2 = 293.13, A3 = 291.25, A4 = 289.38, A5 = 287.50, A6 = 285.63, A7 = 308.75, A8 = 281.88, A9 = 280.00, A10 = 278.13, A11 = 276.25, A12 = 274.38, A13 = 297.50, A14 = 270.63, A15 = 268.75, A16 = 266.88, A17 = 265.00, A18 = 263.13, A19 = 286.25, A20 = 259.38, A21 = 257.50, A22 = 255.63, A23 = 253.75, A24 = 251.88.

The equation becomes:

$$6000 = 60 + 320.00\frac{1}{(1+X)^{1/12}} + 293.13\frac{1}{(1+X)^{2/12}} + \ldots + 253.75\frac{1}{(1+X)^{23/12}} + 251.88\frac{1}{(1+X)^{24/12}}$$

giving X= 12.263091%, i.e. an APR of 12.3%.

EXAMPLE 29

Credit agreement for a total amount of credit of €6000 repayable in 24 monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) increases from 5% to 9% after the first year and remains in this new level until the end of the agreement. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

Assumption (i), which refers to the case where different borrowing rates and charges are offered for a limited period or amount, should not be applied in this example. This is because this assumption should be applied when, at the date of the calculation of the APR, the relevant elements of the credit which determine the application and the effect on the APR of different interest rates or charges are not known. In this example, all these elements are known and the effects on the APR are certain and quantifiable; in fact, none of the assumption in Annex I is used for calculating the APR. Therefore, the calculation of the APR will take into account the different borrowing rates. This is different to the case where, for example, the credit is open-end or it gives freedom of drawdown and/or repayment (either completely or within limits) to the consumer. In these and similar cases assumption (i) should be applied (see examples 32, 37 and 39).

The monthly instalments which provide full repayment of the credit are €263.23 for the period with a borrowing rate of 5% and €268.90 for the period with a borrowing rate of 9%.

The equation becomes:

$$6000 = 60 + 263.23\frac{1}{(1+X)^{1/12}} + \cdots + 263.23\frac{1}{(1+X)^{12/12}} + 268.90\frac{1}{(1+X)^{13/12}} + \ldots + 268.90\frac{1}{(1+X)^{24/12}} =$$

$$= 60 + 263.23\frac{1}{(1+X)^{1/12}} + \cdots + 263.23\frac{1}{(1+X)^{12/12}} + \frac{1}{(1+X)^{12/12}} \times \left[268.90\frac{1}{(1+X)^{1/12}} + \ldots + 268.90\frac{1}{(1+X)^{12/12}} \right]$$

or:

$$6000 = 60 + \left(263.23 + 268.90 \times \frac{1}{(1+X)^{12/12}} \right) \times \frac{1 - \frac{1}{(1+X)^{12/12}}}{(1+X)^{1/12} - 1}$$

giving X= 7.235697%, i.e. an APR of 7.2%.

EXAMPLE 30

Credit agreement for a total amount of credit of €6000 repayable in 24 monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is fixed at 5% for one year and after that it is quarterly adjusted according to the 1-year Euribor rate plus a spread of 2%. The 1-year Euribor rate is 4% at the time of calculating the APR. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

Application of assumptions (j) and (i) should be assessed in this example. Assumption (j), which refers to those agreements where a fixed borrowing rate is agreed in relation to an initial period after which the borrowing rate is periodically adjusted according to an agreed indicator, should be applied to determine the rate following the end of the initial fixed-rate period. Specifically, for the variable-rate period, the borrowing rate is assumed to be determined by the value of the agreed indicator at the time of calculating the APR. Therefore, the borrowing rate for the second year is assumed to be 6% (i.e. 4% + spread of 2%). As regards assumption (i), which refers to the case where different borrowing rates and charges are offered for a limited period or amount, this assumption should not be applied. Similar to example 29, the relevant elements of the credit which determine the application and the effect on the APR of different interest rates or charges are known and the effects on the APR are certain and quantifiable.

The monthly instalments which provide full repayment of the credit are €263.23 for the fixed-rate period with a borrowing rate of 5% and €264.64 for the variable-rate period with an assumed borrowing rate of 6%.

The equation becomes:

$$6000 = 60 + 263.23\frac{1}{(1+X)^{1/12}} + \cdots + 263.23\frac{1}{(1+X)^{12/12}} + 264.64\frac{1}{(1+X)^{13/12}} + \ldots + 264.64\frac{1}{(1+X)^{24/12}} =$$

$$= 60 + 263.23\frac{1}{(1+X)^{1/12}} + \cdots + 263.23\frac{1}{(1+X)^{12/12}} + \frac{1}{(1+X)^{12/12}} \times \left[264.64\frac{1}{(1+X)^{1/12}} + \ldots + 264.64\frac{1}{(1+X)^{12/12}} \right]$$

or:

$$6000 = 60 + \left(263.23 + 264.64 \times \frac{1}{(1+X)^{12/12}} \right) \times \frac{1 - \frac{1}{(1+X)^{12/12}}}{(1+X)^{1/12} - 1}$$

giving X= 6.423882%, i.e. an APR of 6.4%.

EXAMPLE 31

Credit agreement for a total amount of credit of €6000 repayable in 24 monthly instalments. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The borrowing rate (nominal rate) is fixed at 5% for one year and after that it is quarterly adjusted according to the 1-year Euribor rate plus a spread of 2% or a new fixed rate could be agreed. The 1-year Euribor rate is 4% at the time of calculating the APR. Single sum (lump sum) cost of €60 payable on conclusion of the agreement.

The difference between this example and example 30 is that in this example the change of the rate to a variable rate is only a possibility as a new fixed rate might be agreed. This implies that assumption (j) should not be applied because it only applies when it is known that the variable borrowing rate period follows the fixed rate period. Instead, Article 19 (4) should be applied on the basis that the borrowing rate cannot be quantified at the time of the calculation of the APR. Accordingly, the initial (fixed) borrowing rate of 5% shall be assumed until the end of the credit agreement.

Using this borrowing rate, the monthly instalment which provides full repayment of the credit is €263.23.

The equation becomes:

$$6000 = 60 + 263.23\frac{1}{(1+X)^{1/12}} + 263.23\frac{1}{(1+X)^{2/12}} + \cdots + 263.23\frac{1}{(1+X)^{24/12}}$$

or:

$$6000 = 60 + 263.23\frac{1 - \frac{1}{(1+X)^{24/12}}}{(1+X)^{1/12} - 1}$$

giving X= 6.154194%, i.e. an APR of 6.2%.

EXAMPLE 32

Credit agreement for a total amount of credit of €1000 for a period of one year. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed. The credit agreement provides for payment of interest every month plus a minimum monthly repayment of 20% of the outstanding balance of capital with a minimum of €20. A final payment at the end of the year is compulsory and must provide full repayment of the credit. The borrowing rate (nominal rate) is fixed at 9% and will revert to a variable rate quarterly adjusted according to the 1-year Euribor rate plus a spread of 2% when the outstanding balance reduces to less of a half of the initial amount of credit. The 1-year Euribor rate is 4% at the time of calculating the APR. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

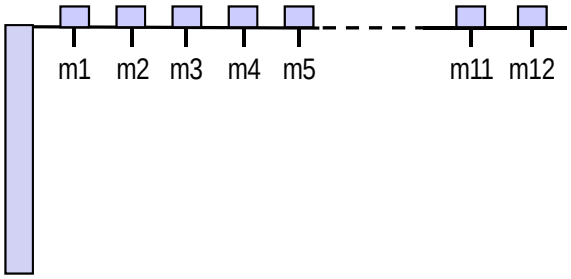
This example uses example 26 as a starting point and add the feature of a variable borrowing rate for the period where the amount owed is lower than a half of the initial amount of credit. Since this period will arrive sooner or later, and hence the change to a variable-rate will happen, assumption (j) should be applied. Accordingly, the variable borrowing rate is assumed to be 6% (i.e. 4% + spread of 2%). However, as the repayment of the credit is specified in terms of a minimum percentage and thus, the timing of the change to the variable-rate period is not known, the effects on the APR are not certain, implying that assumption (i) should be applied in conjunction with assumption (j). This means that the borrowing rate is assumed to be the highest rate for the whole duration of the credit agreement. Since this highest rate is the fixed-rate of 9%, the solution of this example coincides with example 26.

EXAMPLE 33

Credit agreement for an open-end credit for a maximum amount of €1000. The agreement gives freedom of drawdown and the credit may be used repeatedly as the borrower repays the sum used. The credit agreement provides for a minimum monthly payment of 20% of the outstanding balance of capital and interest with a minimum of €20. The borrowing rate (effective rate) is 12%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

This example differs from example 22 in that the credit is open-end. That is, it does not have a fixed duration. This is due to two reasons: the revolving features of the credit and the scheme of repayments. Assumptions (a) and (e) are relevant in this type of credits. Assumption (a) determines that if the agreement gives the consumer freedom of drawdown, the total amount of credit shall be deemed to be drawn down immediately and in full. Also, as clarified in the Guidelines on the application of Directive 2008/48/EC, the concept of additional drawdowns on the basis of the amount of the credit repaid is not a factor in the calculation of the APR unless it applies by virtue of assumption (e). Assumption (e) determines the duration and scheme of repayments of the credit to be assumed. Specifically, point (i) establishes an

assumed duration of 1 year and point (ii) determines the scheme of repayment, which in general (being the case of this example) consists of equal monthly repayments of capital within the 1-year period. The combination of the two assumptions is illustrated in the figure below. The downward bar represents the immediate drawdown of the credit limit, €1000 in this example, and the upward bars for months 1 to 12 represent the equal repayments of 1/12 of such amount, i.e. 1000/12 = €83.33.



As regards interest and other charges point (ii) establishes that they shall be applied in accordance with these drawdowns and repayments of capital and as provided for in the credit agreement. Therefore, the single sum cost of 25€ is paid on the date the agreement is concluded and interest charges are paid at a monthly frequency.

The 12 monthly payments, comprised of a constant quota of capital of €83.33 and the interest charges generated each month, can be obtained from the amortisation table, being A1 = 92.82, A2 = 92.03, A3 = 91.24, A4 = 90.45, A5 = 89.66, A6 = 88.87, A7 = 88.08, A8 = 87.29, A9 = 86.50, A10 = 85.71, A11 = 84.91, A12 = 84.12.

The equation becomes:

$$1000 = 25 + 92.82\frac{1}{(1+X)^{1/12}} + 92.03\frac{1}{(1+X)^{2/12}} + \ldots + 84.12\frac{1}{(1+X)^{12/12}}$$

giving X= 17.572711%, i.e. an APR of 17.6%.

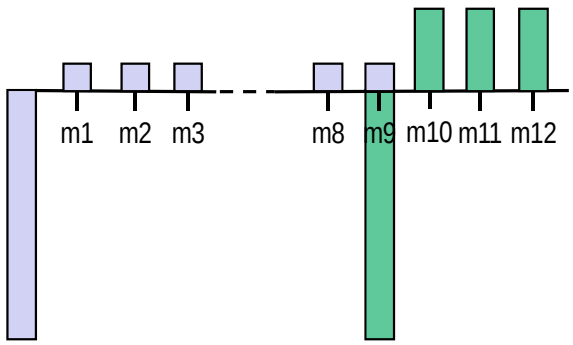
This example is representative of some revolving credit accounts and credit cards.

EXAMPLE 34

Credit agreement for an open-end credit for a maximum amount of €1000. The agreement gives freedom of drawdown and repayment but requires full repayment of the credit within a period of 9 months before the credit can be draw down again. The borrowing rate (effective rate) is 12%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

Similar to example 33, assumptions (a) and (e) should be applied in this example, with the difference that the recurrent periods until full repayment should be respected. Therefore, the assumed duration of 1 year is split into two periods which start with a drawdown of the total amount of credit followed by monthly and equal repayments of the capital at within each one of these periods, as shown in the figure below. The first period has a length of 9 months and the second period covers the remaining duration of the credit agreement until 1 year, i.e. 3

months. Therefore, the payments of capital are €111.11 (1000/9) for the first period and €333.33 (1000/3) for the second period.



As regards the costs of the credit, the single sum cost of €25 is paid on the date the agreement is concluded, as provided for the agreement, and interest charges should be determined by assumption (g) because the agreement does not stipulates anything about them. Accordingly, interest charges are assumed to be paid together with the repayments of capital and for an amount given as the amount of interest accrued up to the date of each repayment of capital.

The 12 monthly payments can be obtained from the amortisation table, being A1 = 120.60, A2 = 119.55, A3 = 118.49, A4 = 117.44, A5 = 116.38, A6 = 115.33, A7 = 114.27, A8 = 113.22, A9 = 112.17, A10 = 342.82, A11 = 339.66, A12 = 336.50.

The equation becomes:

$$1000 = 25 + 120.60\frac{1}{(1+X)^{1/12}} + 119.55\frac{1}{(1+X)^{2/12}} + \ldots + 336.50\frac{1}{(1+X)^{12/12}}$$

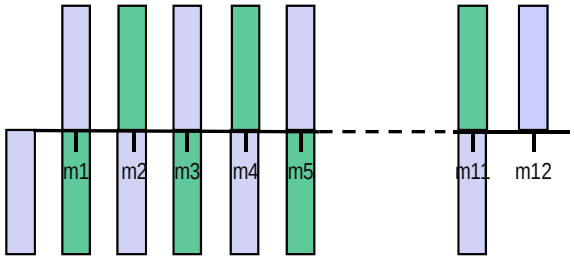
giving X= 17.229722%, i.e. an APR of 17.2%.

EXAMPLE 35

Credit agreement for an open-end credit for a maximum amount of €1000. The agreement gives freedom of drawdown but requires full repayment of the amount of the credit draw down in a single payment each month (no revolving balance is allowed from one month to another). No interest is charged but an annual fee of €50 is payable at the first month of each year.

As in the previous two examples, assumptions (a) and (e) should be applied in this case. What is specific of this example is that the scheme of repayments requires the capital to be repaid only in full, in a single payment, within each payment period. As a result, the special scheme of sucessive drawdowns and repayments established in the second sentence of point (ii) of assumption (e) should be applied. This scheme is illustrated in the figure below. For the payment periods of 1 month considered in this example, successive drawdowns (represented by downward bars) and repayments (upward bars) of the entire capital (i.e. €1000) are

assumed to occur monthly over the duration of the credit agreement, which is 1-year according to (e)(i).



Taking into account the absence of interest charges and the only existence of cost of €25 payable at month 1, the equation becomes:

$$1000+\frac{1000}{(1+X)^{1/12}}+\frac{1000}{(1+X)^{2/12}}+\cdots+\frac{1000}{(1+X)^{11/12}}=\frac{50+1000}{(1+X)^{1/12}}+\frac{1000}{(1+X)^{2/12}}+\ldots+\frac{1000}{(1+X)^{12/12}}$$

Note that in the left side of this equation all of the terms except the first one cancel with terms on the right side. Thus, the equation simplifies to:

$$1000=50\frac{1}{(1+X)^{1/12}}+1000\frac{1}{(1+X)^{12/12}}$$

giving X= 5.239618%, i.e. an APR of 5.2%.

This example is representative of charge (or deferred debit) cards.

EXAMPLE 36

Credit agreement for an open-end credit for a maximum amount of €1000. The agreement gives freedom of drawdown but with the following limits in the first three months: during the first month no drawdown is possible, in the second month no more than one tenth of the amount of credit can be drawn down, in the third month drawdowns are possible up to a limit of 50% of the amount of the credit and from the fourth month no limitation exists. The credit may be used repeatedly as the borrower repays the sum used within the previous limits. The credit agreement provides for a minimum monthly payment of 20% of the outstanding balance of capital and interest with a minimum of €20. The borrowing rate (effective rate) is 12%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

This example differs from example 33 in the existence of drawdown limits with regard to the amounts of drawdown and periods of time. Assumption (b) should be applied in this case, instead of assumption (a). According to assumption (b), the amount of credit will be assumed to be drawn down on the earliest date (or dates) provided for in the agreement and in accordance to these limits. As regards duration and repayments, assumption (e) is still of application, implying that the credit is provided for a period of 1 year starting from the date of

the initial drawdown and that capital is repaid in equal monthly repayments within this 1-year period and commencing 1 month after the date of the initial drawdown.

The combination of both assumptions implies the following plan of drawdowns and repayments of capital:

- a first drawdown at the beginning of the second month (this date is the earliest date of drawdown provided for in the agreement) of 10% of the amount of the credit (i.e. €100), whose repayment starts at the beginning of the third month in monthly amounts of 100/12=€8.33,
- a second drawdown of 40% (maximum of 50% minus 10% of the first drawdown) at the beginning of the third month (i.e. €400), which increases the monthly repayments of capital in 400/11=€36.36 up to €44.70, and
- a final drawdown at the beginning of the fourth month of the remaining 50% of the credit (i.e. €500), which increases the monthly repayments of capital in 500/10=€50 up to €94.70.

The monthly payments to be made by the consumer are comprised of these repayments of capital plus interest charges. The 12 monthly payments can be obtained from the amortisation table, being A2 = 9.28, A3 = 49.36, A4 = 103.68, A5 = 102.78, A6 = 101.89, A7 = 100.99, A8 = 100.09, A9 = 99.19, A10 = 98.29, A11 = 97.39, A12 = 96.49, A13 = 95.60. To these payments the single sum cost of €25 payable at the conclusion of the agreement is added (A0=€25).

The equation becomes:

$$100 + 400\frac{1}{(1+X)^{1/12}} + 500\frac{1}{(1+X)^{2/12}} = 25(1+X)^{1/12} + 9.28\frac{1}{(1+X)^{1/12}} + 49.36\frac{1}{(1+X)^{2/12}} + \ldots + 95.60\frac{1}{(1+X)^{12/12}}$$

giving X= 18.455593%, i.e. an APR of 18.5%.

Note that the equation uses intervals of time calculated from the date of the first drawdown, as indicated in part I of Annex I of Directive 2008/48/EC.

EXAMPLE 37

Credit agreement for an open-end credit for a maximum amount of €1000. The agreement gives freedom of drawdown and the credit may be used repeatedly as the borrower repays the sum used. The credit agreement provides for a minimum monthly payment of 20% of the outstanding balance of capital and interest with a minimum of €20. The borrowing rate (effective rate) is fixed at 12% for one year and after that it is quarterly adjusted according to the 1-year Euribor rate plus a spread of 10%. The 1-year Euribor rate is 4% at the time of calculating the APR. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

This example adds to example 33 the existence of a variable borrowing rate after an initial period where the borrowing rate is fixed. As in example 33, assumptions (a) and (e) should be applied and, in respect to the variable borrowing rate, the application of assumptions (j) and (i) should be assessed (as in examples 30 to 32). Specifically, for this example assumption (j) should be applied because it is known that the variable borrowing rate period will follow the fixed-rate period (similar to examples 30 and 32). According to this assumption, for the variable-rate period, the borrowing rate is assumed to be determined by the value of the agreed indicator at the time of calculating the APR. Therefore, the borrowing rate of the credit after the first year is assumed to be 14% (i.e. 4% + spread of 10%). As regards assumption (i), which refers to the case where different borrowing rates and charges are offered for a limited period or amount, this assumption should be also applied (as in example 32) because for the agreement of this example relevant elements of the credit which determine the application and the effect on the APR of different interest rates or charges are unknown. Specifically, the agreement is open-end and hence it does not have a fixed duration, and the dates and amounts of drawdowns and repayments are not certain. This implies that the borrowing rate is assumed to be the highest rate, i.e. 14%, for the whole duration of the credit agreement. As explained in the Guidelines on the application of Directive 2008/48/EC, this is regardless of whether this highest rate is payable later than the assumed duration of the credit, which is 1 year by virtue of assumption (e).

The solution of the example then coincides with example 33 but replacing the borrowing rate of 12% by a borrowing rate of 14%. Hence the 12 monthly payments are comprised of a constant quota of capital of €83.33 and the interest charges generated each month. These payments can be obtained from the amortisation table, being A1 = 94.31, A2 = 93.40, A3 = 92.48, A4 = 91.57, A5 = 90.65, A6 = 89.74, A7 = 88.82, A8 = 87.91, A9 = 86.99, A10 = 86.08, A11 = 85.16, A12 = 84.25.

The equation becomes:

$$1000 = 25 + 94.31\frac{1}{(1+X)^{1/12}} + 93.40\frac{1}{(1+X)^{2/12}} + \ldots + 84.25\frac{1}{(1+X)^{12/12}}$$

giving X= 19.702274%, i.e. an APR of 19.7%.

EXAMPLE 38

Credit agreement for an open-end credit for a maximum amount of €1000 involving the use of a card for drawdowns. The agreement gives freedom of drawdown and the credit may be used repeatedly as the borrower repays the sum used. The credit agreement provides for a minimum monthly payment of 20% of the outstanding balance of capital and interest with a minimum of €20. The card has an annual cost of €25. Other costs are as follows:

Drawdown mechanism	*Borrowing rate (effective rate)*	*Fee payable on the date of drawdown*
Cash advances	15%	4% or €4 whichever is greater

Purchases (most common)	12%, with 0% for the first 2 months	None
Balance transfers	12%	3%

Several assumptions are required for this example. Firstly, freedom of drawdown is dealt with assumption (a), whereby the total amount of credit is deemed to be drawn down immediately and in full. Secondly, the open-end nature of the agreement implies the application of assumption (e), which establishes an assumed duration of 1 year and an scheme of repayments consisting of equal monthly repayments of capital within the 1 year period (as first showed in example 33). Thirdly, the agreement is silent about the date of the payment the annual cost of the card, leading to the application of point (iii) of assumption (g), which assumes that non-interest charges expressed as several payments are paid at regular intervals, commencing with the date of the first repayment of capital; therefore, the cost of the card is assumed to be paid the first month of each year coinciding with the first repayment of capital of the year. Fourthly, for determining the rest of costs, assumption (c) should be applied. This assumption deals with the existence of different forms of drawdown with different charges and/or borrowing rates and implies using the highest charge and borrowing rate applied to the most common drawdown mechanism for the type of credit agreement considered. According to the table, purchases are the most common drawdown mechanism, being the highest charges corresponding to this mechanism a borrowing rate of 12% and no fee charged on drawdowns.

The 12 monthly payments to be made by the consumer are then comprised of a constant quota of capital of 1000/12=€83.33 and the interest charges generated during the month using a borrowing rate (effective rate) of 12%, to which the annual cost of the card of €25 is added in the first payment. These payments can be obtained from the amortisation table, being A1 = 117.82, A2 = 92.03, A3 = 91.24, A4 = 90.45, A5 = 89.66, A6 = 88.87, A7 = 88.08, A8 = 87.29, A9 = 86.50, A10 = 85.71, A11 = 84.91, A12 = 84.12.

The equation becomes:

$$1000 = 117.82\frac{1}{(1+X)^{1/12}} + 92.03\frac{1}{(1+X)^{2/12}} + \ldots + 84.12\frac{1}{(1+X)^{12/12}}$$

giving X= 17.495305%, i.e. an APR of 17.5%.

This example is representative of credits cards.

EXAMPLE 39

Credit agreement for an open-end credit for a maximum amount not specificed involving the use of a card for drawdowns. The agreement gives freedom of drawdown and the credit may be used repeatedly as the borrower repays the sum used. The credit agreement provides for a minimum monthly payment of 20% of the outstanding balance of capital and interest with a

minimum of €20. The borrowing rate (effective rate) is 0% for the first two months and 12% afterwards. The card has annual costs of €25.

This example requires assumptions (a), (e) and point (iii) of assumption (g) as applied in the previous example. However, assumption (c) is meaningless here, as there are not differences in costs depending on the mechanism of drawdown. In fact, the charges corresponding to purchases in the previous example have been retained here as the only applicable charges. These charges contemplate an introductory rate of 0% for the first two months. While this introductory rate was discarded in the previous example by virtue of assumption (c), in this example this rate should be assessed under assumption (i). This assumption, which refers to the case where different borrowing rates and charges are offered for a limited period or amount, should be applied in this example (as in examples 32 and 37) because for the agreement of this example relevant elements of the credit which determine the application and the effect on the APR of different interest rates or charges are unknown. Specifically, the agreement is open-end and hence it does not have a fixed duration, and the dates and amounts of drawdowns and repayments are not certain. This implies that the borrowing rate is assumed to be the highest rate, i.e. 12%, for the whole duration of the credit agreement. Finally, as the maximum amount of the credit is not specified, assumption (h) should be applied and thus, a ceiling of €1500 is assumed, on the grounds that this is representative of this type of agreements.

The above implies that the 12 monthly payments to be made by the consumer are comprised of a constant quota of capital of 1500/12=€125 and the interest charges generated during the month using a borrowing rate (effective rate) of 12%, to which the annual cost of the card of €25 is added in the first payment. These payments can be obtained from the amortisation table, being A1 = 164.23, A2 = 138.05, A3 = 136.86, A4 = 135.67, A5 = 134.49, A6 = 133.30, A7 = 132.12, A8 = 130.93, A9 = 129.74, A10 = 128.56, A11 = 127.37, A12 = 126.19.

The equation becomes:

$$1500 = 164.23\frac{1}{(1+X)^{1/12}} + 138.05\frac{1}{(1+X)^{2/12}} + \ldots + 126.19\frac{1}{(1+X)^{12/12}}$$

giving X= 15.617945%, i.e. an APR of 15.6%.

The lower APR of this example compared to example 38 (15.6% versus 17.5%) is exclusively due to the higher amount of credit used in this example, which reduces the effect on the APR of the annual cost of the card. This highlights the relevance of using assumption (h) in cases where the amount of the credit can vary considerably and there are costs which are independent from the amount of credit, provided that the assumed ceiling of €1500 is representative of the type of credit agreement under consideration.

This example is representative of credits cards.

EXAMPLE 40

Credit agreement for a maximum amount of €1000 in the form of an overdraft facility for a period of 1 year. The agreement gives freedom of drawdown and the credit may be used repeatedly as the borrower repays the sum used. The credit agreement does not impose any requirements in terms of repayment of capital, but provides for monthly payment of the cost of the credit. The borrowing rate (effective rate) is 12%. Administrative charges amount to €2.5 per month.

Despite the reference to the duration of 1 year, the credit has not a fixed duration due to the flexibility of the repayments and the possibility of making new drawdowns as the capital is repaid. The Guidelines on the application of Directive 2008/48/EC provides the following clarification: "If the overdraft facility has a fixed duration, and the credit must be repaid in full at the end (and is not available to be drawn down again), that fixed duration shall be taken into account. However in all other cases, the duration is assumed to be 3 months (even if it is known that the facility is likely to last longer)". Therefore, assumption (d) should be used to determine the drawdown and repayment of capital and also the duration of the credit. Accordingly, it is assumed that the duration of the credit is 3 months and the capital is drawdown in full and for the whole duration of the credit, implying that the capital is paid entirely in 3 months.

As the amount owed remains constant at a level of €1000 during the 3 months, the monthly interest charges are also constant, being:

$$1000 \times \left[(1+0.12)^{1/12} - 1 \right] = 1000 \times 0{,}9488793\% = €9.49$$

The monthly payment of interest and charges is then given by:

$$A = 9.49 + 2.5 = €11.99$$

and the equation becomes:

$$1000 = 11.99 \frac{1}{(1+X)^{1/12}} + 11.99 \frac{1}{(1+X)^{2/12}} + (11.99 + 1000) \frac{1}{(1+X)^{3/12}}$$

or:

$$1000 = 11.99 \frac{1 - \frac{1}{(1+X)^{3/12}}}{(1+X)^{1/12} - 1} + 1000 \frac{1}{(1+X)^{3/12}}$$

giving X= 15.375765%, i.e. an APR of 15.4%.

EXAMPLE 41

Credit agreement for a maximum amount of €1000 in the form of an overdraft facility. The credit can be used only once and should be repaid in 6 months. The borrowing rate (effective rate) is 12%.

Unlike the previous example, here the duration of the credit is fixed because there is no flexibility in repayment and the credit is not available to be drawdown again. Therefore, the agreed duration of 6 months is used for the calculation of the APR. Also, the scheme of repayment is coherent with the first sentence of assumption (d), for which reason it is also respected. The agreement, however, does not specify the date of payment of interest charges and hence assumption (g)(i) should be used to determine it as the date at which the capital is repaid.

The interest charges are:

$$1000 \times \left[(1+0.12)^{6/12} - 1 \right] = 1000 \times 5.8300524\% = €58.30$$

and the equation becomes:

$$1000 = 1058.30 \frac{1}{(1+X)^{6/12}}$$

giving X= 11.999889%[81], i.e. an APR of 12.0%.

[81] The difference with respect to percentage of exactly 12% is due exclusively to the rounding of the payments to be made by the consumer to two decimals (euro cents).

CREDIT INFORMATION AND AMORTISATION TABLES

EXAMPLE 1

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments half-yearly

NOTE: It determines the periods in the table are given as: SIX MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 1 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	6270.00	DYNAMIC	Recalculate
Duration of the credit	1	SIX MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	9.2%	DYNAMIC	Recalculate
Total cost of the credit	270.00		
Total amount of credit	6000.00		
Total amount payable	6270.00		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6270.00	0.00	9.00%	270.00			6000.00	270.00	6270.00	0.00	6270.00	-6270.00	-6000.00

EXAMPLE 2

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments yearly

NOTE: It determines the periods in the table are given as: YEARS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 4 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	1852.01	DYNAMIC	Recalculate
Duration of the credit	4	YEARS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	9.0%	DYNAMIC	Recalculate
Total cost of the credit	1408.04		
Total amount of credit	6000.00		
Total amount payable	7408.04		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6540.00	4687.99	9.00%	540.00			1312.01	540.00	1852.01	0.00	1852.01	-1852.01	-1699.09
2		4687.99	4687.99	5109.91	3257.89	9.00%	421.92			1430.09	421.92	1852.01	0.00	1852.01	-1852.01	-1558.80
3		3257.89	3257.89	3551.11	1699.09	9.00%	293.21			1558.80	293.21	1852.01	0.00	1852.01	-1852.01	-1430.09
4		1699.09	1699.09	1852.01	0.00	9.00%	152.92			1699.09	152.92	1852.01	0.00	1852.01	-1852.01	-1312.01

EXAMPLE 3

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons Generate and then Calculate to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	274.11	DYNAMIC
Duration of the credit	24	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.4%	DYNAMIC
Total cost of the credit	578.64	
Total amount of credit	6000.00	
Total amount payable	6578.64	

Recalculate

Recalculate

Amortisation table

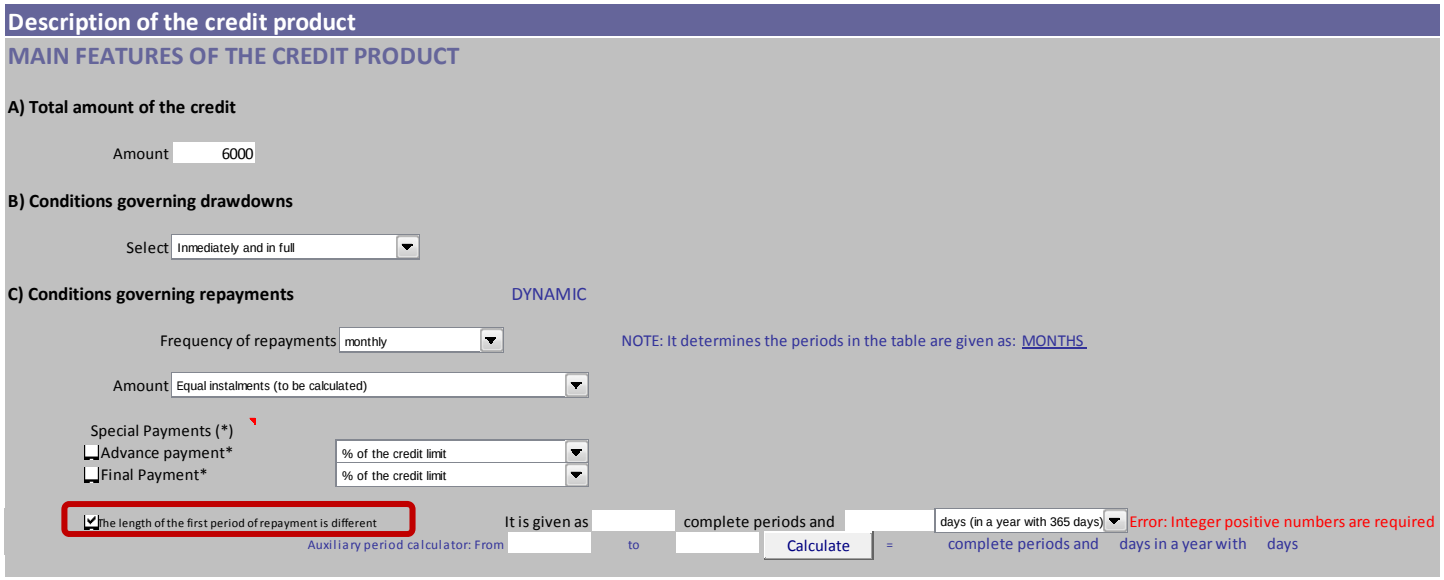
Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6045.00	5770.89	9.00%	45.00			229.11	45.00	274.11	0.00	274.11	-274.11	-272.07
2		5770.89	5770.89	5814.17	5540.06	9.00%	43.28			230.83	43.28	274.11	0.00	274.11	-274.11	-270.04
3		5540.06	5540.06	5581.62	5307.51	9.00%	41.55			232.56	41.55	274.11	0.00	274.11	-274.11	-268.03
4		5307.51	5307.51	5347.31	5073.20	9.00%	39.81			234.30	39.81	274.11	0.00	274.11	-274.11	-266.04
5		5073.20	5073.20	5111.25	4837.15	9.00%	38.05			236.06	38.05	274.11	0.00	274.11	-274.11	-264.06
6		4837.15	4837.15	4873.42	4599.32	9.00%	36.28			237.83	36.28	274.11	0.00	274.11	-274.11	-262.09
7		4599.32	4599.32	4633.81	4359.70	9.00%	34.49			239.61	34.49	274.11	0.00	274.11	-274.11	-260.14
8		4359.70	4359.70	4392.40	4118.29	9.00%	32.70			241.41	32.70	274.11	0.00	274.11	-274.11	-258.20
9		4118.29	4118.29	4149.18	3875.07	9.00%	30.89			243.22	30.89	274.11	0.00	274.11	-274.11	-256.28
10		3875.07	3875.07	3904.13	3630.02	9.00%	29.06			245.05	29.06	274.11	0.00	274.11	-274.11	-254.37
11		3630.02	3630.02	3657.25	3383.14	9.00%	27.23			246.88	27.23	274.11	0.00	274.11	-274.11	-252.48
12		3383.14	3383.14	3408.51	3134.41	9.00%	25.37			248.73	25.37	274.11	0.00	274.11	-274.11	-250.60
13		3134.41	3134.41	3157.91	2883.81	9.00%	23.51			250.60	23.51	274.11	0.00	274.11	-274.11	-248.73
14		2883.81	2883.81	2905.43	2631.33	9.00%	21.63			252.48	21.63	274.11	0.00	274.11	-274.11	-246.88
15		2631.33	2631.33	2651.06	2376.95	9.00%	19.73			254.37	19.73	274.11	0.00	274.11	-274.11	-245.05
16		2376.95	2376.95	2394.78	2120.67	9.00%	17.83			256.28	17.83	274.11	0.00	274.11	-274.11	-243.22
17		2120.67	2120.67	2136.58	1862.47	9.00%	15.91			258.20	15.91	274.11	0.00	274.11	-274.11	-241.41
18		1862.47	1862.47	1876.44	1602.33	9.00%	13.97			260.14	13.97	274.11	0.00	274.11	-274.11	-239.61
19		1602.33	1602.33	1614.35	1340.24	9.00%	12.02			262.09	12.02	274.11	0.00	274.11	-274.11	-237.83
20		1340.24	1340.24	1350.29	1076.18	9.00%	10.05			264.06	10.05	274.11	0.00	274.11	-274.11	-236.06
21		1076.18	1076.18	1084.25	810.14	9.00%	8.07			266.04	8.07	274.11	0.00	274.11	-274.11	-234.30
22		810.14	810.14	816.22	542.11	9.00%	6.08			268.03	6.08	274.11	0.00	274.11	-274.11	-232.56
23		542.11	542.11	546.18	272.07	9.00%	4.07			270.04	4.07	274.11	0.00	274.11	-274.11	-230.83
24		272.07	272.07	274.11	0.00	9.00%	2.04			272.07	2.04	274.11	0.00	274.11	-274.11	-229.11

EXAMPLE 4

Case 1

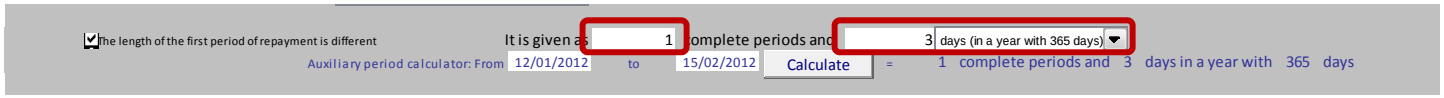
Click on the button *Reset* and then enter the information highlighted in red.

Note that after checking the box *The length of the first period of repayment is different*, an auxiliary period calculator appears.



In the auxiliary calculator enter the initial and final dates of the first period of repayment and click on the button *Calculate* to obtain the number of regular periods and days corresponding to this period and the number of days of the year.

Then enter the information obtained in the previous row.



Complete the information with the number of repayment periods.

D) Duration of the credit agreement

Duration Fixed of 3 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	2031.57	DYNAMIC
Duration of the credit	3	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.4%	DYNAMIC
Total cost of the credit	94.71	
Total amount of credit	6000.00	
Total amount payable	6094.71	

Recalculate

Recalculate

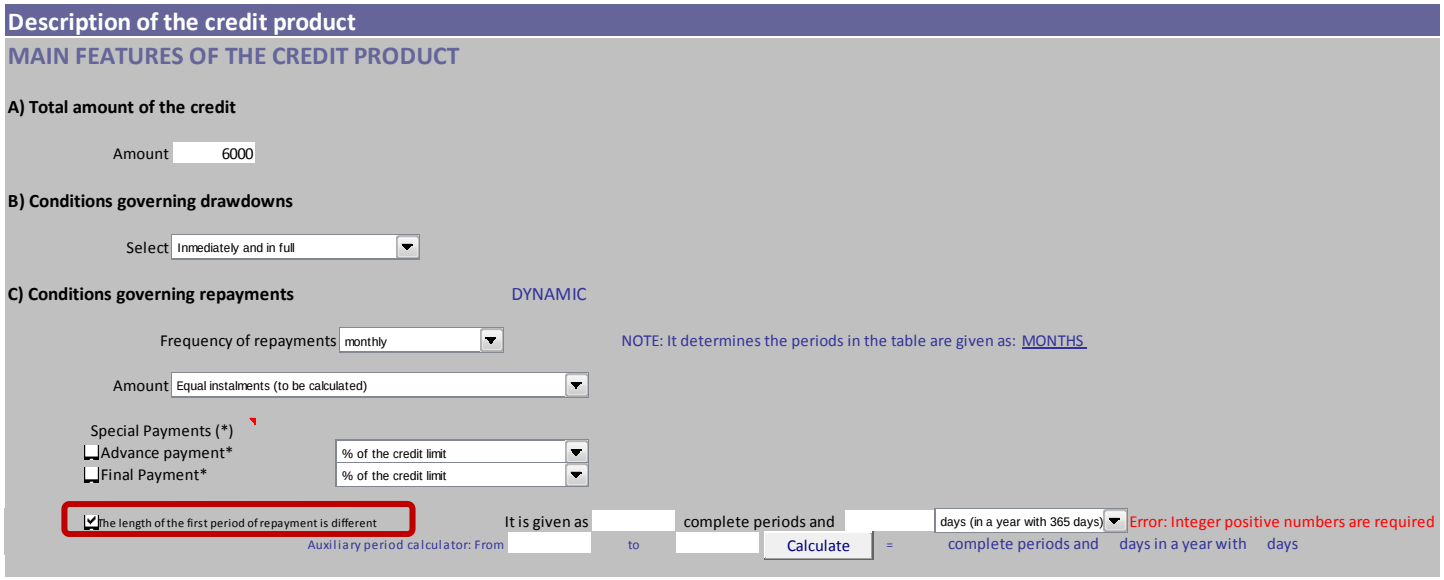
Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6049.44	4017.87	9.00%	49.44			1982.13	49.44	2031.57	0.00	2031.57	-2031.57	-2014.96
2		4017.87	4017.87	4048.01	2016.44	9.00%	30.13			2001.43	30.13	2031.57	0.00	2031.57	-2031.57	-1999.96
3		2016.44	2016.44	2031.57	0.00	9.00%	15.12			2016.44	15.12	2031.57	0.00	2031.57	-2031.57	-1985.08

Case 2

Click on the button *Reset* and then enter the information highlighted in red.

Note that after checking the box *The length of the first period of repayment is different*, an auxiliary period calculator appears.



In the auxiliary calculator enter the initial and final dates of the first period of repayment and click on the button *Calculate* to obtain the number of regular periods and days corresponding to this period and the number of days of the year.

Then enter the information obtained in the previous row.

Complete the information with the number of repayment periods.

D) Duration of the credit agreement

Duration Fixed of 3 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	2031.56	DYNAMIC
Duration of the credit	3	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.4%	DYNAMIC
Total cost of the credit	94.68	
Total amount of credit	6000.00	
Total amount payable	6094.68	

Recalculate

Recalculate

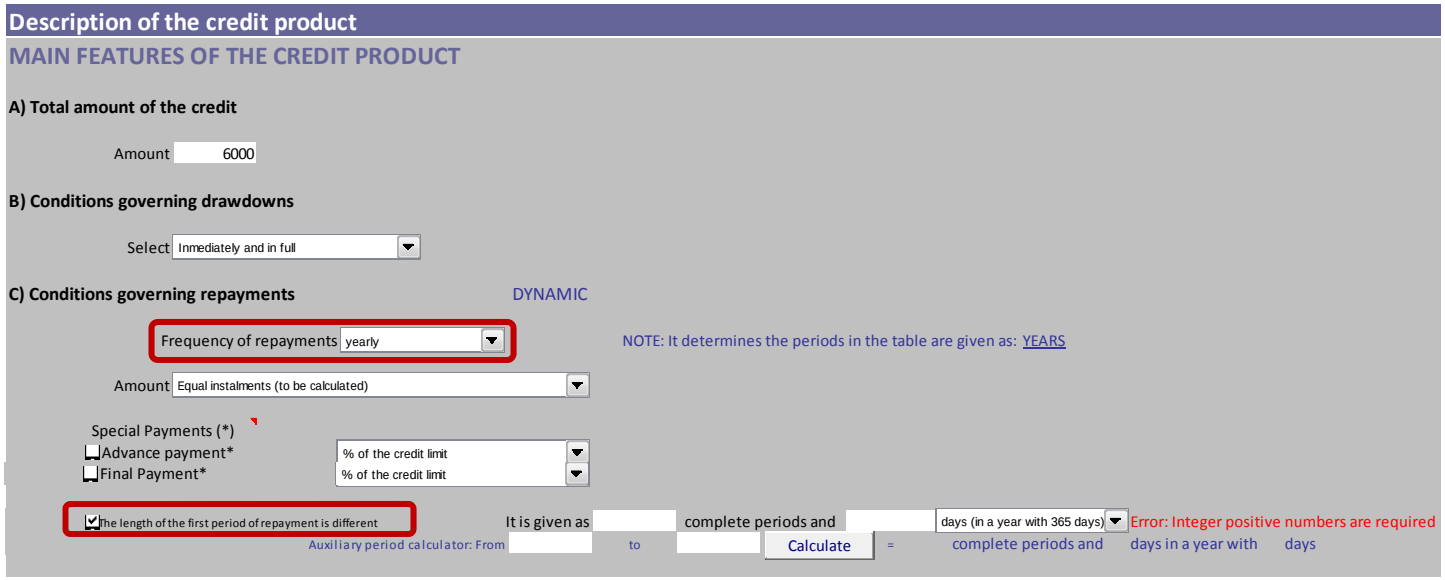
Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6049.43	4017.87	9.00%	49.43			1982.13	49.43	2031.56	0.00	2031.56	-2031.56	-2014.96
2		4017.87	4017.87	4048.00	2016.44	9.00%	30.13			2001.43	30.13	2031.56	0.00	2031.56	-2031.56	-1999.96
3		2016.44	2016.44	2031.56	0.00	9.00%	15.12			2016.44	15.12	2031.56	0.00	2031.56	-2031.56	-1985.08

Case 3

Click on the button *Reset* and then enter the information highlighted in red.

Note that after checking the box *The length of the first period of repayment is different*, an auxiliary period calculator appears.



In the auxiliary calculator enter the initial and final dates of the first period of repayment and click on the button *Calculate* to obtain the number of regular periods and days corresponding to this period and the number of days of the year.

Then enter the information obtained in the previous row.

Complete the information with the number of repayment periods.

D) Duration of the credit agreement

Duration Fixed of 3 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	2192.84	DYNAMIC	Recalculate
Duration of the credit	3	YEARS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	9.0%	DYNAMIC	Recalculate
Total cost of the credit	578.52		
Total amount of credit	6000.00		
Total amount payable	6578.52		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6050.30	3857.46	9.00%	50.30			2142.54	50.30	2192.84	0.00	2192.84	-2192.84	-2175.24
2		3857.46	3857.46	4204.63	2011.78	9.00%	347.17			1845.67	347.17	2192.84	0.00	2192.84	-2192.84	-1995.02
3		2011.78	2011.78	2192.84	0.00	9.00%	181.06			2011.78	181.06	2192.84	0.00	2192.84	-2192.84	-1829.73

EXAMPLE 5

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

- [ ] Advance payment* % of the credit limit
- [ ] Final Payment* % of the credit limit

- [ ] The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
[x]	Cost 1	fixed amount	60	No*	At conclusion
[ ]	Cost 2	% of the credit limit		No*	At conclusion
[ ]	Cost 3	% of the drawdowns in each period		No*	
[ ]	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
[ ]	Cost 5	% of the balance outstanding (only capital) in each period		No*	
[ ]	Cost 6	% of the credit not used at the begining of each period		No*	
[ ]	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	274.11	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.5%	DYNAMIC	Recalculate
Total cost of the credit	638.64		
Total amount of credit	6000.00		
Total amount payable	6638.64		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5770.89	9.00%	45.00			229.11	45.00	274.11	0.00	274.11	-274.11	-271.84
2		5770.89	5770.89	5814.17	5540.06	9.00%	43.28			230.83	43.28	274.11	0.00	274.11	-274.11	-269.60
3		5540.06	5540.06	5581.62	5307.51	9.00%	41.55			232.56	41.55	274.11	0.00	274.11	-274.11	-267.37
4		5307.51	5307.51	5347.31	5073.20	9.00%	39.81			234.30	39.81	274.11	0.00	274.11	-274.11	-265.16
5		5073.20	5073.20	5111.25	4837.15	9.00%	38.05			236.06	38.05	274.11	0.00	274.11	-274.11	-262.97
6		4837.15	4837.15	4873.42	4599.32	9.00%	36.28			237.83	36.28	274.11	0.00	274.11	-274.11	-260.79
7		4599.32	4599.32	4633.81	4359.70	9.00%	34.49			239.61	34.49	274.11	0.00	274.11	-274.11	-258.64
8		4359.70	4359.70	4392.40	4118.29	9.00%	32.70			241.41	32.70	274.11	0.00	274.11	-274.11	-256.50
9		4118.29	4118.29	4149.18	3875.07	9.00%	30.89			243.22	30.89	274.11	0.00	274.11	-274.11	-254.38
10		3875.07	3875.07	3904.13	3630.02	9.00%	29.06			245.05	29.06	274.11	0.00	274.11	-274.11	-252.27
11		3630.02	3630.02	3657.25	3383.14	9.00%	27.23			246.88	27.23	274.11	0.00	274.11	-274.11	-250.19
12		3383.14	3383.14	3408.51	3134.41	9.00%	25.37			248.73	25.37	274.11	0.00	274.11	-274.11	-248.12
13		3134.41	3134.41	3157.91	2883.81	9.00%	23.51			250.60	23.51	274.11	0.00	274.11	-274.11	-246.07
14		2883.81	2883.81	2905.43	2631.33	9.00%	21.63			252.48	21.63	274.11	0.00	274.11	-274.11	-244.03
15		2631.33	2631.33	2651.06	2376.95	9.00%	19.73			254.37	19.73	274.11	0.00	274.11	-274.11	-242.02
16		2376.95	2376.95	2394.78	2120.67	9.00%	17.83			256.28	17.83	274.11	0.00	274.11	-274.11	-240.02
17		2120.67	2120.67	2136.58	1862.47	9.00%	15.91			258.20	15.91	274.11	0.00	274.11	-274.11	-238.03
18		1862.47	1862.47	1876.44	1602.33	9.00%	13.97			260.14	13.97	274.11	0.00	274.11	-274.11	-236.06
19		1602.33	1602.33	1614.35	1340.24	9.00%	12.02			262.09	12.02	274.11	0.00	274.11	-274.11	-234.11
20		1340.24	1340.24	1350.29	1076.18	9.00%	10.05			264.06	10.05	274.11	0.00	274.11	-274.11	-232.18
21		1076.18	1076.18	1084.25	810.14	9.00%	8.07			266.04	8.07	274.11	0.00	274.11	-274.11	-230.26
22		810.14	810.14	816.22	542.11	9.00%	6.08			268.03	6.08	274.11	0.00	274.11	-274.11	-228.35
23		542.11	542.11	546.18	272.07	9.00%	4.07			270.04	4.07	274.11	0.00	274.11	-274.11	-226.47
24		272.07	272.07	274.11	0.00	9.00%	2.04			272.07	2.04	274.11	0.00	274.11	-274.11	-224.59

EXAMPLE 6

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	2.5	No*	Each time a repayment takes place
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	274.11	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.4%	DYNAMIC	Recalculate
Total cost of the credit	638.64		
Total amount of credit	6000.00		
Total amount payable	6638.64		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			0.00					0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6045.00	5770.89	9.00%	45.00	2.50		229.11	45.00	274.11	2.50	276.61	-276.61	-274.35
2		5770.89	5770.89	5814.17	5540.06	9.00%	43.28	2.50		230.83	43.28	274.11	2.50	276.61	-276.61	-272.10
3		5540.06	5540.06	5581.62	5307.51	9.00%	41.55	2.50		232.56	41.55	274.11	2.50	276.61	-276.61	-269.87
4		5307.51	5307.51	5347.31	5073.20	9.00%	39.81	2.50		234.30	39.81	274.11	2.50	276.61	-276.61	-267.66
5		5073.20	5073.20	5111.25	4837.15	9.00%	38.05	2.50		236.06	38.05	274.11	2.50	276.61	-276.61	-265.47
6		4837.15	4837.15	4873.42	4599.32	9.00%	36.28	2.50		237.83	36.28	274.11	2.50	276.61	-276.61	-263.30
7		4599.32	4599.32	4633.81	4359.70	9.00%	34.49	2.50		239.61	34.49	274.11	2.50	276.61	-276.61	-261.14
8		4359.70	4359.70	4392.40	4118.29	9.00%	32.70	2.50		241.41	32.70	274.11	2.50	276.61	-276.61	-259.00
9		4118.29	4118.29	4149.18	3875.07	9.00%	30.89	2.50		243.22	30.89	274.11	2.50	276.61	-276.61	-256.88
10		3875.07	3875.07	3904.13	3630.02	9.00%	29.06	2.50		245.05	29.06	274.11	2.50	276.61	-276.61	-254.78
11		3630.02	3630.02	3657.25	3383.14	9.00%	27.23	2.50		246.88	27.23	274.11	2.50	276.61	-276.61	-252.69
12		3383.14	3383.14	3408.51	3134.41	9.00%	25.37	2.50		248.73	25.37	274.11	2.50	276.61	-276.61	-250.62
13		3134.41	3134.41	3157.91	2883.81	9.00%	23.51	2.50		250.60	23.51	274.11	2.50	276.61	-276.61	-248.57
14		2883.81	2883.81	2905.43	2631.33	9.00%	21.63	2.50		252.48	21.63	274.11	2.50	276.61	-276.61	-246.54
15		2631.33	2631.33	2651.06	2376.95	9.00%	19.73	2.50		254.37	19.73	274.11	2.50	276.61	-276.61	-244.52
16		2376.95	2376.95	2394.78	2120.67	9.00%	17.83	2.50		256.28	17.83	274.11	2.50	276.61	-276.61	-242.52
17		2120.67	2120.67	2136.58	1862.47	9.00%	15.91	2.50		258.20	15.91	274.11	2.50	276.61	-276.61	-240.53
18		1862.47	1862.47	1876.44	1602.33	9.00%	13.97	2.50		260.14	13.97	274.11	2.50	276.61	-276.61	-238.56
19		1602.33	1602.33	1614.35	1340.24	9.00%	12.02	2.50		262.09	12.02	274.11	2.50	276.61	-276.61	-236.61
20		1340.24	1340.24	1350.29	1076.18	9.00%	10.05	2.50		264.06	10.05	274.11	2.50	276.61	-276.61	-234.67
21		1076.18	1076.18	1084.25	810.14	9.00%	8.07	2.50		266.04	8.07	274.11	2.50	276.61	-276.61	-232.75
22		810.14	810.14	816.22	542.11	9.00%	6.08	2.50		268.03	6.08	274.11	2.50	276.61	-276.61	-230.84
23		542.11	542.11	546.18	272.07	9.00%	4.07	2.50		270.04	4.07	274.11	2.50	276.61	-276.61	-228.95
24		272.07	272.07	274.11	0.00	9.00%	2.04	2.50		272.07	2.04	274.11	2.50	276.61	-276.61	-227.08

EXAMPLE 7

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

- ☐ Advance payment* % of the credit limit
- ☐ Final Payment* % of the credit limit

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☑	Cost 2	% of the credit limit	0,20833333	No*	Each time a repayment takes place
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	274.11	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	15.5%	DYNAMIC	Recalculate
Total cost of the credit	938.64		
Total amount of credit	6000.00		
Total amount payable	6938.64		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5770.89	9.00%	45.00	12.50		229.11	45.00	274.11	12.50	286.61	-286.61	-283.19
2		5770.89	5770.89	5814.17	5540.06	9.00%	43.28	12.50		230.83	43.28	274.11	12.50	286.61	-286.61	-279.81
3		5540.06	5540.06	5581.62	5307.51	9.00%	41.55	12.50		232.56	41.55	274.11	12.50	286.61	-286.61	-276.46
4		5307.51	5307.51	5347.31	5073.20	9.00%	39.81	12.50		234.30	39.81	274.11	12.50	286.61	-286.61	-273.16
5		5073.20	5073.20	5111.25	4837.15	9.00%	38.05	12.50		236.06	38.05	274.11	12.50	286.61	-286.61	-269.90
6		4837.15	4837.15	4873.42	4599.32	9.00%	36.28	12.50		237.83	36.28	274.11	12.50	286.61	-286.61	-266.68
7		4599.32	4599.32	4633.81	4359.70	9.00%	34.49	12.50		239.61	34.49	274.11	12.50	286.61	-286.61	-263.49
8		4359.70	4359.70	4392.40	4118.29	9.00%	32.70	12.50		241.41	32.70	274.11	12.50	286.61	-286.61	-260.35
9		4118.29	4118.29	4149.18	3875.07	9.00%	30.89	12.50		243.22	30.89	274.11	12.50	286.61	-286.61	-257.24
10		3875.07	3875.07	3904.13	3630.02	9.00%	29.06	12.50		245.05	29.06	274.11	12.50	286.61	-286.61	-254.17
11		3630.02	3630.02	3657.25	3383.14	9.00%	27.23	12.50		246.88	27.23	274.11	12.50	286.61	-286.61	-251.13
12		3383.14	3383.14	3408.51	3134.41	9.00%	25.37	12.50		248.73	25.37	274.11	12.50	286.61	-286.61	-248.13
13		3134.41	3134.41	3157.91	2883.81	9.00%	23.51	12.50		250.60	23.51	274.11	12.50	286.61	-286.61	-245.17
14		2883.81	2883.81	2905.43	2631.33	9.00%	21.63	12.50		252.48	21.63	274.11	12.50	286.61	-286.61	-242.24
15		2631.33	2631.33	2651.06	2376.95	9.00%	19.73	12.50		254.37	19.73	274.11	12.50	286.61	-286.61	-239.35
16		2376.95	2376.95	2394.78	2120.67	9.00%	17.83	12.50		256.28	17.83	274.11	12.50	286.61	-286.61	-236.49
17		2120.67	2120.67	2136.58	1862.47	9.00%	15.91	12.50		258.20	15.91	274.11	12.50	286.61	-286.61	-233.67
18		1862.47	1862.47	1876.44	1602.33	9.00%	13.97	12.50		260.14	13.97	274.11	12.50	286.61	-286.61	-230.88
19		1602.33	1602.33	1614.35	1340.24	9.00%	12.02	12.50		262.09	12.02	274.11	12.50	286.61	-286.61	-228.12
20		1340.24	1340.24	1350.29	1076.18	9.00%	10.05	12.50		264.06	10.05	274.11	12.50	286.61	-286.61	-225.40
21		1076.18	1076.18	1084.25	810.14	9.00%	8.07	12.50		266.04	8.07	274.11	12.50	286.61	-286.61	-222.70
22		810.14	810.14	816.22	542.11	9.00%	6.08	12.50		268.03	6.08	274.11	12.50	286.61	-286.61	-220.04
23		542.11	542.11	546.18	272.07	9.00%	4.07	12.50		270.04	4.07	274.11	12.50	286.61	-286.61	-217.42
24		272.07	272.07	274.11	0.00	9.00%	2.04	12.50		272.07	2.04	274.11	12.50	286.61	-286.61	-214.82

EXAMPLE 8

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

- [ ] Advance payment* % of the credit limit
- [ ] Final Payment* % of the credit limit

- [ ] The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
[x]	Cost 1	fixed amount	60	No*	At conclusion
[x]	Cost 2	% of the credit limit	5	Yes*	At conclusion
[ ]	Cost 3	% of the drawdowns in each period		No*	
[ ]	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
[ ]	Cost 5	% of the balance outstanding (only capital) in each period		No*	
[ ]	Cost 6	% of the credit not used at the begining of each period		No*	
[ ]	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	287.81	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	16.0%	DYNAMIC	Recalculate
Total cost of the credit	967.44		
Total amount of credit	6000.00		
Total amount payable	6967.44		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6300.00			60.00	300.00				60.00	60.00	5940.00	5940.00
1		6300.00	6300.00	6347.25	6059.44	9.00%	47.25			240.56	47.25	287.81	0.00	287.81	-287.81	-284.27
2		6059.44	6059.44	6104.88	5817.07	9.00%	45.45			242.37	45.45	287.81	0.00	287.81	-287.81	-280.78
3		5817.07	5817.07	5860.70	5572.88	9.00%	43.63			244.19	43.63	287.81	0.00	287.81	-287.81	-277.33
4		5572.88	5572.88	5614.68	5326.86	9.00%	41.80			246.02	41.80	287.81	0.00	287.81	-287.81	-273.92
5		5326.86	5326.86	5366.82	5079.00	9.00%	39.95			247.86	39.95	287.81	0.00	287.81	-287.81	-270.56
6		5079.00	5079.00	5117.10	4829.28	9.00%	38.09			249.72	38.09	287.81	0.00	287.81	-287.81	-267.23
7		4829.28	4829.28	4865.50	4577.69	9.00%	36.22			251.59	36.22	287.81	0.00	287.81	-287.81	-263.95
8		4577.69	4577.69	4612.02	4324.21	9.00%	34.33			253.48	34.33	287.81	0.00	287.81	-287.81	-260.70
9		4324.21	4324.21	4356.64	4068.82	9.00%	32.43			255.38	32.43	287.81	0.00	287.81	-287.81	-257.50
10		4068.82	4068.82	4099.34	3811.53	9.00%	30.52			257.30	30.52	287.81	0.00	287.81	-287.81	-254.34
11		3811.53	3811.53	3840.11	3552.30	9.00%	28.59			259.23	28.59	287.81	0.00	287.81	-287.81	-251.21
12		3552.30	3552.30	3578.94	3291.13	9.00%	26.64			261.17	26.64	287.81	0.00	287.81	-287.81	-248.13
13		3291.13	3291.13	3315.81	3028.00	9.00%	24.68			263.13	24.68	287.81	0.00	287.81	-287.81	-245.08
14		3028.00	3028.00	3050.71	2762.89	9.00%	22.71			265.10	22.71	287.81	0.00	287.81	-287.81	-242.06
15		2762.89	2762.89	2783.61	2495.80	9.00%	20.72			267.09	20.72	287.81	0.00	287.81	-287.81	-239.09
16		2495.80	2495.80	2514.52	2226.70	9.00%	18.72			269.10	18.72	287.81	0.00	287.81	-287.81	-236.15
17		2226.70	2226.70	2243.40	1955.59	9.00%	16.70			271.11	16.70	287.81	0.00	287.81	-287.81	-233.25
18		1955.59	1955.59	1970.26	1682.44	9.00%	14.67			273.15	14.67	287.81	0.00	287.81	-287.81	-230.38
19		1682.44	1682.44	1695.06	1407.25	9.00%	12.62			275.20	12.62	287.81	0.00	287.81	-287.81	-227.55
20		1407.25	1407.25	1417.80	1129.99	9.00%	10.55			277.26	10.55	287.81	0.00	287.81	-287.81	-224.76
21		1129.99	1129.99	1138.46	850.65	9.00%	8.47			279.34	8.47	287.81	0.00	287.81	-287.81	-222.00
22		850.65	850.65	857.03	569.22	9.00%	6.38			281.43	6.38	287.81	0.00	287.81	-287.81	-219.27
23		569.22	569.22	573.49	285.67	9.00%	4.27			283.54	4.27	287.81	0.00	287.81	-287.81	-216.57
24		285.67	285.67	287.81	0.00	9.00%	2.14			285.67	2.14	287.81	0.00	287.81	-287.81	-213.91

EXAMPLE 9

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 0.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	250.00	Recalculate
Duration of the credit	24	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	1.0%	DYNAMIC Recalculate
Total cost of the credit	60.00	
Total amount of credit	6000.00	
Total amount payable	6060.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6000.00	5750.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-249.80
2		5750.00	5750.00	5750.00	5500.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-249.60
3		5500.00	5500.00	5500.00	5250.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-249.40
4		5250.00	5250.00	5250.00	5000.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-249.20
5		5000.00	5000.00	5000.00	4750.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-249.00
6		4750.00	4750.00	4750.00	4500.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-248.80
7		4500.00	4500.00	4500.00	4250.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-248.59
8		4250.00	4250.00	4250.00	4000.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-248.39
9		4000.00	4000.00	4000.00	3750.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-248.19
10		3750.00	3750.00	3750.00	3500.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-247.99
11		3500.00	3500.00	3500.00	3250.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-247.80
12		3250.00	3250.00	3250.00	3000.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-247.60
13		3000.00	3000.00	3000.00	2750.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-247.40
14		2750.00	2750.00	2750.00	2500.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-247.20
15		2500.00	2500.00	2500.00	2250.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-247.00
16		2250.00	2250.00	2250.00	2000.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-246.80
17		2000.00	2000.00	2000.00	1750.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-246.60
18		1750.00	1750.00	1750.00	1500.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-246.40
19		1500.00	1500.00	1500.00	1250.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-246.20
20		1250.00	1250.00	1250.00	1000.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-246.01
21		1000.00	1000.00	1000.00	750.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-245.81
22		750.00	750.00	750.00	500.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-245.61
23		500.00	500.00	500.00	250.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-245.41
24		250.00	250.00	250.00	0.00	0.00%	0.00			250.00	0.00	250.00	0.00	250.00	-250.00	-245.21

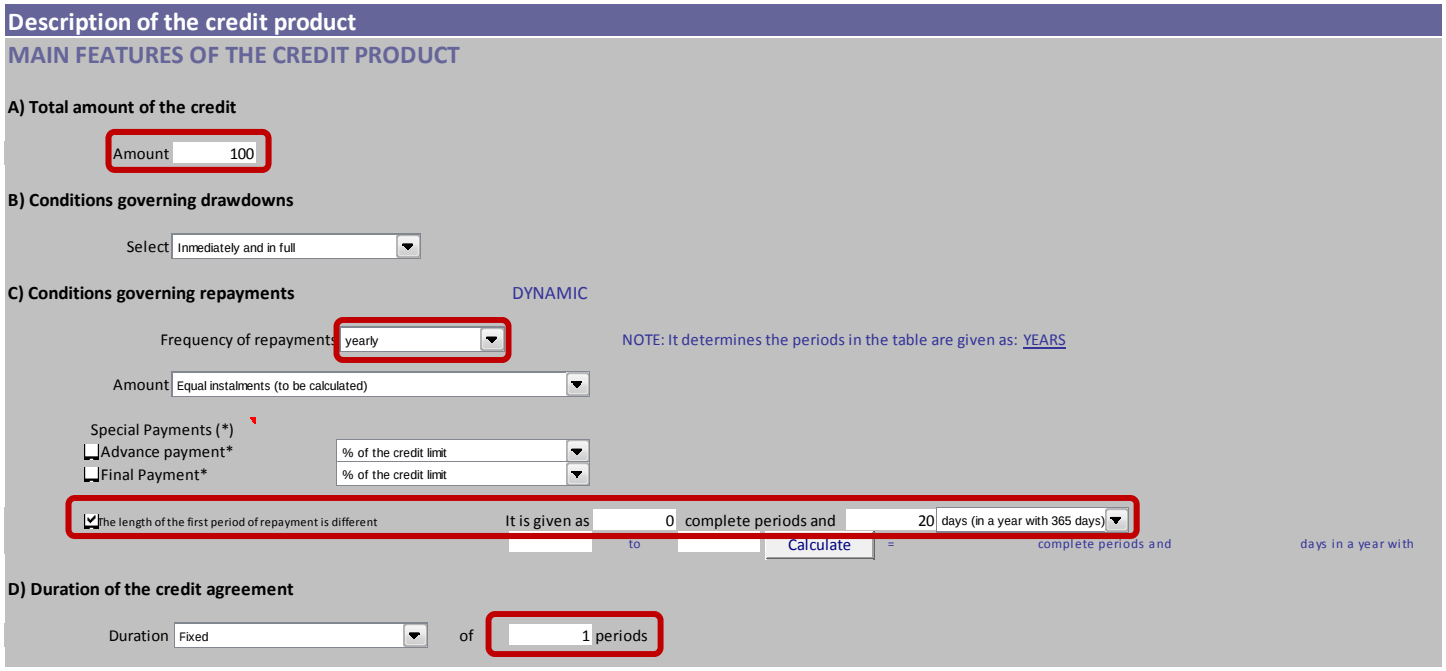
EXAMPLE 10

The simulator does not deal automatically with special periods or user-specific formulas for charging interest. These cases should be addressed manually.

This example, where interest is charged daily, can be solved in two different ways.

Approach 1

The first way consists on obtaining the interest charges manually (22.02 euros, as obtained in the example) and then using the simulator to obtain the APR from the value of drawdowns, repayments and payments of charges (see stage 3 in the instructions of the simulator).



To this end, click on the button *Reset* and then enter the information highlighted in red.

Note that after checking the box *The length of the first period of repayment is different*, an auxiliary period calculator appears. The auxiliary calculator is not necessary in this example, as it is assumed that the length of the first interval is exactly 0 regular periods and 20 days in a year with 365 days (i.e. a non-leap year). Therefore, enter this information directly in the upper row.

Complete the information with the costs of the credit, but do not change the *borrowing rate*, as the interest charges obtained before will be entered manually in the amortisation table.

COSTS OF THE CREDIT

A) Borrowing rate

Level: Fixed for the entire duration of the credit — by a percentage of: 9.00%

Defined as: Nominal (annual) — DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	5	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples — Obs (*) — Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	100.49	
Duration of the credit	1	YEARS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	178.8%	DYNAMIC
Total cost of the credit	5.49	
Total amount of credit	100.00	
Total amount payable	105.49	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	100.00				100.00			5.00					5.00	5.00	95.00	95.00
1		100.00	100.00	100.49	0.00	9.00%	0.49			100.00	0.49	100.49	0.00	100.49	-100.49	-95.00

In the amortisation table, delete the cells highlighted in red. Be aware of not deleting the cells under variables titled in red font (*Period, Costs not financed, Total*, and the two columns of *Cash flows*), as these cells cannot be changed under any circumstance.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	100.49	Recalculate
Duration of the credit	1	YEARS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	178.8%	DYNAMIC Recalculate
Total cost of the credit	5.49	
Total amount of credit	100.00	
Total amount payable	105.49	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	100.00				100.00			5.00					5.00	5.00	95.00	95.00
1		100.00	100.00	100.49	0.00	9.00%	0.49			100.00	0.49	100.49	0.00	100.49	-100.49	-95.00

Now enter in the column *Total* the sum of the amount of the credit and the interest charges (100+22.02=€122.02) in the row corresponding to period 1 of the amortisation table.

Note that due to these changes, the area of *Main results* reports the error that *the APR is not valid because the present value of the cash flows is not zero*.

Main results

Final balance in the last period	0.00	
Amount of the first repayment		Recalculate
Duration of the credit	1	YEARS
Present value of the cash flows	-20.35	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	178.8%	DYNAMIC Recalculate
Total cost of the credit	27.02	
Total amount of credit	100.00	
Total amount payable	127.02	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	100.00							5.00					5.00	5.00	95.00	95.00
1												122.02	0.00	122.02	-122.02	-115.35

To obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 9536.3% is obtained and the error message disappears.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	1 YEARS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9536.3% DYNAMIC	Recalculate
Total cost of the credit	27.02	
Total amount of credit	100.00	
Total amount payable	127.02	

Amortisation table

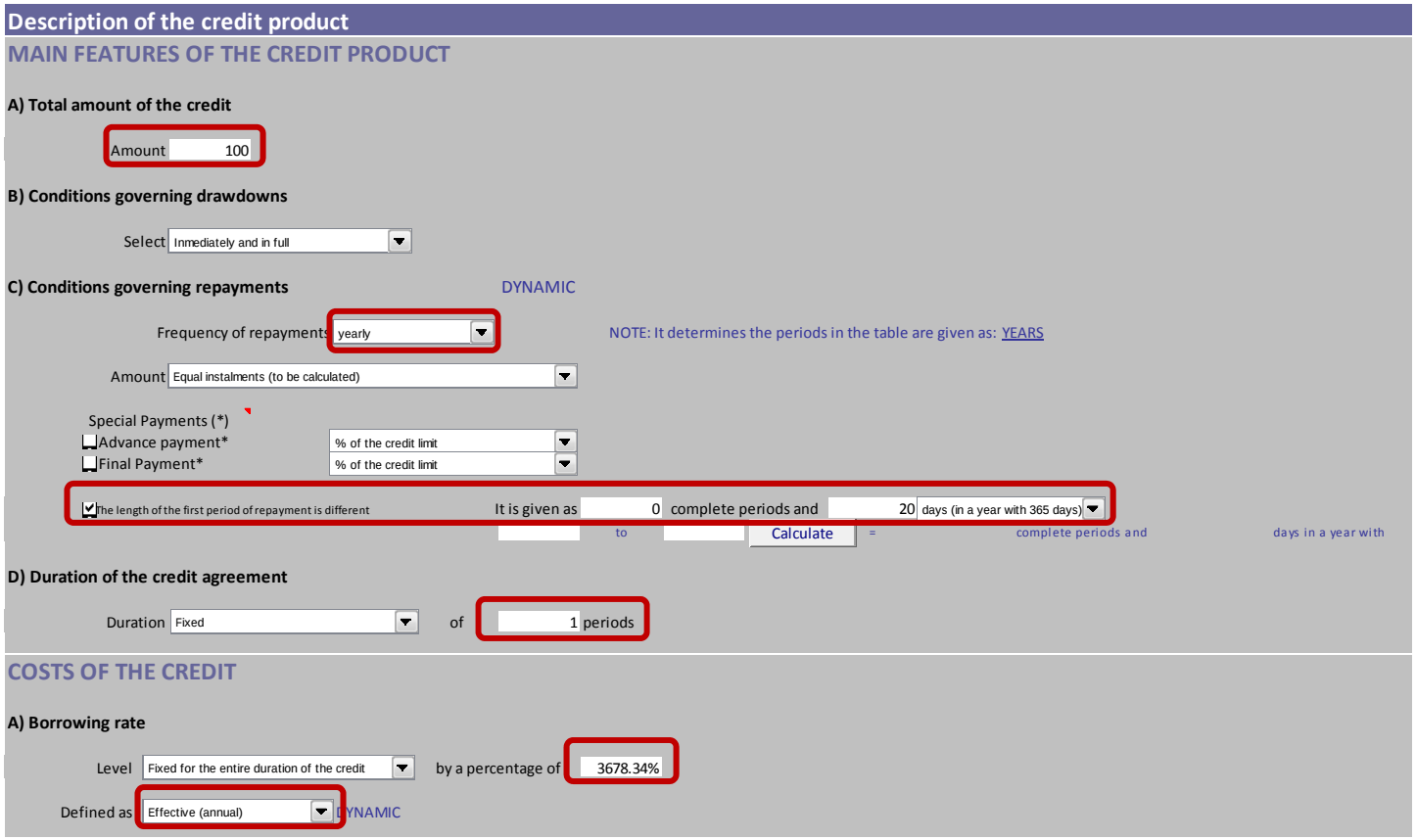
Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	100.00							5.00					5.00	5.00	95.00	95.00
1												122.02	0.00	122.02	-122.02	-95.00

Approach 2

The second way consists on obtaining manually an equivalent rate for a frequency available in the simulator and then using it to obtain the APR.

To obtain such equivalent rate remember from section 'Effective annual rate' of the study that the effective rate is an equivalent rate calculated as if compounded annually, meaning that applied to same amount of the credit on an annual compound basis gives the same balance for the same horizon. The yearly frequency is available in the simulator and hence an effective rate can be used in this example. The relation between the effective rate *r* and the nominal rate *i* compounded *f* times a year is:

$$1+r=\left(1+\frac{i}{f}\right)^{f}$$



The rate of 1% per day implies a nominal (annual) borrowing rate of 1x365=365%. The effective rate is then:

$$r=\left(1+\frac{365\%}{365}\right)^{365}-1=3678.34\%$$

Enter this rate and a yearly frequency in the simulator. Specifically, click on the button *Reset* and then enter the information highlighted in red.

Complete the information with the other costs of the credit.

And click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table. The APR of 9536.3% is obtained again.

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	5	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Main results

Final balance in the last period	0.00		
Amount of the first repayment	122.02		Recalculate
Duration of the credit	1	YEARS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	9536.3%	DYNAMIC	Recalculate
Total cost of the credit	27.02		
Total amount of credit	100.00		
Total amount payable	127.02		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	100.00				100.00			5.00					5.00	5.00	95.00	95.00
1		100.00	100.00	122.02	0.00	3678.34%	22.02			100.00	22.02	122.02	0.00	122.02	-122.02	-95.00

EXAMPLE 11

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

☐ Advance payment*	% of the credit limit		
☑ Final Payment*	% of the credit limit	of	25

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☑	Cost 2	% of the credit limit	0,20833333	No*	Each time a repayment takes place
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	225.44	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	14.6%	DYNAMIC	Recalculate
Total cost of the credit	1045.12		
Total amount of credit	6000.00		
Total amount payable	7045.12		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5819.56	9.00%	45.00	12.50		180.44	45.00	225.44	12.50	237.94	-237.94	-235.25
2		5819.56	5819.56	5863.21	5637.77	9.00%	43.65	12.50		181.79	43.65	225.44	12.50	237.94	-237.94	-232.59
3		5637.77	5637.77	5680.05	5454.61	9.00%	42.28	12.50		183.16	42.28	225.44	12.50	237.94	-237.94	-229.96
4		5454.61	5454.61	5495.52	5270.08	9.00%	40.91	12.50		184.53	40.91	225.44	12.50	237.94	-237.94	-227.37
5		5270.08	5270.08	5309.61	5084.17	9.00%	39.53	12.50		185.91	39.53	225.44	12.50	237.94	-237.94	-224.80
6		5084.17	5084.17	5122.30	4896.86	9.00%	38.13	12.50		187.31	38.13	225.44	12.50	237.94	-237.94	-222.26
7		4896.86	4896.86	4933.58	4708.14	9.00%	36.73	12.50		188.71	36.73	225.44	12.50	237.94	-237.94	-219.75
8		4708.14	4708.14	4743.46	4518.02	9.00%	35.31	12.50		190.13	35.31	225.44	12.50	237.94	-237.94	-217.26
9		4518.02	4518.02	4551.90	4326.46	9.00%	33.89	12.50		191.55	33.89	225.44	12.50	237.94	-237.94	-214.81
10		4326.46	4326.46	4358.91	4133.47	9.00%	32.45	12.50		192.99	32.45	225.44	12.50	237.94	-237.94	-212.38
11		4133.47	4133.47	4164.47	3939.03	9.00%	31.00	12.50		194.44	31.00	225.44	12.50	237.94	-237.94	-209.98
12		3939.03	3939.03	3968.57	3743.13	9.00%	29.54	12.50		195.90	29.54	225.44	12.50	237.94	-237.94	-207.61
13		3743.13	3743.13	3771.21	3545.77	9.00%	28.07	12.50		197.37	28.07	225.44	12.50	237.94	-237.94	-205.26
14		3545.77	3545.77	3572.36	3346.92	9.00%	26.59	12.50		198.85	26.59	225.44	12.50	237.94	-237.94	-202.94
15		3346.92	3346.92	3372.02	3146.58	9.00%	25.10	12.50		200.34	25.10	225.44	12.50	237.94	-237.94	-200.65
16		3146.58	3146.58	3170.18	2944.74	9.00%	23.60	12.50		201.84	23.60	225.44	12.50	237.94	-237.94	-198.38
17		2944.74	2944.74	2966.83	2741.39	9.00%	22.09	12.50		203.35	22.09	225.44	12.50	237.94	-237.94	-196.14
18		2741.39	2741.39	2761.95	2536.51	9.00%	20.56	12.50		204.88	20.56	225.44	12.50	237.94	-237.94	-193.92
19		2536.51	2536.51	2555.53	2330.09	9.00%	19.02	12.50		206.42	19.02	225.44	12.50	237.94	-237.94	-191.73
20		2330.09	2330.09	2347.57	2122.13	9.00%	17.48	12.50		207.96	17.48	225.44	12.50	237.94	-237.94	-189.57
21		2122.13	2122.13	2138.05	1912.61	9.00%	15.92	12.50		209.52	15.92	225.44	12.50	237.94	-237.94	-187.42
22		1912.61	1912.61	1926.95	1701.51	9.00%	14.34	12.50		211.10	14.34	225.44	12.50	237.94	-237.94	-185.31
23		1701.51	1701.51	1714.27	1488.83	9.00%	12.76	12.50		212.68	12.76	225.44	12.50	237.94	-237.94	-183.21
24		1488.83	1488.83	1500.00	0.00	9.00%	11.17	12.50		1488.83	11.17	1500.00	12.50	1512.50	-1512.50	-1151.45

EXAMPLE 12

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

☑ Advance payment*	% of the credit limit	of	25
☐ Final Payment*	% of the credit limit		

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
☑ Cost 1	fixed amount	60	No*	At conclusion
☐ Cost 2	% of the credit limit		No*	At conclusion
☐ Cost 3	% of the drawdowns in each period		No*	
☐ Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐ Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐ Cost 6	% of the credit not used at the begining of each period		No*	
☐ Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	205.58	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.8%	DYNAMIC	Recalculate
Total cost of the credit	493.92		
Total amount of credit	4500.00		
Total amount payable	4993.92		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	4500.00				4500.00			60.00					60.00	60.00	4440.00	4440.00
1		4500.00	4500.00	4533.75	4328.17	9.00%	33.75			171.83	33.75	205.58	0.00	205.58	-205.58	-203.82
2		4328.17	4328.17	4360.63	4155.05	9.00%	32.46			173.12	32.46	205.58	0.00	205.58	-205.58	-202.08
3		4155.05	4155.05	4186.21	3980.63	9.00%	31.16			174.42	31.16	205.58	0.00	205.58	-205.58	-200.36
4		3980.63	3980.63	4010.48	3804.90	9.00%	29.85			175.73	29.85	205.58	0.00	205.58	-205.58	-198.64
5		3804.90	3804.90	3833.44	3627.86	9.00%	28.54			177.04	28.54	205.58	0.00	205.58	-205.58	-196.95
6		3627.86	3627.86	3655.07	3449.49	9.00%	27.21			178.37	27.21	205.58	0.00	205.58	-205.58	-195.27
7		3449.49	3449.49	3475.36	3269.78	9.00%	25.87			179.71	25.87	205.58	0.00	205.58	-205.58	-193.60
8		3269.78	3269.78	3294.30	3088.72	9.00%	24.52			181.06	24.52	205.58	0.00	205.58	-205.58	-191.94
9		3088.72	3088.72	3111.88	2906.30	9.00%	23.17			182.42	23.17	205.58	0.00	205.58	-205.58	-190.30
10		2906.30	2906.30	2928.10	2722.52	9.00%	21.80			183.78	21.80	205.58	0.00	205.58	-205.58	-188.68
11		2722.52	2722.52	2742.94	2537.36	9.00%	20.42			185.16	20.42	205.58	0.00	205.58	-205.58	-187.07
12		2537.36	2537.36	2556.39	2350.80	9.00%	19.03			186.55	19.03	205.58	0.00	205.58	-205.58	-185.47
13		2350.80	2350.80	2368.44	2162.85	9.00%	17.63			187.95	17.63	205.58	0.00	205.58	-205.58	-183.88
14		2162.85	2162.85	2179.08	1973.49	9.00%	16.22			189.36	16.22	205.58	0.00	205.58	-205.58	-182.31
15		1973.49	1973.49	1988.30	1782.71	9.00%	14.80			190.78	14.80	205.58	0.00	205.58	-205.58	-180.76
16		1782.71	1782.71	1796.08	1590.50	9.00%	13.37			192.21	13.37	205.58	0.00	205.58	-205.58	-179.21
17		1590.50	1590.50	1602.43	1396.85	9.00%	11.93			193.65	11.93	205.58	0.00	205.58	-205.58	-177.68
18		1396.85	1396.85	1407.33	1201.75	9.00%	10.48			195.10	10.48	205.58	0.00	205.58	-205.58	-176.16
19		1201.75	1201.75	1210.76	1005.18	9.00%	9.01			196.57	9.01	205.58	0.00	205.58	-205.58	-174.66
20		1005.18	1005.18	1012.72	807.14	9.00%	7.54			198.04	7.54	205.58	0.00	205.58	-205.58	-173.17
21		807.14	807.14	813.19	607.61	9.00%	6.05			199.53	6.05	205.58	0.00	205.58	-205.58	-171.69
22		607.61	607.61	612.16	406.58	9.00%	4.56			201.02	4.56	205.58	0.00	205.58	-205.58	-170.22
23		406.58	406.58	409.63	204.05	9.00%	3.05			202.53	3.05	205.58	0.00	205.58	-205.58	-168.77
24		204.05	204.05	205.58	0.00	9.00%	1.53			204.05	1.53	205.58	0.00	205.58	-205.58	-167.32

EXAMPLE 13

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 20000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

☑ Advance payment*	% of the credit limit	of	50
☑ Final Payment*	% of the credit limit	of	10

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	395.58	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.0%	DYNAMIC	Recalculate
Total cost of the credit	1158.34		
Total amount of credit	10000.00		
Total amount payable	11158.34		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	10000.00				10000.00			60.00					60.00	60.00	9940.00	9940.00
1		10000.00	10000.00	10075.00	9679.42	9.00%	75.00			320.58	75.00	395.58	0.00	395.58	-395.58	-392.46
2		9679.42	9679.42	9752.01	9356.43	9.00%	72.60			322.99	72.60	395.58	0.00	395.58	-395.58	-389.37
3		9356.43	9356.43	9426.60	9031.02	9.00%	70.17			325.41	70.17	395.58	0.00	395.58	-395.58	-386.30
4		9031.02	9031.02	9098.75	8703.17	9.00%	67.73			327.85	67.73	395.58	0.00	395.58	-395.58	-383.26
5		8703.17	8703.17	8768.44	8372.86	9.00%	65.27			330.31	65.27	395.58	0.00	395.58	-395.58	-380.24
6		8372.86	8372.86	8435.66	8040.07	9.00%	62.80			332.79	62.80	395.58	0.00	395.58	-395.58	-377.24
7		8040.07	8040.07	8100.37	7704.79	9.00%	60.30			335.28	60.30	395.58	0.00	395.58	-395.58	-374.27
8		7704.79	7704.79	7762.58	7366.99	9.00%	57.79			337.80	57.79	395.58	0.00	395.58	-395.58	-371.32
9		7366.99	7366.99	7422.25	7026.66	9.00%	55.25			340.33	55.25	395.58	0.00	395.58	-395.58	-368.40
10		7026.66	7026.66	7079.36	6683.78	9.00%	52.70			342.88	52.70	395.58	0.00	395.58	-395.58	-365.49
11		6683.78	6683.78	6733.91	6338.32	9.00%	50.13			345.45	50.13	395.58	0.00	395.58	-395.58	-362.61
12		6338.32	6338.32	6385.86	5990.28	9.00%	47.54			348.05	47.54	395.58	0.00	395.58	-395.58	-359.76
13		5990.28	5990.28	6035.21	5639.62	9.00%	44.93			350.66	44.93	395.58	0.00	395.58	-395.58	-356.92
14		5639.62	5639.62	5681.92	5286.34	9.00%	42.30			353.29	42.30	395.58	0.00	395.58	-395.58	-354.11
15		5286.34	5286.34	5325.98	4930.40	9.00%	39.65			355.94	39.65	395.58	0.00	395.58	-395.58	-351.32
16		4930.40	4930.40	4967.38	4571.80	9.00%	36.98			358.61	36.98	395.58	0.00	395.58	-395.58	-348.55
17		4571.80	4571.80	4606.08	4210.50	9.00%	34.29			361.29	34.29	395.58	0.00	395.58	-395.58	-345.81
18		4210.50	4210.50	4242.08	3846.50	9.00%	31.58			364.00	31.58	395.58	0.00	395.58	-395.58	-343.08
19		3846.50	3846.50	3875.34	3479.76	9.00%	28.85			366.73	28.85	395.58	0.00	395.58	-395.58	-340.38
20		3479.76	3479.76	3505.86	3110.28	9.00%	26.10			369.48	26.10	395.58	0.00	395.58	-395.58	-337.70
21		3110.28	3110.28	3133.60	2738.02	9.00%	23.33			372.26	23.33	395.58	0.00	395.58	-395.58	-335.04
22		2738.02	2738.02	2758.56	2362.97	9.00%	20.54			375.05	20.54	395.58	0.00	395.58	-395.58	-332.40
23		2362.97	2362.97	2380.69	1985.11	9.00%	17.72			377.86	17.72	395.58	0.00	395.58	-395.58	-329.78
24		1985.11	1985.11	2000.00	0.00	9.00%	14.89			1985.11	14.89	2000.00	0.00	2000.00	-2000.00	-1654.18

EXAMPLE 14

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Increasing or decreasing instalments by a % of 60.00 every 12 periods

Special Payments (*)

☐ Advance payment* % of the credit limit

☐ Final Payment* % of the credit limit

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	213.06	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.4%	DYNAMIC	Recalculate
Total cost of the credit	707.40		
Total amount of credit	6000.00		
Total amount payable	6707.40		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5831.94	9.00%	45.00			168.06	45.00	213.06	0.00	213.06	-213.06	-211.32
2		5831.94	5831.94	5875.68	5662.63	9.00%	43.74			169.32	43.74	213.06	0.00	213.06	-213.06	-209.59
3		5662.63	5662.63	5705.10	5492.04	9.00%	42.47			170.59	42.47	213.06	0.00	213.06	-213.06	-207.87
4		5492.04	5492.04	5533.23	5320.18	9.00%	41.19			171.87	41.19	213.06	0.00	213.06	-213.06	-206.17
5		5320.18	5320.18	5360.08	5147.02	9.00%	39.90			173.15	39.90	213.06	0.00	213.06	-213.06	-204.48
6		5147.02	5147.02	5185.63	4972.57	9.00%	38.60			174.45	38.60	213.06	0.00	213.06	-213.06	-202.81
7		4972.57	4972.57	5009.87	4796.81	9.00%	37.29			175.76	37.29	213.06	0.00	213.06	-213.06	-201.15
8		4796.81	4796.81	4832.79	4619.73	9.00%	35.98			177.08	35.98	213.06	0.00	213.06	-213.06	-199.51
9		4619.73	4619.73	4654.38	4441.32	9.00%	34.65			178.41	34.65	213.06	0.00	213.06	-213.06	-197.87
10		4441.32	4441.32	4474.63	4261.58	9.00%	33.31			179.75	33.31	213.06	0.00	213.06	-213.06	-196.25
11		4261.58	4261.58	4293.54	4080.48	9.00%	31.96			181.09	31.96	213.06	0.00	213.06	-213.06	-194.65
12		4080.48	4080.48	4111.09	3898.03	9.00%	30.60			182.45	30.60	213.06	0.00	213.06	-213.06	-193.06
13		3898.03	3898.03	3927.27	3586.38	9.00%	29.24			311.65	29.24	340.89	0.00	340.89	-340.89	-306.36
14		3586.38	3586.38	3613.28	3272.39	9.00%	26.90			313.99	26.90	340.89	0.00	340.89	-340.89	-303.85
15		3272.39	3272.39	3296.93	2956.04	9.00%	24.54			316.35	24.54	340.89	0.00	340.89	-340.89	-301.36
16		2956.04	2956.04	2978.21	2637.32	9.00%	22.17			318.72	22.17	340.89	0.00	340.89	-340.89	-298.90
17		2637.32	2637.32	2657.10	2316.22	9.00%	19.78			321.11	19.78	340.89	0.00	340.89	-340.89	-296.45
18		2316.22	2316.22	2333.59	1992.70	9.00%	17.37			323.52	17.37	340.89	0.00	340.89	-340.89	-294.03
19		1992.70	1992.70	2007.64	1666.75	9.00%	14.95			325.94	14.95	340.89	0.00	340.89	-340.89	-291.62
20		1666.75	1666.75	1679.26	1338.37	9.00%	12.50			328.39	12.50	340.89	0.00	340.89	-340.89	-289.23
21		1338.37	1338.37	1348.40	1007.52	9.00%	10.04			330.85	10.04	340.89	0.00	340.89	-340.89	-286.87
22		1007.52	1007.52	1015.07	674.18	9.00%	7.56			333.33	7.56	340.89	0.00	340.89	-340.89	-284.52
23		674.18	674.18	679.24	338.35	9.00%	5.06			335.83	5.06	340.89	0.00	340.89	-340.89	-282.19
24		338.35	338.35	340.89	0.00	9.00%	2.54			338.35	2.54	340.89	0.00	340.89	-340.89	-279.88

EXAMPLE 15

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Increasing or decreasing instalments by a % of -40.00 every 12 periods

Special Payments (*)

☐ Advance payment* % of the credit limit

☐ Final Payment* % of the credit limit

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	338.84	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.6%	DYNAMIC	Recalculate
Total cost of the credit	565.68		
Total amount of credit	6000.00		
Total amount payable	6565.68		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5706.16	9.00%	45.00			293.84	45.00	338.84	0.00	338.84	-338.84	-336.00
2		5706.16	5706.16	5748.96	5410.12	9.00%	42.80			296.04	42.80	338.84	0.00	338.84	-338.84	-333.18
3		5410.12	5410.12	5450.69	5111.85	9.00%	40.58			298.26	40.58	338.84	0.00	338.84	-338.84	-330.39
4		5111.85	5111.85	5150.19	4811.35	9.00%	38.34			300.50	38.34	338.84	0.00	338.84	-338.84	-327.62
5		4811.35	4811.35	4847.43	4508.59	9.00%	36.09			302.76	36.09	338.84	0.00	338.84	-338.84	-324.88
6		4508.59	4508.59	4542.41	4203.57	9.00%	33.81			305.03	33.81	338.84	0.00	338.84	-338.84	-322.16
7		4203.57	4203.57	4235.10	3896.25	9.00%	31.53			307.31	31.53	338.84	0.00	338.84	-338.84	-319.46
8		3896.25	3896.25	3925.48	3586.64	9.00%	29.22			309.62	29.22	338.84	0.00	338.84	-338.84	-316.78
9		3586.64	3586.64	3613.54	3274.70	9.00%	26.90			311.94	26.90	338.84	0.00	338.84	-338.84	-314.12
10		3274.70	3274.70	3299.26	2960.42	9.00%	24.56			314.28	24.56	338.84	0.00	338.84	-338.84	-311.49
11		2960.42	2960.42	2982.62	2643.78	9.00%	22.20			316.64	22.20	338.84	0.00	338.84	-338.84	-308.88
12		2643.78	2643.78	2663.61	2324.77	9.00%	19.83			319.01	19.83	338.84	0.00	338.84	-338.84	-306.29
13		2324.77	2324.77	2342.20	2138.90	9.00%	17.44			185.87	17.44	203.30	0.00	203.30	-203.30	-182.23
14		2138.90	2138.90	2154.94	1951.64	9.00%	16.04			187.26	16.04	203.30	0.00	203.30	-203.30	-180.70
15		1951.64	1951.64	1966.27	1762.97	9.00%	14.64			188.67	14.64	203.30	0.00	203.30	-203.30	-179.19
16		1762.97	1762.97	1776.19	1572.89	9.00%	13.22			190.08	13.22	203.30	0.00	203.30	-203.30	-177.69
17		1572.89	1572.89	1584.68	1381.38	9.00%	11.80			191.51	11.80	203.30	0.00	203.30	-203.30	-176.20
18		1381.38	1381.38	1391.74	1188.43	9.00%	10.36			192.94	10.36	203.30	0.00	203.30	-203.30	-174.72
19		1188.43	1188.43	1197.35	994.04	9.00%	8.91			194.39	8.91	203.30	0.00	203.30	-203.30	-173.26
20		994.04	994.04	1001.50	798.19	9.00%	7.46			195.85	7.46	203.30	0.00	203.30	-203.30	-171.81
21		798.19	798.19	804.18	600.88	9.00%	5.99			197.32	5.99	203.30	0.00	203.30	-203.30	-170.37
22		600.88	600.88	605.38	402.08	9.00%	4.51			198.80	4.51	203.30	0.00	203.30	-203.30	-168.94
23		402.08	402.08	405.10	201.79	9.00%	3.02			200.29	3.02	203.30	0.00	203.30	-203.30	-167.52
24		201.79	201.79	203.30	0.00	9.00%	1.51			201.79	1.51	203.30	0.00	203.30	-203.30	-166.12

EXAMPLE 16

Click on the button *Reset* and then enter the information highlighted in red.

The duration of the credit in this example depends on the amount of the repayments and will be determined internally by the simulator. However, if you plan to enter or change manually the values in the amortisation table before calculating the APR, you should enter as *Duration of the credit agreement* a high number of periods (e.g. 30), so that the table will not be extended by the simulator without considering your changes.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Constant amount known in advance amount of 300.00

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 30 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

As shown in the amortisation table and the main results, the duration of the credit resulting from the repayments is 22 months.

The simulator also update the duration previously entered to this final number of periods.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	22	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.6%	DYNAMIC	Recalculate
Total cost of the credit	585.31		
Total amount of credit	6000.00		
Total amount payable	6585.31		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5745.00	9.00%	45.00			255.00	45.00	300.00	0.00	300.00	-300.00	-297.50
2		5745.00	5745.00	5788.09	5488.09	9.00%	43.09			256.91	43.09	300.00	0.00	300.00	-300.00	-295.01
3		5488.09	5488.09	5529.25	5229.25	9.00%	41.16			258.84	41.16	300.00	0.00	300.00	-300.00	-292.55
4		5229.25	5229.25	5268.47	4968.47	9.00%	39.22			260.78	39.22	300.00	0.00	300.00	-300.00	-290.11
5		4968.47	4968.47	5005.73	4705.73	9.00%	37.26			262.74	37.26	300.00	0.00	300.00	-300.00	-287.69
6		4705.73	4705.73	4741.02	4441.02	9.00%	35.29			264.71	35.29	300.00	0.00	300.00	-300.00	-285.29
7		4441.02	4441.02	4474.33	4174.33	9.00%	33.31			266.69	33.31	300.00	0.00	300.00	-300.00	-282.91
8		4174.33	4174.33	4205.64	3905.64	9.00%	31.31			268.69	31.31	300.00	0.00	300.00	-300.00	-280.55
9		3905.64	3905.64	3934.93	3634.93	9.00%	29.29			270.71	29.29	300.00	0.00	300.00	-300.00	-278.21
10		3634.93	3634.93	3662.19	3362.19	9.00%	27.26			272.74	27.26	300.00	0.00	300.00	-300.00	-275.88
11		3362.19	3362.19	3387.41	3087.41	9.00%	25.22			274.78	25.22	300.00	0.00	300.00	-300.00	-273.58
12		3087.41	3087.41	3110.57	2810.57	9.00%	23.16			276.84	23.16	300.00	0.00	300.00	-300.00	-271.30
13		2810.57	2810.57	2831.64	2531.64	9.00%	21.08			278.92	21.08	300.00	0.00	300.00	-300.00	-269.04
14		2531.64	2531.64	2550.63	2250.63	9.00%	18.99			281.01	18.99	300.00	0.00	300.00	-300.00	-266.79
15		2250.63	2250.63	2267.51	1967.51	9.00%	16.88			283.12	16.88	300.00	0.00	300.00	-300.00	-264.56
16		1967.51	1967.51	1982.27	1682.27	9.00%	14.76			285.24	14.76	300.00	0.00	300.00	-300.00	-262.36
17		1682.27	1682.27	1694.89	1394.89	9.00%	12.62			287.38	12.62	300.00	0.00	300.00	-300.00	-260.17
18		1394.89	1394.89	1405.35	1105.35	9.00%	10.46			289.54	10.46	300.00	0.00	300.00	-300.00	-258.00
19		1105.35	1105.35	1113.64	813.64	9.00%	8.29			291.71	8.29	300.00	0.00	300.00	-300.00	-255.84
20		813.64	813.64	819.74	519.74	9.00%	6.10			293.90	6.10	300.00	0.00	300.00	-300.00	-253.71
21		519.74	519.74	523.64	223.64	9.00%	3.90			296.10	3.90	300.00	0.00	300.00	-300.00	-251.59
22		223.64	223.64	225.31	0.00	9.00%	1.68			223.64	1.68	225.31	0.00	225.31	-225.31	-187.38

D) Duration of the credit agreement

Duration Fixed of 22 periods

EXAMPLE 17

Click on the button *Reset* and then enter the information highlighted in red.

The duration of the credit in this example depends on the amount of the repayments and will be determined internally by the simulator. However, if you plan to enter or change manually the values in the amortisation table before calculating the APR, you should enter as *Duration of the credit agreement* a high number of periods (e.g. 30), so that the table will not be extended by the simulator without considering your changes.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus constant amount known in advance amount of 300.00

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 30 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

As shown in the amortisation table and the main results, the duration of the credit resulting from the repayments is 20 months.

The simulator also update the duration previously entered to this final number of periods.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	20	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.7%	DYNAMIC	Recalculate
Total cost of the credit	532.50		
Total amount of credit	6000.00		
Total amount payable	6532.50		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5700.00	9.00%	45.00			300.00	45.00	345.00	0.00	345.00	-345.00	-342.09
2		5700.00	5700.00	5742.75	5400.00	9.00%	42.75			300.00	42.75	342.75	0.00	342.75	-342.75	-336.99
3		5400.00	5400.00	5440.50	5100.00	9.00%	40.50			300.00	40.50	340.50	0.00	340.50	-340.50	-331.95
4		5100.00	5100.00	5138.25	4800.00	9.00%	38.25			300.00	38.25	338.25	0.00	338.25	-338.25	-326.97
5		4800.00	4800.00	4836.00	4500.00	9.00%	36.00			300.00	36.00	336.00	0.00	336.00	-336.00	-322.06
6		4500.00	4500.00	4533.75	4200.00	9.00%	33.75			300.00	33.75	333.75	0.00	333.75	-333.75	-317.20
7		4200.00	4200.00	4231.50	3900.00	9.00%	31.50			300.00	31.50	331.50	0.00	331.50	-331.50	-312.40
8		3900.00	3900.00	3929.25	3600.00	9.00%	29.25			300.00	29.25	329.25	0.00	329.25	-329.25	-307.66
9		3600.00	3600.00	3627.00	3300.00	9.00%	27.00			300.00	27.00	327.00	0.00	327.00	-327.00	-302.98
10		3300.00	3300.00	3324.75	3000.00	9.00%	24.75			300.00	24.75	324.75	0.00	324.75	-324.75	-298.36
11		3000.00	3000.00	3022.50	2700.00	9.00%	22.50			300.00	22.50	322.50	0.00	322.50	-322.50	-293.79
12		2700.00	2700.00	2720.25	2400.00	9.00%	20.25			300.00	20.25	320.25	0.00	320.25	-320.25	-289.28
13		2400.00	2400.00	2418.00	2100.00	9.00%	18.00			300.00	18.00	318.00	0.00	318.00	-318.00	-284.82
14		2100.00	2100.00	2115.75	1800.00	9.00%	15.75			300.00	15.75	315.75	0.00	315.75	-315.75	-280.42
15		1800.00	1800.00	1813.50	1500.00	9.00%	13.50			300.00	13.50	313.50	0.00	313.50	-313.50	-276.07
16		1500.00	1500.00	1511.25	1200.00	9.00%	11.25			300.00	11.25	311.25	0.00	311.25	-311.25	-271.77
17		1200.00	1200.00	1209.00	900.00	9.00%	9.00			300.00	9.00	309.00	0.00	309.00	-309.00	-267.53
18		900.00	900.00	906.75	600.00	9.00%	6.75			300.00	6.75	306.75	0.00	306.75	-306.75	-263.34
19		600.00	600.00	604.50	300.00	9.00%	4.50			300.00	4.50	304.50	0.00	304.50	-304.50	-259.20
20		300.00	300.00	302.25	0.00	9.00%	2.25			300.00	2.25	302.25	0.00	302.25	-302.25	-255.12

D) Duration of the credit agreement

Duration Fixed of 20 periods

EXAMPLE 18

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest regulary and repayment of capital at the end

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.0%	DYNAMIC	Recalculate
Total cost of the credit	1140.00		
Total amount of credit	6000.00		
Total amount payable	7140.00		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-44.64
2		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-44.29
3		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-43.94
4		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-43.60
5		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-43.25
6		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-42.91
7		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-42.57
8		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-42.23
9		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-41.90
10		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-41.57
11		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-41.24
12		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-40.92
13		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-40.59
14		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-40.27
15		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-39.95
16		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-39.64
17		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-39.33
18		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-39.02
19		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-38.71
20		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-38.40
21		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-38.10
22		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-37.80
23		6000.00	6000.00	6045.00	6000.00	9.00%	45.00			0.00	45.00	45.00	0.00	45.00	-45.00	-37.50
24		6000.00	6000.00	6045.00	0.00	9.00%	45.00			6000.00	45.00	6045.00	0.00	6045.00	-6045.00	-4997.62

EXAMPLE 19

Click on the button *Reset* and then enter the information highlighted in red.

Although there is only a single repayment at the end of the agreement (in two years), keep the *Frequency of repayments* as *monthly* as this is the frequency used for charging interest. Coherently, keep the *Duration of the credit agreement* as 24 monthly periods.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus capital at the end

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	9.9%	DYNAMIC	Recalculate
Total cost of the credit	1238.48		
Total amount of credit	6000.00		
Total amount payable	7238.48		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	6045.00	9.00%	45.00			-45.00	45.00	0.00	0.00	0.00	0.00	0.00
2		6045.00	6045.00	6090.34	6090.34	9.00%	45.34			-45.34	45.34	0.00	0.00	0.00	0.00	0.00
3		6090.34	6090.34	6136.02	6136.02	9.00%	45.68			-45.68	45.68	0.00	0.00	0.00	0.00	0.00
4		6136.02	6136.02	6182.04	6182.04	9.00%	46.02			-46.02	46.02	0.00	0.00	0.00	0.00	0.00
5		6182.04	6182.04	6228.40	6228.40	9.00%	46.37			-46.37	46.37	0.00	0.00	0.00	0.00	0.00
6		6228.40	6228.40	6275.11	6275.11	9.00%	46.71			-46.71	46.71	0.00	0.00	0.00	0.00	0.00
7		6275.11	6275.11	6322.18	6322.18	9.00%	47.06			-47.06	47.06	0.00	0.00	0.00	0.00	0.00
8		6322.18	6322.18	6369.59	6369.59	9.00%	47.42			-47.42	47.42	0.00	0.00	0.00	0.00	0.00
9		6369.59	6369.59	6417.37	6417.37	9.00%	47.77			-47.77	47.77	0.00	0.00	0.00	0.00	0.00
10		6417.37	6417.37	6465.50	6465.50	9.00%	48.13			-48.13	48.13	0.00	0.00	0.00	0.00	0.00
11		6465.50	6465.50	6513.99	6513.99	9.00%	48.49			-48.49	48.49	0.00	0.00	0.00	0.00	0.00
12		6513.99	6513.99	6562.84	6562.84	9.00%	48.85			-48.85	48.85	0.00	0.00	0.00	0.00	0.00
13		6562.84	6562.84	6612.06	6612.06	9.00%	49.22			-49.22	49.22	0.00	0.00	0.00	0.00	0.00
14		6612.06	6612.06	6661.65	6661.65	9.00%	49.59			-49.59	49.59	0.00	0.00	0.00	0.00	0.00
15		6661.65	6661.65	6711.62	6711.62	9.00%	49.96			-49.96	49.96	0.00	0.00	0.00	0.00	0.00
16		6711.62	6711.62	6761.95	6761.95	9.00%	50.34			-50.34	50.34	0.00	0.00	0.00	0.00	0.00
17		6761.95	6761.95	6812.67	6812.67	9.00%	50.71			-50.71	50.71	0.00	0.00	0.00	0.00	0.00
18		6812.67	6812.67	6863.76	6863.76	9.00%	51.10			-51.10	51.10	0.00	0.00	0.00	0.00	0.00
19		6863.76	6863.76	6915.24	6915.24	9.00%	51.48			-51.48	51.48	0.00	0.00	0.00	0.00	0.00
20		6915.24	6915.24	6967.10	6967.10	9.00%	51.86			-51.86	51.86	0.00	0.00	0.00	0.00	0.00
21		6967.10	6967.10	7019.36	7019.36	9.00%	52.25			-52.25	52.25	0.00	0.00	0.00	0.00	0.00
22		7019.36	7019.36	7072.00	7072.00	9.00%	52.65			-52.65	52.65	0.00	0.00	0.00	0.00	0.00
23		7072.00	7072.00	7125.04	7125.04	9.00%	53.04			-53.04	53.04	0.00	0.00	0.00	0.00	0.00
24		7125.04	7125.04	7178.48	0.00	9.00%	53.44			7125.04	53.44	7178.48	0.00	7178.48	-7178.48	-5940.00

EXAMPLE 20

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

- [ ] Advance payment* % of the credit limit
- [ ] Final Payment* % of the credit limit

- [ ] The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
[x]	Cost 1	fixed amount	60	No*	At conclusion
[ ]	Cost 2	% of the credit limit		No*	At conclusion
[ ]	Cost 3	% of the drawdowns in each period		No*	
[ ]	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
[ ]	Cost 5	% of the balance outstanding (only capital) in each period		No*	
[ ]	Cost 6	% of the credit not used at the begining of each period		No*	
[ ]	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.5%	DYNAMIC	Recalculate
Total cost of the credit	622.56		
Total amount of credit	6000.00		
Total amount payable	6622.56		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5750.00	9.00%	45.00			250.00	45.00	295.00	0.00	295.00	-295.00	-292.55
2		5750.00	5750.00	5793.13	5500.00	9.00%	43.13			250.00	43.13	293.13	0.00	293.13	-293.13	-288.29
3		5500.00	5500.00	5541.25	5250.00	9.00%	41.25			250.00	41.25	291.25	0.00	291.25	-291.25	-284.07
4		5250.00	5250.00	5289.38	5000.00	9.00%	39.38			250.00	39.38	289.38	0.00	289.38	-289.38	-279.90
5		5000.00	5000.00	5037.50	4750.00	9.00%	37.50			250.00	37.50	287.50	0.00	287.50	-287.50	-275.78
6		4750.00	4750.00	4785.63	4500.00	9.00%	35.63			250.00	35.63	285.63	0.00	285.63	-285.63	-271.71
7		4500.00	4500.00	4533.75	4250.00	9.00%	33.75			250.00	33.75	283.75	0.00	283.75	-283.75	-267.69
8		4250.00	4250.00	4281.88	4000.00	9.00%	31.88			250.00	31.88	281.88	0.00	281.88	-281.88	-263.72
9		4000.00	4000.00	4030.00	3750.00	9.00%	30.00			250.00	30.00	280.00	0.00	280.00	-280.00	-259.79
10		3750.00	3750.00	3778.13	3500.00	9.00%	28.13			250.00	28.13	278.13	0.00	278.13	-278.13	-255.91
11		3500.00	3500.00	3526.25	3250.00	9.00%	26.25			250.00	26.25	276.25	0.00	276.25	-276.25	-252.08
12		3250.00	3250.00	3274.38	3000.00	9.00%	24.38			250.00	24.38	274.38	0.00	274.38	-274.38	-248.29
13		3000.00	3000.00	3022.50	2750.00	9.00%	22.50			250.00	22.50	272.50	0.00	272.50	-272.50	-244.55
14		2750.00	2750.00	2770.63	2500.00	9.00%	20.63			250.00	20.63	270.63	0.00	270.63	-270.63	-240.86
15		2500.00	2500.00	2518.75	2250.00	9.00%	18.75			250.00	18.75	268.75	0.00	268.75	-268.75	-237.20
16		2250.00	2250.00	2266.88	2000.00	9.00%	16.88			250.00	16.88	266.88	0.00	266.88	-266.88	-233.60
17		2000.00	2000.00	2015.00	1750.00	9.00%	15.00			250.00	15.00	265.00	0.00	265.00	-265.00	-230.03
18		1750.00	1750.00	1763.13	1500.00	9.00%	13.13			250.00	13.13	263.13	0.00	263.13	-263.13	-226.51
19		1500.00	1500.00	1511.25	1250.00	9.00%	11.25			250.00	11.25	261.25	0.00	261.25	-261.25	-223.03
20		1250.00	1250.00	1259.38	1000.00	9.00%	9.38			250.00	9.38	259.38	0.00	259.38	-259.38	-219.60
21		1000.00	1000.00	1007.50	750.00	9.00%	7.50			250.00	7.50	257.50	0.00	257.50	-257.50	-216.20
22		750.00	750.00	755.63	500.00	9.00%	5.63			250.00	5.63	255.63	0.00	255.63	-255.63	-212.85
23		500.00	500.00	503.75	250.00	9.00%	3.75			250.00	3.75	253.75	0.00	253.75	-253.75	-209.53
24		250.00	250.00	251.88	0.00	9.00%	1.88			250.00	1.88	251.88	0.00	251.88	-251.88	-206.26

EXAMPLE 21

Click on the button *Reset* and then enter the information highlighted in red.

The duration of the credit in this example depends on the amount of the repayments and will be determined internally by the simulator. However, if you plan to enter or change manually the values in the amortisation table before calculating the APR, you should enter as *Duration of the credit agreement* a high number of periods (e.g. 30), so that the table will not be extended by the simulator without considering your changes.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus a % of outstanding balance (only capital) % of 20.00 with 20 as a minimum amount

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 30 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

As shown in the amortisation table and the main results, the duration of the credit resulting from the repayments is 16 months.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	16	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	16.8%	DYNAMIC	Recalculate
Total cost of the credit	60.97		
Total amount of credit	1000.00		
Total amount payable	1060.97		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.33
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.68
13		65.90	65.90	66.39	45.90	9.00%	0.49			20.00	0.49	20.49	0.00	20.49	-20.49	-17.32
14		45.90	45.90	46.24	25.90	9.00%	0.34			20.00	0.34	20.34	0.00	20.34	-20.34	-16.97
15		25.90	25.90	26.09	5.90	9.00%	0.19			20.00	0.19	20.19	0.00	20.19	-20.19	-16.63
16		5.90	5.90	5.94	0.00	9.00%	0.04			5.90	0.04	5.94	0.00	5.94	-5.94	-4.83

The simulator also update the duration previously entered to this final number of periods.

D) Duration of the credit agreement

Duration Fixed of 16 periods

EXAMPLE 22

Click on the button *Reset* and then enter the information highlighted in red.

The duration of the credit in this example depends on the amount of the repayments and will be determined internally by the simulator. However, if you plan to enter or change manually the values in the amortisation table before calculating the APR, you should enter as *Duration of the credit agreement* a high number of periods (e.g. 30), so that the table will not be extended by the simulator without considering your changes.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount % of outstanding balance (capital + interest) % of 20.00 with 20 as a minimum amount

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 30 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

As shown in the amortisation table and the main results, the duration of the credit resulting from the repayments is 16 months.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	16	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	16.6%	DYNAMIC	Recalculate
Total cost of the credit	62.10		
Total amount of credit	1000.00		
Total amount payable	1062.10		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	806.00	9.00%	7.50			194.00	7.50	201.50	0.00	201.50	-201.50	-198.94
2		806.00	806.00	812.05	649.64	9.00%	6.05			156.36	6.05	162.41	0.00	162.41	-162.41	-158.31
3		649.64	649.64	654.51	523.61	9.00%	4.87			126.03	4.87	130.90	0.00	130.90	-130.90	-125.98
4		523.61	523.61	527.53	422.03	9.00%	3.93			101.58	3.93	105.51	0.00	105.51	-105.51	-100.26
5		422.03	422.03	425.19	340.15	9.00%	3.17			81.87	3.17	85.04	0.00	85.04	-85.04	-79.78
6		340.15	340.15	342.70	274.16	9.00%	2.55			65.99	2.55	68.54	0.00	68.54	-68.54	-63.48
7		274.16	274.16	276.22	220.98	9.00%	2.06			53.19	2.06	55.24	0.00	55.24	-55.24	-50.52
8		220.98	220.98	222.63	178.11	9.00%	1.66			42.87	1.66	44.53	0.00	44.53	-44.53	-40.21
9		178.11	178.11	179.44	143.55	9.00%	1.34			34.55	1.34	35.89	0.00	35.89	-35.89	-31.99
10		143.55	143.55	144.63	115.70	9.00%	1.08			27.85	1.08	28.93	0.00	28.93	-28.93	-25.46
11		115.70	115.70	116.57	93.26	9.00%	0.87			22.45	0.87	23.31	0.00	23.31	-23.31	-20.26
12		93.26	93.26	93.96	73.96	9.00%	0.70			19.30	0.70	20.00	0.00	20.00	-20.00	-17.16
13		73.96	73.96	74.51	54.51	9.00%	0.55			19.45	0.55	20.00	0.00	20.00	-20.00	-16.94
14		54.51	54.51	54.92	34.92	9.00%	0.41			19.59	0.41	20.00	0.00	20.00	-20.00	-16.73
15		34.92	34.92	35.18	15.18	9.00%	0.26			19.74	0.26	20.00	0.00	20.00	-20.00	-16.51
16		15.18	15.18	15.30	0.00	9.00%	0.11			15.18	0.11	15.30	0.00	15.30	-15.30	-12.47

The simulator also update the duration previously entered to this final number of periods.

D) Duration of the credit agreement

Duration Fixed of 16 periods

EXAMPLE 23

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 4 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 18.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	15	No*	Each time a repayment takes place
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	259.44	DYNAMIC	Recalculate
Duration of the credit	4	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	57.1%	DYNAMIC	Recalculate
Total cost of the credit	97.76		
Total amount of credit	1000.00		
Total amount payable	1097.76		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			0.00					0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1015.00	755.56	18.00%	15.00	15.00		244.44	15.00	259.44	15.00	274.44	-274.44	-264.30
2		755.56	755.56	766.89	507.44	18.00%	11.33	15.00		248.11	11.33	259.44	15.00	274.44	-274.44	-254.53
3		507.44	507.44	515.06	255.61	18.00%	7.61	15.00		251.83	7.61	259.44	15.00	274.44	-274.44	-245.12
4		255.61	255.61	259.44	0.00	18.00%	3.83	15.00		255.61	3.83	259.44	15.00	274.44	-274.44	-236.06

EXAMPLE 24

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Do not specify the *Amount* of the repayments, as they will be entered manually in the amortisation table.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments yearly

NOTE: It determines the periods in the table are given as: YEARS

Amount Equal instalments (to be calculated)

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 2 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the preliminary results and amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	568.47	Recalculate
Duration of the credit	2 YEARS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.0% DYNAMIC	Recalculate
Total cost of the credit	136.94	
Total amount of credit	1000.00	
Total amount payable	1136.94	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1090.00	521.53	9.00%	90.00			478.47	90.00	568.47	0.00	568.47	-568.47	-521.53
2		521.53	521.53	568.47	0.00	9.00%	46.94			521.53	46.94	568.47	0.00	568.47	-568.47	-478.47

In the amortisation table, delete the cells highlighted in red. Be aware of not deleting the cells under variables titled in red font (*Period, Costs not financed, Total*, and the two columns of *Cash flows*), as these cells cannot be changed under any circumstance.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	568.47	Recalculate
Duration of the credit	2 YEARS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.0% DYNAMIC	Recalculate
Total cost of the credit	136.94	
Total amount of credit	1000.00	
Total amount payable	1136.94	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1090.00	521.53	9.00%	90.00			478.47	90.00	568.47	0.00	568.47	-568.47	-521.53
2		521.53	521.53	568.47	0.00	9.00%	46.94			521.53	46.94	568.47	0.00	568.47	-568.47	-478.47

Now enter the two repayments of €500 and €700 in the rows corresponding to periods 1 and 2 of the amortisation table.

Note that due to these changes, the area of *Main results* reports the error that *the APR is not valid because the present value of the cash flows is not zero*.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	2 YEARS	
Present value of the cash flows	-47.89	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	9.0% DYNAMIC	Recalculate
Total cost of the credit	200.00	
Total amount of credit	1000.00	
Total amount payable	1200.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00												0.00	0.00	1000.00	1000.00
1												500.00	0.00	500.00	-500.00	-458.71
2												700.00	0.00	700.00	-700.00	-589.17

To obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 12.3% is obtained and the error message disappears.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	2 YEARS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	12.3% DYNAMIC	Recalculate
Total cost of the credit	200.00	
Total amount of credit	1000.00	
Total amount payable	1200.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00												0.00	0.00	1000.00	1000.00
1												500.00	0.00	500.00	-500.00	-445.15
2												700.00	0.00	700.00	-700.00	-554.85

EXAMPLE 25

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.5%	DYNAMIC	Recalculate
Total cost of the credit	622.56		
Total amount of credit	6000.00		
Total amount payable	6622.56		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5750.00	9.00%	45.00			250.00	45.00	295.00	0.00	295.00	-295.00	-292.55
2		5750.00	5750.00	5793.13	5500.00	9.00%	43.13			250.00	43.13	293.13	0.00	293.13	-293.13	-288.29
3		5500.00	5500.00	5541.25	5250.00	9.00%	41.25			250.00	41.25	291.25	0.00	291.25	-291.25	-284.07
4		5250.00	5250.00	5289.38	5000.00	9.00%	39.38			250.00	39.38	289.38	0.00	289.38	-289.38	-279.90
5		5000.00	5000.00	5037.50	4750.00	9.00%	37.50			250.00	37.50	287.50	0.00	287.50	-287.50	-275.78
6		4750.00	4750.00	4785.63	4500.00	9.00%	35.63			250.00	35.63	285.63	0.00	285.63	-285.63	-271.71
7		4500.00	4500.00	4533.75	4250.00	9.00%	33.75			250.00	33.75	283.75	0.00	283.75	-283.75	-267.69
8		4250.00	4250.00	4281.88	4000.00	9.00%	31.88			250.00	31.88	281.88	0.00	281.88	-281.88	-263.72
9		4000.00	4000.00	4030.00	3750.00	9.00%	30.00			250.00	30.00	280.00	0.00	280.00	-280.00	-259.79
10		3750.00	3750.00	3778.13	3500.00	9.00%	28.13			250.00	28.13	278.13	0.00	278.13	-278.13	-255.91
11		3500.00	3500.00	3526.25	3250.00	9.00%	26.25			250.00	26.25	276.25	0.00	276.25	-276.25	-252.08
12		3250.00	3250.00	3274.38	3000.00	9.00%	24.38			250.00	24.38	274.38	0.00	274.38	-274.38	-248.29
13		3000.00	3000.00	3022.50	2750.00	9.00%	22.50			250.00	22.50	272.50	0.00	272.50	-272.50	-244.55
14		2750.00	2750.00	2770.63	2500.00	9.00%	20.63			250.00	20.63	270.63	0.00	270.63	-270.63	-240.86
15		2500.00	2500.00	2518.75	2250.00	9.00%	18.75			250.00	18.75	268.75	0.00	268.75	-268.75	-237.20
16		2250.00	2250.00	2266.88	2000.00	9.00%	16.88			250.00	16.88	266.88	0.00	266.88	-266.88	-233.60
17		2000.00	2000.00	2015.00	1750.00	9.00%	15.00			250.00	15.00	265.00	0.00	265.00	-265.00	-230.03
18		1750.00	1750.00	1763.13	1500.00	9.00%	13.13			250.00	13.13	263.13	0.00	263.13	-263.13	-226.51
19		1500.00	1500.00	1511.25	1250.00	9.00%	11.25			250.00	11.25	261.25	0.00	261.25	-261.25	-223.03
20		1250.00	1250.00	1259.38	1000.00	9.00%	9.38			250.00	9.38	259.38	0.00	259.38	-259.38	-219.60
21		1000.00	1000.00	1007.50	750.00	9.00%	7.50			250.00	7.50	257.50	0.00	257.50	-257.50	-216.20
22		750.00	750.00	755.63	500.00	9.00%	5.63			250.00	5.63	255.63	0.00	255.63	-255.63	-212.85
23		500.00	500.00	503.75	250.00	9.00%	3.75			250.00	3.75	253.75	0.00	253.75	-253.75	-209.53
24		250.00	250.00	251.88	0.00	9.00%	1.88			250.00	1.88	251.88	0.00	251.88	-251.88	-206.26

EXAMPLE 26

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus a % of outstanding balance (only capital) % of 20.00 with 20 as a minimum amount

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the preliminary results and amortisation table.

As shown, the simulator has extended the number of periods of repayment to 16 because the scheme of repayments entered before does not provide full repayment of the credit in 12 months (see example 21).

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	16	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	16.8%	DYNAMIC	Recalculate
Total cost of the credit	60.97		
Total amount of credit	1000.00		
Total amount payable	1060.97		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.33
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.68
13		65.90	65.90	66.39	45.90	9.00%	0.49			20.00	0.49	20.49	0.00	20.49	-20.49	-17.32
14		45.90	45.90	46.24	25.90	9.00%	0.34			20.00	0.34	20.34	0.00	20.34	-20.34	-16.97
15		25.90	25.90	26.09	5.90	9.00%	0.19			20.00	0.19	20.19	0.00	20.19	-20.19	-16.63
16		5.90	5.90	5.94	0.00	9.00%	0.04			5.90	0.04	5.94	0.00	5.94	-5.94	-4.83

To limit the number of periods to 12, delete the cells highlighted in red, corresponding to periods 13 to 16 and the *Duration of the credit* shown in the area of *Main results*.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	DYNAMIC
Duration of the credit	16	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	16.8%	DYNAMIC
Total cost of the credit	60.97	
Total amount of credit	1000.00	
Total amount payable	1060.97	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.33
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.68
13		65.90	65.90	66.39	45.90	9.00%	0.49			20.00	0.49	20.49	0.00	20.49	-20.49	-17.32
14		45.90	45.90	46.24	25.90	9.00%	0.34			20.00	0.34	20.34	0.00	20.34	-20.34	-16.97
15		25.90	25.90	26.09	5.90	9.00%	0.19			20.00	0.19	20.19	0.00	20.19	-20.19	-16.63
16		5.90	5.90	5.94	0.00	9.00%	0.04			5.90	0.04	5.94	0.00	5.94	-5.94	-4.83

To provide full repayment of the credit in period 12, for this period substitute the last payment in the column with the *Total* of *Repayment of the credit* by the reference to the cell where the amount of €86.54 of *Balance Outstanding (capital plus interest)* appears. That is, enter the formula =$E$120 in the former cell. As a result, the *Final Balance* becomes 0, meaning that the credit repaid in full.

Note that due to these changes, the area of *Main results* reports the error that *the APR is not valid because the present value of the cash flows is not zero*.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	[redacted]		Recalculate
Duration of the credit		MONTHS	
Present value of the cash flows	-0.68	Caution: The APR is not valid because the present value of the cash flows is not zero.	
Annual Percentage Rate of Charge	16.8%	DYNAMIC	Recalculate
Total cost of the credit	59.91		
Total amount of credit	1000.00		
Total amount payable	1059.91		

Amortisation table

Period	Drawdowns	Balance: Initial	Balance: Outstanding (only capital)	Balance: Outstanding (capital plus interest)	Balance: Final	Interest on capital: Borrowing rate (%)	Interest on capital: Interest charges	Other costs: Not financed	Other costs: Financed	Payments: Repayment of the credit: Capital amortisation	Payments: Repayment of the credit: Interest	Payments: Repayment of the credit: Total	Payments: Costs not financed	Payments: Total	Cash flows: Value at each period	Cash flows: Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.8[illegible]	[illegible]	0.00	22.28	-22.28	-19.33
12		85.90	85.90	86.54	0.00	9.00%	0.64			85.90	0.6[illegible]	=$E$120	0.00	86.54	-86.54	-74.11

To obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 17.0% is obtained and the error message disappears.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	[redacted]	DYNAMIC	Recalculate
Duration of the credit		MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	17.0%	DYNAMIC	Recalculate
Total cost of the credit	59.91		
Total amount of credit	1000.00		
Total amount payable	1059.91		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.81
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.72
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.69
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.83
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.61
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.86
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.63
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.20
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.95
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.44
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.30
12		85.90	85.90	86.54	0.00	9.00%	0.64			85.90	0.64	86.54	0.00	86.54	-86.54	-73.98

EXAMPLE 27

Case 1

Click on the button *Reset* and then enter the information highlighted in red.

Note that after checking the box *The length of the first period of repayment is different*, an auxiliary period calculator appears.

The auxiliary calculator is not necessary in this example, as it is assumed that the length of the first interval is exactly 0 regular periods and 14 days in a year with 365 days (i.e. a non-leap year). Therefore, enter this information directly in the upper row.

Complete the information with the costs of the credit.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)
Advance payment* % of the credit limit
Final Payment* % of the credit limit

☑ The length of the first period of repayment is different It is given as 0 complete periods and 14 days (in a year with 365 days)
to Calculate = complete periods and days in a year with

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	273.01	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	10.5%	DYNAMIC	Recalculate
Total cost of the credit	612.24		
Total amount of credit	6000.00		
Total amount payable	6612.24		

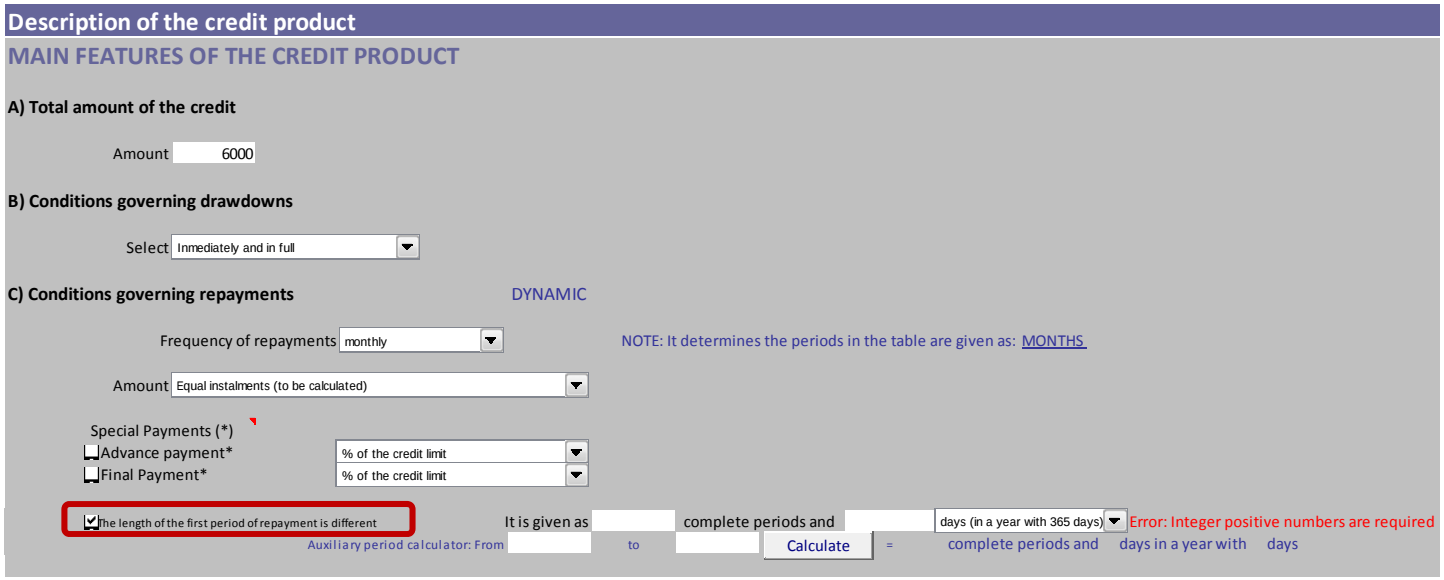
Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6020.71	5747.71	9.00%	20.71			252.29	20.71	273.01	0.00	273.01	-273.01	-271.96
2		5747.71	5747.71	5790.81	5517.81	9.00%	43.11			229.90	43.11	273.01	0.00	273.01	-273.01	-269.70
3		5517.81	5517.81	5559.19	5286.18	9.00%	41.38			231.62	41.38	273.01	0.00	273.01	-273.01	-267.46
4		5286.18	5286.18	5325.83	5052.82	9.00%	39.65			233.36	39.65	273.01	0.00	273.01	-273.01	-265.24
5		5052.82	5052.82	5090.72	4817.71	9.00%	37.90			235.11	37.90	273.01	0.00	273.01	-273.01	-263.04
6		4817.71	4817.71	4853.84	4580.84	9.00%	36.13			236.87	36.13	273.01	0.00	273.01	-273.01	-260.85
7		4580.84	4580.84	4615.19	4342.19	9.00%	34.36			238.65	34.36	273.01	0.00	273.01	-273.01	-258.69
8		4342.19	4342.19	4374.75	4101.74	9.00%	32.57			240.44	32.57	273.01	0.00	273.01	-273.01	-256.54
9		4101.74	4101.74	4132.51	3859.50	9.00%	30.76			242.24	30.76	273.01	0.00	273.01	-273.01	-254.41
10		3859.50	3859.50	3888.45	3615.44	9.00%	28.95			244.06	28.95	273.01	0.00	273.01	-273.01	-252.29
11		3615.44	3615.44	3642.56	3369.55	9.00%	27.12			245.89	27.12	273.01	0.00	273.01	-273.01	-250.20
12		3369.55	3369.55	3394.82	3121.81	9.00%	25.27			247.74	25.27	273.01	0.00	273.01	-273.01	-248.12
13		3121.81	3121.81	3145.23	2872.22	9.00%	23.41			249.59	23.41	273.01	0.00	273.01	-273.01	-246.06
14		2872.22	2872.22	2893.76	2620.75	9.00%	21.54			251.47	21.54	273.01	0.00	273.01	-273.01	-244.02
15		2620.75	2620.75	2640.41	2367.40	9.00%	19.66			253.35	19.66	273.01	0.00	273.01	-273.01	-241.99
16		2367.40	2367.40	2385.16	2112.15	9.00%	17.76			255.25	17.76	273.01	0.00	273.01	-273.01	-239.98
17		2112.15	2112.15	2127.99	1854.98	9.00%	15.84			257.17	15.84	273.01	0.00	273.01	-273.01	-237.99
18		1854.98	1854.98	1868.90	1595.89	9.00%	13.91			259.09	13.91	273.01	0.00	273.01	-273.01	-236.01
19		1595.89	1595.89	1607.86	1334.85	9.00%	11.97			261.04	11.97	273.01	0.00	273.01	-273.01	-234.05
20		1334.85	1334.85	1344.86	1071.86	9.00%	10.01			263.00	10.01	273.01	0.00	273.01	-273.01	-232.10
21		1071.86	1071.86	1079.90	806.89	9.00%	8.04			264.97	8.04	273.01	0.00	273.01	-273.01	-230.18
22		806.89	806.89	812.94	539.93	9.00%	6.05			266.96	6.05	273.01	0.00	273.01	-273.01	-228.26
23		539.93	539.93	543.98	270.97	9.00%	4.05			268.96	4.05	273.01	0.00	273.01	-273.01	-226.37
24		270.97	270.97	273.01	0.00	9.00%	2.03			270.97	2.03	273.01	0.00	273.01	-273.01	-224.49

Case 2

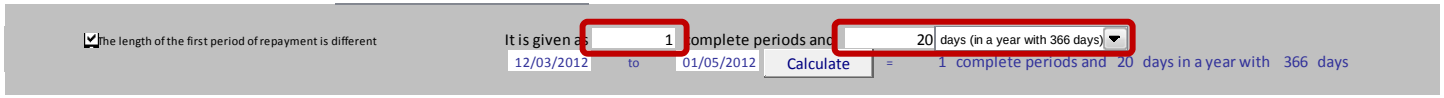
Click on the button *Reset* and then enter the information highlighted in red.

Note that after checking the box *The length of the first period of repayment is different*, an auxiliary period calculator appears.



In the auxiliary calculator enter the initial and final dates of the first period of repayment and click on the button *Calculate* to obtain the number of regular periods and days corresponding to this period and the number of days of the year.

Then enter the information obtained in the previous row.



Complete the information with the costs of the credit.

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	275.45	Recalculate
Duration of the credit	24 MONTHS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	10.4% DYNAMIC	Recalculate
Total cost of the credit	670.80	
Total amount of credit	6000.00	
Total amount payable	6670.80	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6074.51	5799.06	9.00%	74.51			200.94	74.51	275.45	0.00	275.45	-275.45	-271.71
2		5799.06	5799.06	5842.55	5567.11	9.00%	43.49			231.95	43.49	275.45	0.00	275.45	-275.45	-269.48
3		5567.11	5567.11	5608.86	5333.41	9.00%	41.75			233.69	41.75	275.45	0.00	275.45	-275.45	-267.26
4		5333.41	5333.41	5373.42	5097.97	9.00%	40.00			235.45	40.00	275.45	0.00	275.45	-275.45	-265.06
5		5097.97	5097.97	5136.20	4860.76	9.00%	38.23			237.21	38.23	275.45	0.00	275.45	-275.45	-262.88
6		4860.76	4860.76	4897.21	4621.77	9.00%	36.46			238.99	36.46	275.45	0.00	275.45	-275.45	-260.72
7		4621.77	4621.77	4656.43	4380.98	9.00%	34.66			240.78	34.66	275.45	0.00	275.45	-275.45	-258.58
8		4380.98	4380.98	4413.84	4138.39	9.00%	32.86			242.59	32.86	275.45	0.00	275.45	-275.45	-256.45
9		4138.39	4138.39	4169.43	3893.99	9.00%	31.04			244.41	31.04	275.45	0.00	275.45	-275.45	-254.34
10		3893.99	3893.99	3923.19	3647.74	9.00%	29.20			246.24	29.20	275.45	0.00	275.45	-275.45	-252.25
11		3647.74	3647.74	3675.10	3399.66	9.00%	27.36			248.09	27.36	275.45	0.00	275.45	-275.45	-250.18
12		3399.66	3399.66	3425.15	3149.71	9.00%	25.50			249.95	25.50	275.45	0.00	275.45	-275.45	-248.12
13		3149.71	3149.71	3173.33	2897.88	9.00%	23.62			251.82	23.62	275.45	0.00	275.45	-275.45	-246.08
14		2897.88	2897.88	2919.62	2644.17	9.00%	21.73			253.71	21.73	275.45	0.00	275.45	-275.45	-244.05
15		2644.17	2644.17	2664.00	2388.56	9.00%	19.83			255.62	19.83	275.45	0.00	275.45	-275.45	-242.05
16		2388.56	2388.56	2406.47	2131.02	9.00%	17.91			257.53	17.91	275.45	0.00	275.45	-275.45	-240.06
17		2131.02	2131.02	2147.01	1871.56	9.00%	15.98			259.46	15.98	275.45	0.00	275.45	-275.45	-238.08
18		1871.56	1871.56	1885.60	1610.15	9.00%	14.04			261.41	14.04	275.45	0.00	275.45	-275.45	-236.13
19		1610.15	1610.15	1622.23	1346.78	9.00%	12.08			263.37	12.08	275.45	0.00	275.45	-275.45	-234.18
20		1346.78	1346.78	1356.88	1081.43	9.00%	10.10			265.35	10.10	275.45	0.00	275.45	-275.45	-232.26
21		1081.43	1081.43	1089.54	814.10	9.00%	8.11			267.34	8.11	275.45	0.00	275.45	-275.45	-230.35
22		814.10	814.10	820.20	544.76	9.00%	6.11			269.34	6.11	275.45	0.00	275.45	-275.45	-228.45
23		544.76	544.76	548.84	273.40	9.00%	4.09			271.36	4.09	275.45	0.00	275.45	-275.45	-226.58
24		273.40	273.40	275.45	0.00	9.00%	2.05			273.40	2.05	275.45	0.00	275.45	-275.45	-224.71

EXAMPLE 28

Click on the button *Reset* and then enter the information highlighted in red.

Note that the explanations in Obs(*) under the *Date of charge* of other costs indicate that 'costs paid in advance are payable at the beginning of the interval assuming that the first payment coincides with the first repayment of the credit'. This is coherent with the treatment of the regular costs in this example by virtue of assumption (g)(iii); therefore, payment *in advance* is the option to choose for these costs.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

☐ Advance payment* % of the credit limit

☐ Final Payment* % of the credit limit

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge		
☑	Cost 1	fixed amount	60	No*	At conclusion		
☑	Cost 2	fixed amount	25	No*	Other frequency (num. of periods) *	6	in advance*
☐	Cost 3	% of the drawdowns in each period		No*			
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*			
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*			
☐	Cost 6	% of the credit not used at the begining of each period		No*			
☐	Cost 7	% of the final balance in each period					

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	12.3%	DYNAMIC	Recalculate
Total cost of the credit	722.56		
Total amount of credit	6000.00		
Total amount payable	6722.56		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6045.00	5750.00	9.00%	45.00	25.00		250.00	45.00	295.00	25.00	320.00	-320.00	-316.93
2		5750.00	5750.00	5793.13	5500.00	9.00%	43.13			250.00	43.13	293.13	0.00	293.13	-293.13	-287.53
3		5500.00	5500.00	5541.25	5250.00	9.00%	41.25			250.00	41.25	291.25	0.00	291.25	-291.25	-282.95
4		5250.00	5250.00	5289.38	5000.00	9.00%	39.38			250.00	39.38	289.38	0.00	289.38	-289.38	-278.43
5		5000.00	5000.00	5037.50	4750.00	9.00%	37.50			250.00	37.50	287.50	0.00	287.50	-287.50	-273.97
6		4750.00	4750.00	4785.63	4500.00	9.00%	35.63			250.00	35.63	285.63	0.00	285.63	-285.63	-269.58
7		4500.00	4500.00	4533.75	4250.00	9.00%	33.75	25.00		250.00	33.75	283.75	25.00	308.75	-308.75	-288.60
8		4250.00	4250.00	4281.88	4000.00	9.00%	31.88			250.00	31.88	281.88	0.00	281.88	-281.88	-260.96
9		4000.00	4000.00	4030.00	3750.00	9.00%	30.00			250.00	30.00	280.00	0.00	280.00	-280.00	-256.73
10		3750.00	3750.00	3778.13	3500.00	9.00%	28.13			250.00	28.13	278.13	0.00	278.13	-278.13	-252.57
11		3500.00	3500.00	3526.25	3250.00	9.00%	26.25			250.00	26.25	276.25	0.00	276.25	-276.25	-248.46
12		3250.00	3250.00	3274.38	3000.00	9.00%	24.38			250.00	24.38	274.38	0.00	274.38	-274.38	-244.41
13		3000.00	3000.00	3022.50	2750.00	9.00%	22.50	25.00		250.00	22.50	272.50	25.00	297.50	-297.50	-262.46
14		2750.00	2750.00	2770.63	2500.00	9.00%	20.63			250.00	20.63	270.63	0.00	270.63	-270.63	-236.46
15		2500.00	2500.00	2518.75	2250.00	9.00%	18.75			250.00	18.75	268.75	0.00	268.75	-268.75	-232.57
16		2250.00	2250.00	2266.88	2000.00	9.00%	16.88			250.00	16.88	266.88	0.00	266.88	-266.88	-228.74
17		2000.00	2000.00	2015.00	1750.00	9.00%	15.00			250.00	15.00	265.00	0.00	265.00	-265.00	-224.95
18		1750.00	1750.00	1763.13	1500.00	9.00%	13.13			250.00	13.13	263.13	0.00	263.13	-263.13	-221.22
19		1500.00	1500.00	1511.25	1250.00	9.00%	11.25	25.00		250.00	11.25	261.25	25.00	286.25	-286.25	-238.34
20		1250.00	1250.00	1259.38	1000.00	9.00%	9.38			250.00	9.38	259.38	0.00	259.38	-259.38	-213.90
21		1000.00	1000.00	1007.50	750.00	9.00%	7.50			250.00	7.50	257.50	0.00	257.50	-257.50	-210.31
22		750.00	750.00	755.63	500.00	9.00%	5.63			250.00	5.63	255.63	0.00	255.63	-255.63	-206.78
23		500.00	500.00	503.75	250.00	9.00%	3.75			250.00	3.75	253.75	0.00	253.75	-253.75	-203.29
24		250.00	250.00	251.88	0.00	9.00%	1.88			250.00	1.88	251.88	0.00	251.88	-251.88	-199.86

EXAMPLE 29

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Note that the level of the borrowing rate is specified as *Other* (instead of *Fixed for the entire duration of the credit*). The note in blue font appearing at the right indicates that the rates should be specified in the amortisation table after pressing the button *Generate*.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

☐ Advance payment* % of the credit limit

☐ Final Payment* % of the credit limit

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Other

NOTE: Fill in the amortisation table after pressing the button Generate below.

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Following these instructions, click on the button *Generate* to obtain this incomplete amortisation table.

Main results

Final balance in the last period	6000.00	Caution: The credit is not repaid in full because the final balance in the last period is not zero.
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit		MONTHS
Present value of the cash flows	5940.00	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	[redacted]	DYNAMIC Recalculate
Total cost of the credit	-5940.00	
Total amount of credit	6000.00	
Total amount payable	60.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
2		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
3		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
4		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
5		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
6		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
7		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
8		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
9		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
10		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
11		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
12		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
13		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
14		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
15		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
16		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
17		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
18		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
19		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
20		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
21		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
22		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
23		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
24		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00

Then fill the row of the *Borrowing rate* with values of 5% for periods 1 to 12 and 9% for periods 13 to 24, as shown.

Main results

Final balance in the last period	6898.61	Caution: The credit is not repaid in full because the final balance in the last period is not zero.
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	[redacted] MONTHS	
Present value of the cash flows	5940.00	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	[redacted] DYNAMIC	Recalculate
Total cost of the credit	-5940.00	
Total amount of credit	6000.00	
Total amount payable	60.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6025.00	6025.00	5.00%	25.00			-25.00	25.00		0.00	0.00	0.00	0.00
2		6025.00	6025.00	6050.10	6050.10	5.00%	25.10			-25.10	25.10		0.00	0.00	0.00	0.00
3		6050.10	6050.10	6075.31	6075.31	5.00%	25.21			-25.21	25.21		0.00	0.00	0.00	0.00
4		6075.31	6075.31	6100.63	6100.63	5.00%	25.31			-25.31	25.31		0.00	0.00	0.00	0.00
5		6100.63	6100.63	6126.05	6126.05	5.00%	25.42			-25.42	25.42		0.00	0.00	0.00	0.00
6		6126.05	6126.05	6151.57	6151.57	5.00%	25.53			-25.53	25.53		0.00	0.00	0.00	0.00
7		6151.57	6151.57	6177.20	6177.20	5.00%	25.63			-25.63	25.63		0.00	0.00	0.00	0.00
8		6177.20	6177.20	6202.94	6202.94	5.00%	25.74			-25.74	25.74		0.00	0.00	0.00	0.00
9		6202.94	6202.94	6228.79	6228.79	5.00%	25.85			-25.85	25.85		0.00	0.00	0.00	0.00
10		6228.79	6228.79	6254.74	6254.74	5.00%	25.95			-25.95	25.95		0.00	0.00	0.00	0.00
11		6254.74	6254.74	6280.80	6280.80	5.00%	26.06			-26.06	26.06		0.00	0.00	0.00	0.00
12		6280.80	6280.80	6306.97	6306.97	5.00%	26.17			-26.17	26.17		0.00	0.00	0.00	0.00
13		6306.97	6306.97	6354.27	6354.27	9.00%	47.30			-47.30	47.30		0.00	0.00	0.00	0.00
14		6354.27	6354.27	6401.93	6401.93	9.00%	47.66			-47.66	47.66		0.00	0.00	0.00	0.00
15		6401.93	6401.93	6449.95	6449.95	9.00%	48.01			-48.01	48.01		0.00	0.00	0.00	0.00
16		6449.95	6449.95	6498.32	6498.32	9.00%	48.37			-48.37	48.37		0.00	0.00	0.00	0.00
17		6498.32	6498.32	6547.06	6547.06	9.00%	48.74			-48.74	48.74		0.00	0.00	0.00	0.00
18		6547.06	6547.06	6596.16	6596.16	9.00%	49.10			-49.10	49.10		0.00	0.00	0.00	0.00
19		6596.16	6596.16	6645.63	6645.63	9.00%	49.47			-49.47	49.47		0.00	0.00	0.00	0.00
20		6645.63	6645.63	6695.47	6695.47	9.00%	49.84			-49.84	49.84		0.00	0.00	0.00	0.00
21		6695.47	6695.47	6745.69	6745.69	9.00%	50.22			-50.22	50.22		0.00	0.00	0.00	0.00
22		6745.69	6745.69	6796.28	6796.28	9.00%	50.59			-50.59	50.59		0.00	0.00	0.00	0.00
23		6796.28	6796.28	6847.25	6847.25	9.00%	50.97			-50.97	50.97		0.00	0.00	0.00	0.00
24		6847.25	6847.25	6898.61	6898.61	9.00%	51.35			-51.35	51.35		0.00	0.00	0.00	0.00

Finally, click on the button *Calculate* to obtain the instalments which provide full repayment of the credit and the APR of the credit.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	263.23	
Duration of the credit	24	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	7.2%	DYNAMIC
Total cost of the credit	445.56	
Total amount of credit	6000.00	
Total amount payable	6445.56	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6025.00	5761.77	5.00%	25.00			238.23	25.00	263.23	0.00	263.23	-263.23	-261.70
2		5761.77	5761.77	5785.78	5522.55	5.00%	24.01			239.22	24.01	263.23	0.00	263.23	-263.23	-260.18
3		5522.55	5522.55	5545.56	5282.33	5.00%	23.01			240.22	23.01	263.23	0.00	263.23	-263.23	-258.67
4		5282.33	5282.33	5304.34	5041.11	5.00%	22.01			241.22	22.01	263.23	0.00	263.23	-263.23	-257.17
5		5041.11	5041.11	5062.12	4798.89	5.00%	21.00			242.22	21.00	263.23	0.00	263.23	-263.23	-255.68
6		4798.89	4798.89	4818.89	4555.66	5.00%	20.00			243.23	20.00	263.23	0.00	263.23	-263.23	-254.19
7		4555.66	4555.66	4574.64	4311.41	5.00%	18.98			244.25	18.98	263.23	0.00	263.23	-263.23	-252.72
8		4311.41	4311.41	4329.38	4066.15	5.00%	17.96			245.26	17.96	263.23	0.00	263.23	-263.23	-251.25
9		4066.15	4066.15	4083.09	3819.86	5.00%	16.94			246.29	16.94	263.23	0.00	263.23	-263.23	-249.79
10		3819.86	3819.86	3835.78	3572.55	5.00%	15.92			247.31	15.92	263.23	0.00	263.23	-263.23	-248.34
11		3572.55	3572.55	3587.43	3324.21	5.00%	14.89			248.34	14.89	263.23	0.00	263.23	-263.23	-246.90
12		3324.21	3324.21	3338.06	3074.83	5.00%	13.85			249.38	13.85	263.23	0.00	263.23	-263.23	-245.47
13		3074.83	3074.83	3097.89	2828.99	9.00%	23.06			245.84	23.06	268.90	0.00	268.90	-268.90	-249.30
14		2828.99	2828.99	2850.21	2581.31	9.00%	21.22			247.68	21.22	268.90	0.00	268.90	-268.90	-247.85
15		2581.31	2581.31	2600.67	2331.77	9.00%	19.36			249.54	19.36	268.90	0.00	268.90	-268.90	-246.41
16		2331.77	2331.77	2349.26	2080.36	9.00%	17.49			251.41	17.49	268.90	0.00	268.90	-268.90	-244.98
17		2080.36	2080.36	2095.96	1827.07	9.00%	15.60			253.30	15.60	268.90	0.00	268.90	-268.90	-243.56
18		1827.07	1827.07	1840.77	1571.87	9.00%	13.70			255.20	13.70	268.90	0.00	268.90	-268.90	-242.15
19		1571.87	1571.87	1583.66	1314.76	9.00%	11.79			257.11	11.79	268.90	0.00	268.90	-268.90	-240.74
20		1314.76	1314.76	1324.62	1055.72	9.00%	9.86			259.04	9.86	268.90	0.00	268.90	-268.90	-239.35
21		1055.72	1055.72	1063.64	794.74	9.00%	7.92			260.98	7.92	268.90	0.00	268.90	-268.90	-237.96
22		794.74	794.74	800.70	531.81	9.00%	5.96			262.94	5.96	268.90	0.00	268.90	-268.90	-236.57
23		531.81	531.81	535.79	266.90	9.00%	3.99			264.91	3.99	268.90	0.00	268.90	-268.90	-235.20
24		266.90	266.90	268.90	0.00	9.00%	2.00			266.90	2.00	268.90	0.00	268.90	-268.90	-233.84

EXAMPLE 30

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Note that the level of the borrowing rate is specified as *Other* (instead of *Fixed for the entire duration of the credit*). The note in blue font appearing at the right indicates that the rates should be specified in the amortisation table after pressing the button *Generate*.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

☐ Advance payment* % of the credit limit

☐ Final Payment* % of the credit limit

☐ The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Other

NOTE: Fill in the amortisation table after pressing the button Generate below.

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	60	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Following these instructions, click on the button *Generate* to obtain this incomplete amortisation table.

Main results

Final balance in the last period	6000.00	Caution: The credit is not repaid in full because the final balance in the last period is not zero.
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	[redacted] MONTHS	
Present value of the cash flows	5940.00	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	[redacted] DYNAMIC	Recalculate
Total cost of the credit	-5940.00	
Total amount of credit	6000.00	
Total amount payable	60.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
2		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
3		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
4		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
5		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
6		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
7		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
8		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
9		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
10		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
11		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
12		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
13		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
14		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
15		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
16		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
17		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
18		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
19		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
20		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
21		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
22		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
23		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00
24		6000.00	6000.00	6000.00	6000.00		0.00			0.00	0.00		0.00	0.00	0.00	0.00

Then fill the row of the *Borrowing rate* with values of 5% for periods 1 to 12 and 6% for periods 13 to 24, as shown.

Main results

Final balance in the last period	6695.97	Caution: The credit is not repaid in full because the final balance in the last period is not zero.
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	MONTHS	
Present value of the cash flows	5940.00	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	[redacted] DYNAMIC	Recalculate
Total cost of the credit	-5940.00	
Total amount of credit	6000.00	
Total amount payable	60.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6025.00	6025.00	5.00%	25.00			-25.00	25.00		0.00	0.00	0.00	0.00
2		6025.00	6025.00	6050.10	6050.10	5.00%	25.10			-25.10	25.10		0.00	0.00	0.00	0.00
3		6050.10	6050.10	6075.31	6075.31	5.00%	25.21			-25.21	25.21		0.00	0.00	0.00	0.00
4		6075.31	6075.31	6100.63	6100.63	5.00%	25.31			-25.31	25.31		0.00	0.00	0.00	0.00
5		6100.63	6100.63	6126.05	6126.05	5.00%	25.42			-25.42	25.42		0.00	0.00	0.00	0.00
6		6126.05	6126.05	6151.57	6151.57	5.00%	25.53			-25.53	25.53		0.00	0.00	0.00	0.00
7		6151.57	6151.57	6177.20	6177.20	5.00%	25.63			-25.63	25.63		0.00	0.00	0.00	0.00
8		6177.20	6177.20	6202.94	6202.94	5.00%	25.74			-25.74	25.74		0.00	0.00	0.00	0.00
9		6202.94	6202.94	6228.79	6228.79	5.00%	25.85			-25.85	25.85		0.00	0.00	0.00	0.00
10		6228.79	6228.79	6254.74	6254.74	5.00%	25.95			-25.95	25.95		0.00	0.00	0.00	0.00
11		6254.74	6254.74	6280.80	6280.80	5.00%	26.06			-26.06	26.06		0.00	0.00	0.00	0.00
12		6280.80	6280.80	6306.97	6306.97	5.00%	26.17			-26.17	26.17		0.00	0.00	0.00	0.00
13		6306.97	6306.97	6338.51	6338.51	6.00%	31.53			-31.53	31.53		0.00	0.00	0.00	0.00
14		6338.51	6338.51	6370.20	6370.20	6.00%	31.69			-31.69	31.69		0.00	0.00	0.00	0.00
15		6370.20	6370.20	6402.05	6402.05	6.00%	31.85			-31.85	31.85		0.00	0.00	0.00	0.00
16		6402.05	6402.05	6434.06	6434.06	6.00%	32.01			-32.01	32.01		0.00	0.00	0.00	0.00
17		6434.06	6434.06	6466.23	6466.23	6.00%	32.17			-32.17	32.17		0.00	0.00	0.00	0.00
18		6466.23	6466.23	6498.56	6498.56	6.00%	32.33			-32.33	32.33		0.00	0.00	0.00	0.00
19		6498.56	6498.56	6531.05	6531.05	6.00%	32.49			-32.49	32.49		0.00	0.00	0.00	0.00
20		6531.05	6531.05	6563.71	6563.71	6.00%	32.66			-32.66	32.66		0.00	0.00	0.00	0.00
21		6563.71	6563.71	6596.53	6596.53	6.00%	32.82			-32.82	32.82		0.00	0.00	0.00	0.00
22		6596.53	6596.53	6629.51	6629.51	6.00%	32.98			-32.98	32.98		0.00	0.00	0.00	0.00
23		6629.51	6629.51	6662.66	6662.66	6.00%	33.15			-33.15	33.15		0.00	0.00	0.00	0.00
24		6662.66	6662.66	6695.97	6695.97	6.00%	33.31			-33.31	33.31		0.00	0.00	0.00	0.00

Finally, click on the button *Calculate* to obtain the instalments which provide full repayment of the credit and the APR of the credit.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	263.23	
Duration of the credit	24	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	6.4%	DYNAMIC
Total cost of the credit	394.44	
Total amount of credit	6000.00	
Total amount payable	6394.44	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6025.00	5761.77	5.00%	25.00			238.23	25.00	263.23	0.00	263.23	-263.23	-261.87
2		5761.77	5761.77	5785.78	5522.55	5.00%	24.01			239.22	24.01	263.23	0.00	263.23	-263.23	-260.51
3		5522.55	5522.55	5545.56	5282.33	5.00%	23.01			240.22	23.01	263.23	0.00	263.23	-263.23	-259.16
4		5282.33	5282.33	5304.34	5041.11	5.00%	22.01			241.22	22.01	263.23	0.00	263.23	-263.23	-257.82
5		5041.11	5041.11	5062.12	4798.89	5.00%	21.00			242.22	21.00	263.23	0.00	263.23	-263.23	-256.49
6		4798.89	4798.89	4818.89	4555.66	5.00%	20.00			243.23	20.00	263.23	0.00	263.23	-263.23	-255.16
7		4555.66	4555.66	4574.64	4311.41	5.00%	18.98			244.25	18.98	263.23	0.00	263.23	-263.23	-253.84
8		4311.41	4311.41	4329.38	4066.15	5.00%	17.96			245.26	17.96	263.23	0.00	263.23	-263.23	-252.53
9		4066.15	4066.15	4083.09	3819.86	5.00%	16.94			246.29	16.94	263.23	0.00	263.23	-263.23	-251.22
10		3819.86	3819.86	3835.78	3572.55	5.00%	15.92			247.31	15.92	263.23	0.00	263.23	-263.23	-249.92
11		3572.55	3572.55	3587.43	3324.21	5.00%	14.89			248.34	14.89	263.23	0.00	263.23	-263.23	-248.63
12		3324.21	3324.21	3338.06	3074.83	5.00%	13.85			249.38	13.85	263.23	0.00	263.23	-263.23	-247.34
13		3074.83	3074.83	3090.20	2825.56	6.00%	15.37			249.27	15.37	264.64	0.00	264.64	-264.64	-247.38
14		2825.56	2825.56	2839.69	2575.05	6.00%	14.13			250.51	14.13	264.64	0.00	264.64	-264.64	-246.10
15		2575.05	2575.05	2587.93	2323.29	6.00%	12.88			251.76	12.88	264.64	0.00	264.64	-264.64	-244.83
16		2323.29	2323.29	2334.90	2070.26	6.00%	11.62			253.02	11.62	264.64	0.00	264.64	-264.64	-243.56
17		2070.26	2070.26	2080.62	1815.98	6.00%	10.35			254.29	10.35	264.64	0.00	264.64	-264.64	-242.30
18		1815.98	1815.98	1825.06	1560.42	6.00%	9.08			255.56	9.08	264.64	0.00	264.64	-264.64	-241.04
19		1560.42	1560.42	1568.22	1303.58	6.00%	7.80			256.84	7.80	264.64	0.00	264.64	-264.64	-239.80
20		1303.58	1303.58	1310.10	1045.46	6.00%	6.52			258.12	6.52	264.64	0.00	264.64	-264.64	-238.56
21		1045.46	1045.46	1050.68	786.05	6.00%	5.23			259.41	5.23	264.64	0.00	264.64	-264.64	-237.32
22		786.05	786.05	789.98	525.34	6.00%	3.93			260.71	3.93	264.64	0.00	264.64	-264.64	-236.09
23		525.34	525.34	527.96	263.32	6.00%	2.63			262.01	2.63	264.64	0.00	264.64	-264.64	-234.87
24		263.32	263.32	264.64	0.00	6.00%	1.32			263.32	1.32	264.64	0.00	264.64	-264.64	-233.66

EXAMPLE 31

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 6000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Equal instalments (to be calculated)

Special Payments (*)

- [ ] Advance payment* % of the credit limit
- [ ] Final Payment* % of the credit limit

- [ ] The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 24 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 5.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
[x]	Cost 1	fixed amount	60	No*	At conclusion
[ ]	Cost 2	% of the credit limit		No*	At conclusion
[ ]	Cost 3	% of the drawdowns in each period		No*	
[ ]	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
[ ]	Cost 5	% of the balance outstanding (only capital) in each period		No*	
[ ]	Cost 6	% of the credit not used at the begining of each period		No*	
[ ]	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment	263.23	DYNAMIC	Recalculate
Duration of the credit	24	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	6.2%	DYNAMIC	Recalculate
Total cost of the credit	377.52		
Total amount of credit	6000.00		
Total amount payable	6377.52		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00			60.00					60.00	60.00	5940.00	5940.00
1		6000.00	6000.00	6025.00	5761.77	5.00%	25.00			238.23	25.00	263.23	0.00	263.23	-263.23	-261.92
2		5761.77	5761.77	5785.78	5522.55	5.00%	24.01			239.22	24.01	263.23	0.00	263.23	-263.23	-260.62
3		5522.55	5522.55	5545.56	5282.33	5.00%	23.01			240.22	23.01	263.23	0.00	263.23	-263.23	-259.33
4		5282.33	5282.33	5304.34	5041.11	5.00%	22.01			241.22	22.01	263.23	0.00	263.23	-263.23	-258.04
5		5041.11	5041.11	5062.12	4798.89	5.00%	21.00			242.22	21.00	263.23	0.00	263.23	-263.23	-256.76
6		4798.89	4798.89	4818.89	4555.66	5.00%	20.00			243.23	20.00	263.23	0.00	263.23	-263.23	-255.49
7		4555.66	4555.66	4574.64	4311.41	5.00%	18.98			244.25	18.98	263.23	0.00	263.23	-263.23	-254.22
8		4311.41	4311.41	4329.38	4066.15	5.00%	17.96			245.26	17.96	263.23	0.00	263.23	-263.23	-252.96
9		4066.15	4066.15	4083.09	3819.86	5.00%	16.94			246.29	16.94	263.23	0.00	263.23	-263.23	-251.70
10		3819.86	3819.86	3835.78	3572.55	5.00%	15.92			247.31	15.92	263.23	0.00	263.23	-263.23	-250.45
11		3572.55	3572.55	3587.43	3324.21	5.00%	14.89			248.34	14.89	263.23	0.00	263.23	-263.23	-249.21
12		3324.21	3324.21	3338.06	3074.83	5.00%	13.85			249.38	13.85	263.23	0.00	263.23	-263.23	-247.97
13		3074.83	3074.83	3087.64	2824.41	5.00%	12.81			250.42	12.81	263.23	0.00	263.23	-263.23	-246.74
14		2824.41	2824.41	2836.18	2572.95	5.00%	11.77			251.46	11.77	263.23	0.00	263.23	-263.23	-245.51
15		2572.95	2572.95	2583.67	2320.44	5.00%	10.72			252.51	10.72	263.23	0.00	263.23	-263.23	-244.29
16		2320.44	2320.44	2330.11	2066.88	5.00%	9.67			253.56	9.67	263.23	0.00	263.23	-263.23	-243.08
17		2066.88	2066.88	2075.50	1812.27	5.00%	8.61			254.62	8.61	263.23	0.00	263.23	-263.23	-241.88
18		1812.27	1812.27	1819.82	1556.59	5.00%	7.55			255.68	7.55	263.23	0.00	263.23	-263.23	-240.67
19		1556.59	1556.59	1563.08	1299.85	5.00%	6.49			256.74	6.49	263.23	0.00	263.23	-263.23	-239.48
20		1299.85	1299.85	1305.26	1042.04	5.00%	5.42			257.81	5.42	263.23	0.00	263.23	-263.23	-238.29
21		1042.04	1042.04	1046.38	783.15	5.00%	4.34			258.89	4.34	263.23	0.00	263.23	-263.23	-237.11
22		783.15	783.15	786.41	523.18	5.00%	3.26			259.97	3.26	263.23	0.00	263.23	-263.23	-235.93
23		523.18	523.18	525.36	262.14	5.00%	2.18			261.05	2.18	263.23	0.00	263.23	-263.23	-234.76
24		262.14	262.14	263.23	0.00	5.00%	1.09			262.14	1.09	263.23	0.00	263.23	-263.23	-233.59

EXAMPLE 32

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus a % of outstanding balance (only capital) % of 20.00 with 20 as a minimum amount

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 9.00%

Defined as Nominal (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the preliminary results and amortisation table.

As shown, the simulator has extended the number of periods of repayment to 16 because the scheme of repayments entered before does not provide full repayment of the credit in 12 months (see example 21).

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	16	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	16.8%	DYNAMIC	Recalculate
Total cost of the credit	60.97		
Total amount of credit	1000.00		
Total amount payable	1060.97		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.33
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.68
13		65.90	65.90	66.39	45.90	9.00%	0.49			20.00	0.49	20.49	0.00	20.49	-20.49	-17.32
14		45.90	45.90	46.24	25.90	9.00%	0.34			20.00	0.34	20.34	0.00	20.34	-20.34	-16.97
15		25.90	25.90	26.09	5.90	9.00%	0.19			20.00	0.19	20.19	0.00	20.19	-20.19	-16.63
16		5.90	5.90	5.94	0.00	9.00%	0.04			5.90	0.04	5.94	0.00	5.94	-5.94	-4.83

To limit the number of periods to 12, delete the cells highlighted in red, corresponding to periods 13 to 16 and the *Duration of the credit* shown in the area of *Main results*.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	DYNAMIC
Duration of the credit	16	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	16.8%	DYNAMIC
Total cost of the credit	60.97	
Total amount of credit	1000.00	
Total amount payable	1060.97	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.33
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.68
13		65.90	65.90	66.39	45.90	9.00%	0.49			20.00	0.49	20.49	0.00	20.49	-20.49	-17.32
14		45.90	45.90	46.24	25.90	9.00%	0.34			20.00	0.34	20.34	0.00	20.34	-20.34	-16.97
15		25.90	25.90	26.09	5.90	9.00%	0.19			20.00	0.19	20.19	0.00	20.19	-20.19	-16.63
16		5.90	5.90	5.94	0.00	9.00%	0.04			5.90	0.04	5.94	0.00	5.94	-5.94	-4.83

To provide full repayment of the credit in period 12, for this period substitute the last payment in the column with the *Total* of *Repayment of the credit* by the reference to the cell where the amount of €86.54 of *Balance Outstanding (capital plus interest)* appears. That is, enter the formula =$E$120 in the former cell. As a result, the *Final Balance* becomes 0, meaning that the credit repaid in full.

Note that due to these changes, the area of *Main results* reports the error that *the APR is not valid because the present value of the cash flows is not zero*.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
83	**Main results**																
85																	
86	Final balance in the last period			0.00													
87	Amount of the first repayment			[redacted]													
88	Duration of the credit				MONTHS												
89																	
90	Present value of the cash flows			-0.68	Caution: The APR is not valid because the present value of the cash flows is not zero.												
91	Annual Percentage Rate of Charge			16.8%	DYNAMIC												
92																	
93	Total cost of the credit			59.91													
94	Total amount of credit			1000.00													
95	Total amount payable			1059.91													
96																	
100	**Amortisation table**																
105			Balance				Interest on capital		Other costs		Payments					Cash flows	
106											Repayment of the credit						
107	Period	Drawdowns	Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
108	0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
109	1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.84
110	2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.77
111	3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.75
112	4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.89
113	5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.67
114	6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.92
115	7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.69
116	8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.25
117	9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.99
118	10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.47
119	11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.8[illegible]	[illegible]	0.00	22.28	-22.28	-19.33
120	12		85.90	85.90	86.54	0.00	9.00%	0.64			85.90	0.6[illegible]	=$E$120	0.00	86.54	-86.54	-74.11

To obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 17.0% is obtained and the error message disappears.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit		MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	17.0%	DYNAMIC	Recalculate
Total cost of the credit	59.91		
Total amount of credit	1000.00		
Total amount payable	1059.91		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.81
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.72
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.69
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.83
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.61
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.86
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.63
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.20
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.95
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.44
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.30
12		85.90	85.90	86.54	0.00	9.00%	0.64			85.90	0.64	86.54	0.00	86.54	-86.54	-73.98

EXAMPLE 33

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Open-end credit other than overdraft Assumed: 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00		
Amount of the first repayment		DYNAMIC	Recalculate
Duration of the credit	12	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	17.6%	DYNAMIC	Recalculate
Total cost of the credit	86.68		
Total amount of credit	1000.00		
Total amount payable	1086.68		

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1009.49	916.67	12.00%	9.49			83.33	9.49	92.82	0.00	92.82	-92.82	-91.58
2		916.67	916.67	925.36	833.33	12.00%	8.70			83.33	8.70	92.03	0.00	92.03	-92.03	-89.58
3		833.33	833.33	841.24	750.00	12.00%	7.91			83.33	7.91	91.24	0.00	91.24	-91.24	-87.62
4		750.00	750.00	757.12	666.67	12.00%	7.12			83.33	7.12	90.45	0.00	90.45	-90.45	-85.70
5		666.67	666.67	672.99	583.33	12.00%	6.33			83.33	6.33	89.66	0.00	89.66	-89.66	-83.81
6		583.33	583.33	588.87	500.00	12.00%	5.54			83.33	5.54	88.87	0.00	88.87	-88.87	-81.96
7		500.00	500.00	504.74	416.67	12.00%	4.74			83.33	4.74	88.08	0.00	88.08	-88.08	-80.14
8		416.67	416.67	420.62	333.33	12.00%	3.95			83.33	3.95	87.29	0.00	87.29	-87.29	-78.36
9		333.33	333.33	336.50	250.00	12.00%	3.16			83.33	3.16	86.50	0.00	86.50	-86.50	-76.61
10		250.00	250.00	252.37	166.67	12.00%	2.37			83.33	2.37	85.71	0.00	85.71	-85.71	-74.89
11		166.67	166.67	168.25	83.33	12.00%	1.58			83.33	1.58	84.91	0.00	84.91	-84.91	-73.20
12		83.33	83.33	84.12	0.00	12.00%	0.79			83.33	0.79	84.12	0.00	84.12	-84.12	-71.55

EXAMPLE 34

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Open-end credit other than overdraft Assumed: 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the preliminary results and amortisation table.

As shown, the simulator has considered a single drawdown of the amount of the credit and equal monthly repayments of capital within the 1-year period.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	12 MONTHS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	17.6% DYNAMIC	Recalculate
Total cost of the credit	86.68	
Total amount of credit	1000.00	
Total amount payable	1086.68	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1009.49	916.67	12.00%	9.49			83.33	9.49	92.82	0.00	92.82	-92.82	-91.58
2		916.67	916.67	925.36	833.33	12.00%	8.70			83.33	8.70	92.03	0.00	92.03	-92.03	-89.58
3		833.33	833.33	841.24	750.00	12.00%	7.91			83.33	7.91	91.24	0.00	91.24	-91.24	-87.62
4		750.00	750.00	757.12	666.67	12.00%	7.12			83.33	7.12	90.45	0.00	90.45	-90.45	-85.70
5		666.67	666.67	672.99	583.33	12.00%	6.33			83.33	6.33	89.66	0.00	89.66	-89.66	-83.81
6		583.33	583.33	588.87	500.00	12.00%	5.54			83.33	5.54	88.87	0.00	88.87	-88.87	-81.96
7		500.00	500.00	504.74	416.67	12.00%	4.74			83.33	4.74	88.08	0.00	88.08	-88.08	-80.14
8		416.67	416.67	420.62	333.33	12.00%	3.95			83.33	3.95	87.29	0.00	87.29	-87.29	-78.36
9		333.33	333.33	336.50	250.00	12.00%	3.16			83.33	3.16	86.50	0.00	86.50	-86.50	-76.61
10		250.00	250.00	252.37	166.67	12.00%	2.37			83.33	2.37	85.71	0.00	85.71	-85.71	-74.89
11		166.67	166.67	168.25	83.33	12.00%	1.58			83.33	1.58	84.91	0.00	84.91	-84.91	-73.20
12		83.33	83.33	84.12	0.00	12.00%	0.79			83.33	0.79	84.12	0.00	84.12	-84.12	-71.55

Changes should be done in order to provide full repayment of the amount of credit in period 9, and then a new drawdown of the total amount of credit repaid during the remaining 3 months.

Specifically, enter the new drawdown in the column *Drawdowns* for month 9, and change the formulas in the column *Total* of the *Repayment of the credit* as shown. The new formulas imply that the payment each month consists of interest plus equal amounts of capital of 1000/9=€111.11 for the first 9 months and 1000/3=€333.33 for the remaining 3 months.

Note that due to these changes, the area of *Main results* reports the error that *the APR is not valid because the present value of the cash flows is not zero*.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
83	**Main results**																
85																	
86	Final balance in the last period			0.00													
87	Amount of the first repayment																
88	Duration of the credit			12	MONTHS												
89																	
90	Present value of the cash flows			1.57	Caution: The APR is not valid because the present value of the cash flows is not zero.												
91	Annual Percentage Rate of Charge			17.6%	DYNAMIC												
92																	
93	Total cost of the credit			91.43													
94	Total amount of credit			2000.00													
95	Total amount payable			2091.43													
96																	
100	**Amortisation table**																
105			Balance				Interest on capital		Other costs		Payments					Cash flows	
106											Repayment of the credit						
107	Period	Drawdowns	Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
108	0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
109	1		1000.00	1000.00	1009.49	888.89	12.00%	9.49			111.11	9.49	=1000/9+L109	0.00	120.60	-120.60	-118.98
110	2		888.89	888.89	897.32	777.78	12.00%	8.43			111.11	8.43	=1000/9+L110	0.00	119.55	-119.55	-116.37
111	3		777.78	777.78	785.16	666.67	12.00%	7.38			111.11	7.38	=1000/9+L111	0.00	118.49	-118.49	-113.79
112	4		666.67	666.67	672.99	555.56	12.00%	6.33			111.11	6.33	=1000/9+L112	0.00	117.44	-117.44	-111.27
113	5		555.56	555.56	560.83	444.44	12.00%	5.27			111.11	5.27	=1000/9+L113	0.00	116.38	-116.38	-108.79
114	6		444.44	444.44	448.66	333.33	12.00%	4.22			111.11	4.22	=1000/9+L114	0.00	115.33	-115.33	-106.36
115	7		333.33	333.33	336.50	222.22	12.00%	3.16			111.11	3.16	=1000/9+L115	0.00	114.27	-114.27	-103.97
116	8		222.22	222.22	224.33	111.11	12.00%	2.11			111.11	2.11	=1000/9+L116	0.00	113.22	-113.22	-101.64
117	9	1000.00	111.11	1111.11	1112.17	1000.00	12.00%	1.05			111.11	1.05	=1000/9+L117	0.00	112.17	887.83	786.32
118	10		1000.00	1000.00	1009.49	666.67	12.00%	9.49			333.33	9.49	=1000/3+L118	0.00	342.82	-342.82	-299.56
119	11		666.67	666.67	672.99	333.33	12.00%	6.33			333.33	6.33	=1000/3+L119	0.00	339.66	-339.66	-292.82
120	12		333.33	333.33	336.50	0.00	12.00%	3.16			333.33	3.16	=1000/3+L120	0.00	336.50	-336.50	-286.21

To obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 17.2% is obtained and the error message disappears.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	
Duration of the credit	12	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	17.2%	DYNAMIC
Total cost of the credit	91.43	
Total amount of credit	2000.00	
Total amount payable	2091.43	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1009.49	888.89	12.00%	9.49			111.11	9.49	120.60	0.00	120.60	-120.60	-119.01
2		888.89	888.89	897.32	777.78	12.00%	8.43			111.11	8.43	119.55	0.00	119.55	-119.55	-116.42
3		777.78	777.78	785.16	666.67	12.00%	7.38			111.11	7.38	118.49	0.00	118.49	-118.49	-113.87
4		666.67	666.67	672.99	555.56	12.00%	6.33			111.11	6.33	117.44	0.00	117.44	-117.44	-111.38
5		555.56	555.56	560.83	444.44	12.00%	5.27			111.11	5.27	116.38	0.00	116.38	-116.38	-108.92
6		444.44	444.44	448.66	333.33	12.00%	4.22			111.11	4.22	115.33	0.00	115.33	-115.33	-106.52
7		333.33	333.33	336.50	222.22	12.00%	3.16			111.11	3.16	114.27	0.00	114.27	-114.27	-104.15
8		222.22	222.22	224.33	111.11	12.00%	2.11			111.11	2.11	113.22	0.00	113.22	-113.22	-101.84
9	1000.00	111.11	1111.11	1112.17	1000.00	12.00%	1.05			111.11	1.05	112.17	0.00	112.17	887.83	788.05
10		1000.00	1000.00	1009.49	666.67	12.00%	9.49			333.33	9.49	342.82	0.00	342.82	-342.82	-300.29
11		666.67	666.67	672.99	333.33	12.00%	6.33			333.33	6.33	339.66	0.00	339.66	-339.66	-293.60
12		333.33	333.33	336.50	0.00	12.00%	3.16			333.33	3.16	336.50	0.00	336.50	-336.50	-287.04

EXAMPLE 35

Click on the button *Reset* and then enter the information highlighted in red.

Note that the explanations in Obs(*) under the *Date of charge* of other costs indicate that 'costs paid in advance are payable at the beginning of the interval assuming that the first payment coincides with the first repayment of the credit'. This is the case of the example and thus, it is the option to choose.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Sucessive drawdowns and repayment in full each period

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Open-end credit other than overdraft Assumed: 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 0.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge		
☑	Cost 1	fixed amount	50	No*	Other frequency (num. of periods) *	12	in advance*
☐	Cost 2	% of the credit limit		No*	At conclusion		
☐	Cost 3	% of the drawdowns in each period		No*			
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*			
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*			
☐	Cost 6	% of the credit not used at the begining of each period		No*			
☐	Cost 7	% of the final balance in each period					

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Note that in the amortisation table two intermediate balances amount to 2000 euros in several periods. This high amount which doubles the amount of credit is due to the definition of these balances. As explained in the instructions of the simulator, these two intermediate balances take into account the drawdowns made during the period but not the repayment of the balance of the previous period.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	12	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	5.2%	DYNAMIC Recalculate
Total cost of the credit	50.00	
Total amount of credit	1000.00	
Total amount payable	1050.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00	50.00		1000.00	0.00	1000.00	50.00	1050.00	-50.00	-49.79
2	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
3	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
4	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
5	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
6	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
7	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
8	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
9	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
10	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
11	1000.00	1000.00	2000.00	2000.00	1000.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	0.00	0.00
12		1000.00	1000.00	1000.00	0.00	0.00%	0.00			1000.00	0.00	1000.00	0.00	1000.00	-1000.00	-950.21

EXAMPLE 36

Click on the button *Reset* and then enter the information highlighted in red.

As explained in the note in blue font which appears after selecting *Other* in the *Conditions governing drawdowns*, this choice implies that drawdowns should be entered manually in the amortisation table once the button *Generate* is clicked on.

For the duration of the credit do not choose *Open-end other than overdraft*, because this would impose a duration of 12 monthly periods. Instead, specify the duration as fixed an equal to 13 periods in order to take into account the single sum cost payable at conclusion of the agreement, the first month where drawdowns are not allowed and the period of 1 year starting from the date of the first drawdown.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Other — NOTE: Fill in the amortisation table after pressing the button Generate below.

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly — NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 13 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
☑ Cost 1	fixed amount	25	No*	At conclusion
☐ Cost 2	% of the credit limit		No*	At conclusion
☐ Cost 3	% of the drawdowns in each period		No*	
☐ Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐ Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐ Cost 6	% of the credit not used at the begining of each period		No*	
☐ Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the button *Generate* to obtain this incomplete amortisation table

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	[redacted] MONTHS	
Present value of the cash flows	-25.00	**Caution: The APR is not valid because the present value of the cash flows is not zero.**
Annual Percentage Rate of Charge	[redacted] DYNAMIC	Recalculate
Total cost of the credit	25.00	
Total amount of credit	0.00	
Total amount payable	25.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0					0.00			25.00					25.00	25.00	-25.00	-25.00
1		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
2		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
3		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
4		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
5		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
6		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
7		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
8		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
9		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
10		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
11		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
12		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00
13		0.00	0.00	0.00	0.00	12.00%	0.00			0.00	0.00		0.00	0.00	0.00	0.00

Then enter the drawdowns in the column *Drawdowns*, as shown.

Main results

Final balance in the last period	1105.31	Caution: The credit is not repaid in full because the final balance in the last period is not zero.
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	[redacted] MONTHS	
Present value of the cash flows	975.00	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	[redacted] DYNAMIC	Recalculate
Total cost of the credit	-975.00	
Total amount of credit	1000.00	
Total amount payable	25.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0					0.00			25.00					25.00	25.00	-25.00	-25.00
1	100.00	0.00	100.00	100.00	100.00	12.00%	0.00			0.00	0.00		0.00	0.00	100.00	100.00
2	400.00	100.00	500.00	500.95	500.95	12.00%	0.95			-0.95	0.95		0.00	0.00	400.00	400.00
3	500.00	500.95	1000.95	1005.70	1005.70	12.00%	4.75			-4.75	4.75		0.00	0.00	500.00	500.00
4		1005.70	1005.70	1015.25	1015.25	12.00%	9.54			-9.54	9.54		0.00	0.00	0.00	0.00
5		1015.25	1015.25	1024.88	1024.88	12.00%	9.63			-9.63	9.63		0.00	0.00	0.00	0.00
6		1024.88	1024.88	1034.60	1034.60	12.00%	9.72			-9.72	9.72		0.00	0.00	0.00	0.00
7		1034.60	1034.60	1044.42	1044.42	12.00%	9.82			-9.82	9.82		0.00	0.00	0.00	0.00
8		1044.42	1044.42	1054.33	1054.33	12.00%	9.91			-9.91	9.91		0.00	0.00	0.00	0.00
9		1054.33	1054.33	1064.34	1064.34	12.00%	10.00			-10.00	10.00		0.00	0.00	0.00	0.00
10		1064.34	1064.34	1074.43	1074.43	12.00%	10.10			-10.10	10.10		0.00	0.00	0.00	0.00
11		1074.43	1074.43	1084.63	1084.63	12.00%	10.20			-10.20	10.20		0.00	0.00	0.00	0.00
12		1084.63	1084.63	1094.92	1094.92	12.00%	10.29			-10.29	10.29		0.00	0.00	0.00	0.00
13		1094.92	1094.92	1105.31	1105.31	12.00%	10.39			-10.39	10.39		0.00	0.00	0.00	0.00

Finally, click on the button *Calculate* to obtain the repayments and the APR of the credit.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	13	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	18.5%	DYNAMIC Recalculate
Total cost of the credit	80.03	
Total amount of credit	1000.00	
Total amount payable	1080.03	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0					0.00			25.00					25.00	25.00	-25.00	-25.00
1	100.00	0.00	100.00	100.00	100.00	12.00%	0.00			0.00	0.00	0.00	0.00	0.00	100.00	98.60
2	400.00	100.00	500.00	500.95	491.67	12.00%	0.95			8.33	0.95	9.28	0.00	9.28	390.72	379.84
3	500.00	491.67	991.67	996.33	946.97	12.00%	4.67			44.70	4.67	49.36	0.00	49.36	450.64	431.96
4		946.97	946.97	955.96	852.27	12.00%	8.99			94.70	8.99	103.68	0.00	103.68	-103.68	-97.99
5		852.27	852.27	860.36	757.58	12.00%	8.09			94.70	8.09	102.78	0.00	102.78	-102.78	-95.78
6		757.58	757.58	764.76	662.88	12.00%	7.19			94.70	7.19	101.89	0.00	101.89	-101.89	-93.62
7		662.88	662.88	669.17	568.18	12.00%	6.29			94.70	6.29	100.99	0.00	100.99	-100.99	-91.49
8		568.18	568.18	573.57	473.48	12.00%	5.39			94.70	5.39	100.09	0.00	100.09	-100.09	-89.40
9		473.48	473.48	477.98	378.79	12.00%	4.49			94.70	4.49	99.19	0.00	99.19	-99.19	-87.36
10		378.79	378.79	382.38	284.09	12.00%	3.59			94.70	3.59	98.29	0.00	98.29	-98.29	-85.35
11		284.09	284.09	286.79	189.39	12.00%	2.70			94.70	2.70	97.39	0.00	97.39	-97.39	-83.39
12		189.39	189.39	191.19	94.70	12.00%	1.80			94.70	1.80	96.49	0.00	96.49	-96.49	-81.46
13		94.70	94.70	95.60	0.00	12.00%	0.90			94.70	0.90	95.60	0.00	95.60	-95.60	-79.57

EXAMPLE 37

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Open-end credit other than overdraft Assumed: 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 14.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge
☑	Cost 1	fixed amount	25	No*	At conclusion
☐	Cost 2	% of the credit limit		No*	At conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment		
Duration of the credit	12	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	19.7%	DYNAMIC
Total cost of the credit	96.36	
Total amount of credit	1000.00	
Total amount payable	1096.36	

Recalculate

Recalculate

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1010.98	916.67	14.00%	10.98			83.33	10.98	94.31	0.00	94.31	-94.31	-92.91
2		916.67	916.67	926.73	833.33	14.00%	10.06			83.33	10.06	93.40	0.00	93.40	-93.40	-90.64
3		833.33	833.33	842.48	750.00	14.00%	9.15			83.33	9.15	92.48	0.00	92.48	-92.48	-88.41
4		750.00	750.00	758.23	666.67	14.00%	8.23			83.33	8.23	91.57	0.00	91.57	-91.57	-86.24
5		666.67	666.67	673.99	583.33	14.00%	7.32			83.33	7.32	90.65	0.00	90.65	-90.65	-84.11
6		583.33	583.33	589.74	500.00	14.00%	6.40			83.33	6.40	89.74	0.00	89.74	-89.74	-82.02
7		500.00	500.00	505.49	416.67	14.00%	5.49			83.33	5.49	88.82	0.00	88.82	-88.82	-79.97
8		416.67	416.67	421.24	333.33	14.00%	4.57			83.33	4.57	87.91	0.00	87.91	-87.91	-77.98
9		333.33	333.33	336.99	250.00	14.00%	3.66			83.33	3.66	86.99	0.00	86.99	-86.99	-76.01
10		250.00	250.00	252.74	166.67	14.00%	2.74			83.33	2.74	86.08	0.00	86.08	-86.08	-74.10
11		166.67	166.67	168.50	83.33	14.00%	1.83			83.33	1.83	85.16	0.00	85.16	-85.16	-72.22
12		83.33	83.33	84.25	0.00	14.00%	0.91			83.33	0.91	84.25	0.00	84.25	-84.25	-70.38

EXAMPLE 38

Click on the button *Reset* and then enter the information highlighted in red.

Note that the explanations in Obs(*) under the *Date of charge* of other costs indicate that 'costs paid in advance are payable at the beginning of the interval assuming that the first payment coincides with the first repayment of the credit'. This is coherent with the treatment of the regular costs in this example by virtue of assumption (g)(iii); therefore, payment *in advance* is the option to choose for these costs.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Open-end credit other than overdraft Assumed: 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge		
☑	Cost 1	fixed amount	25	No*	Other frequency (num. of periods) *	12	in advance*
☐	Cost 2	% of the credit limit		No*	At conclusion		
☐	Cost 3	% of the drawdowns in each period		No*			
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*			
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*			
☐	Cost 6	% of the credit not used at the begining of each period		No*			
☐	Cost 7	% of the final balance in each period					

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	12	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	17.5%	DYNAMIC Recalculate
Total cost of the credit	86.68	
Total amount of credit	1000.00	
Total amount payable	1086.68	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1009.49	916.67	12.00%	9.49	25.00		83.33	9.49	92.82	25.00	117.82	-117.82	-116.25
2		916.67	916.67	925.36	833.33	12.00%	8.70			83.33	8.70	92.03	0.00	92.03	-92.03	-89.59
3		833.33	833.33	841.24	750.00	12.00%	7.91			83.33	7.91	91.24	0.00	91.24	-91.24	-87.64
4		750.00	750.00	757.12	666.67	12.00%	7.12			83.33	7.12	90.45	0.00	90.45	-90.45	-85.72
5		666.67	666.67	672.99	583.33	12.00%	6.33			83.33	6.33	89.66	0.00	89.66	-89.66	-83.83
6		583.33	583.33	588.87	500.00	12.00%	5.54			83.33	5.54	88.87	0.00	88.87	-88.87	-81.99
7		500.00	500.00	504.74	416.67	12.00%	4.74			83.33	4.74	88.08	0.00	88.08	-88.08	-80.17
8		416.67	416.67	420.62	333.33	12.00%	3.95			83.33	3.95	87.29	0.00	87.29	-87.29	-78.39
9		333.33	333.33	336.50	250.00	12.00%	3.16			83.33	3.16	86.50	0.00	86.50	-86.50	-76.65
10		250.00	250.00	252.37	166.67	12.00%	2.37			83.33	2.37	85.71	0.00	85.71	-85.71	-74.93
11		166.67	166.67	168.25	83.33	12.00%	1.58			83.33	1.58	84.91	0.00	84.91	-84.91	-73.24
12		83.33	83.33	84.12	0.00	12.00%	0.79			83.33	0.79	84.12	0.00	84.12	-84.12	-71.59

EXAMPLE 39

Click on the button *Reset* and then enter the information highlighted in red.

Note that the explanations in Obs(*) under the *Date of charge* of other costs indicate that 'costs paid in advance are payable at the beginning of the interval assuming that the first payment coincides with the first repayment of the credit'. This is coherent with the treatment of the regular costs in this example by virtue of assumption (g)(iii); therefore, payment *in advance* is the option to choose for these costs.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1500

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest plus equal repayments of capital regulary

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Open-end credit other than overdraft Assumed: 12 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge		
☑	Cost 1	fixed amount	25	No*	Other frequency (num. of periods) *	12	in advance*
☐	Cost 2	% of the credit limit		No*	At conclusion		
☐	Cost 3	% of the drawdowns in each period		No*			
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*			
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*			
☐	Cost 6	% of the credit not used at the begining of each period		No*			
☐	Cost 7	% of the final balance in each period					

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	12	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	15.6%	DYNAMIC Recalculate
Total cost of the credit	117.51	
Total amount of credit	1500.00	
Total amount payable	1617.51	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1500.00				1500.00								0.00	0.00	1500.00	1500.00
1		1500.00	1500.00	1514.23	1375.00	12.00%	14.23	25.00		125.00	14.23	139.23	25.00	164.23	-164.23	-162.26
2		1375.00	1375.00	1388.05	1250.00	12.00%	13.05			125.00	13.05	138.05	0.00	138.05	-138.05	-134.75
3		1250.00	1250.00	1261.86	1125.00	12.00%	11.86			125.00	11.86	136.86	0.00	136.86	-136.86	-131.98
4		1125.00	1125.00	1135.67	1000.00	12.00%	10.67			125.00	10.67	135.67	0.00	135.67	-135.67	-129.26
5		1000.00	1000.00	1009.49	875.00	12.00%	9.49			125.00	9.49	134.49	0.00	134.49	-134.49	-126.60
6		875.00	875.00	883.30	750.00	12.00%	8.30			125.00	8.30	133.30	0.00	133.30	-133.30	-123.97
7		750.00	750.00	757.12	625.00	12.00%	7.12			125.00	7.12	132.12	0.00	132.12	-132.12	-121.40
8		625.00	625.00	630.93	500.00	12.00%	5.93			125.00	5.93	130.93	0.00	130.93	-130.93	-118.86
9		500.00	500.00	504.74	375.00	12.00%	4.74			125.00	4.74	129.74	0.00	129.74	-129.74	-116.36
10		375.00	375.00	378.56	250.00	12.00%	3.56			125.00	3.56	128.56	0.00	128.56	-128.56	-113.92
11		250.00	250.00	252.37	125.00	12.00%	2.37			125.00	2.37	127.37	0.00	127.37	-127.37	-111.50
12		125.00	125.00	126.19	0.00	12.00%	1.19			125.00	1.19	126.19	0.00	126.19	-126.19	-109.14

EXAMPLE 40

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments monthly

NOTE: It determines the periods in the table are given as: MONTHS

Amount Interest regulary and repayment of capital at the end

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Overdraft with unknown duration Assumed: 3 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

		Given as	Amount or %	Financed	Date of charge		
☑	Cost 1	fixed amount	2.5	No*	Other frequency (num. of periods) *	1	in arrears*
☐	Cost 2	% of the credit limit		No*	At conclusion		
☐	Cost 3	% of the drawdowns in each period		No*			
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*			
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*			
☐	Cost 6	% of the credit not used at the begining of each period		No*			
☐	Cost 7	% of the final balance in each period					

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	3	MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	15.4%	DYNAMIC Recalculate
Total cost of the credit	35.97	
Total amount of credit	1000.00	
Total amount payable	1035.97	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1009.49	1000.00	12.00%	9.49	2.50		0.00	9.49	9.49	2.50	11.99	-11.99	-11.85
2		1000.00	1000.00	1009.49	1000.00	12.00%	9.49	2.50		0.00	9.49	9.49	2.50	11.99	-11.99	-11.71
3		1000.00	1000.00	1009.49	0.00	12.00%	9.49	2.50		1000.00	9.49	1009.49	2.50	1011.99	-1011.99	-976.44

EXAMPLE 41

Click on the button *Reset* and then enter the information highlighted in red.

Description of the credit product

MAIN FEATURES OF THE CREDIT PRODUCT

A) Total amount of the credit

Amount 1000

B) Conditions governing drawdowns

Select Inmediately and in full

C) Conditions governing repayments DYNAMIC

Frequency of repayments half-yearly

NOTE: It determines the periods in the table are given as: SIX MONTHS

Amount Interest plus capital at the end

Special Payments (*)

Advance payment* % of the credit limit

Final Payment* % of the credit limit

The length of the first period of repayment is different

D) Duration of the credit agreement

Duration Fixed of 1 periods

COSTS OF THE CREDIT

A) Borrowing rate

Level Fixed for the entire duration of the credit by a percentage of 12.00%

Defined as Effective (annual) DYNAMIC

B) Other cost included in the Total Cost of the Credit

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount		No*	At conclusion
Cost 2	% of the credit limit		No*	At conclusion
Cost 3	% of the drawdowns in each period		No*	
Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
Cost 5	% of the balance outstanding (only capital) in each period		No*	
Cost 6	% of the credit not used at the begining of each period		No*	
Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Click on the buttons *Generate* and then *Calculate* to obtain the main results and the amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	1	SIX MONTHS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	12.0%	DYNAMIC Recalculate
Total cost of the credit	58.30	
Total amount of credit	1000.00	
Total amount payable	1058.30	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1058.30	0.00	12.00%	58.30			1000.00	58.30	1058.30	0.00	1058.30	-1058.30	-1000.00

4. EXCEL SIMULATOR FOR THE CALCULATION OF THE APR

As a part of this study, a simulator in Excel has been developed. The simulator shows the amortisation table of a credit agreement according to the characteristics entered by the user and calculates the APR of the credit. The simulator can deal with a large variety of credit agreements, although not with any type of agreement or feature, as it is aimed to be a user-friendly tool which accompanies the examples of calculation of the APR contained in the study, making it possible to replicate the examples, obtain new examples and analyze the effect of different variables and parameters of the credit on the APR; therefore, there might be practices not covered by the simulator. On the same ground, the simulator is not aimed at providing creditors with a tool for their commercial activities in substitution of their own internal systems. The simulator is by no means compulsory in commercial use. It is thus up to the creditors to ensure adequate tools (among others, IT) to comply with the requirements of the EU legislation in the field of consumer credit.

4.1. SOFTWARE REQUIREMENTS

- Excel 2003 or higher version. Many popular spreadsheet programs are able of reading Microsoft Excel files. However, Microsoft Excel is required to run the simulator.
- You must Enable Macros when the Excel file is open.

4.2. MAIN FEATURES

The main features of the simulator are:

- *Directive compliance*: The input area is organized into several sections and ensures that the characteristics of the credit agreement conform to the Standard European Consumer Credit Information form in Annex II of Directive 2008/48/EC which are relevant for the calculation of the APR. Where assumptions for the calculation of the APR might apply, this is indicated by 'balloon' messages in cells with the text *Assumptions applicable*. It should be highlighted that *the user is deemed to follow these indications to obtain the APR*. Whenever feasible, the simulator informs as to discrepancies with those assumptions. Internally, the APR calculated by the simulator uses the conventions applied in the Directive for the definition of the APR (present value rules and definition of the APR as an effective annual rate of charge) and the clarifications in the document of Guidelines for the measurement of time intervals.
- *Ample coverage*: Given the large number of characteristics and options available to the user, the simulator is able to cover an ample variety of credit agreements, with very few limitations.

- *Simplicity*: The characteristics of the credit are entered by the user through simple menus and by entering numbers in specific cells. Consequently, no special training or financial knowledge is required to use the simulator. Some sections also include *Notes* with relevant explanations and a box with brief instructions is provided. Finally, once the data is entered, the simulator informs on possible errors and inconsistencies.

- *Flexibility*: When the menus and cells are insufficient to describe the credit agreement, the user can, in most cases, enter his own data in the amortisation table. The user can complete, change or replace the formulas in the amortisation table. However, in this case, the user should take care of the correctness of the result.

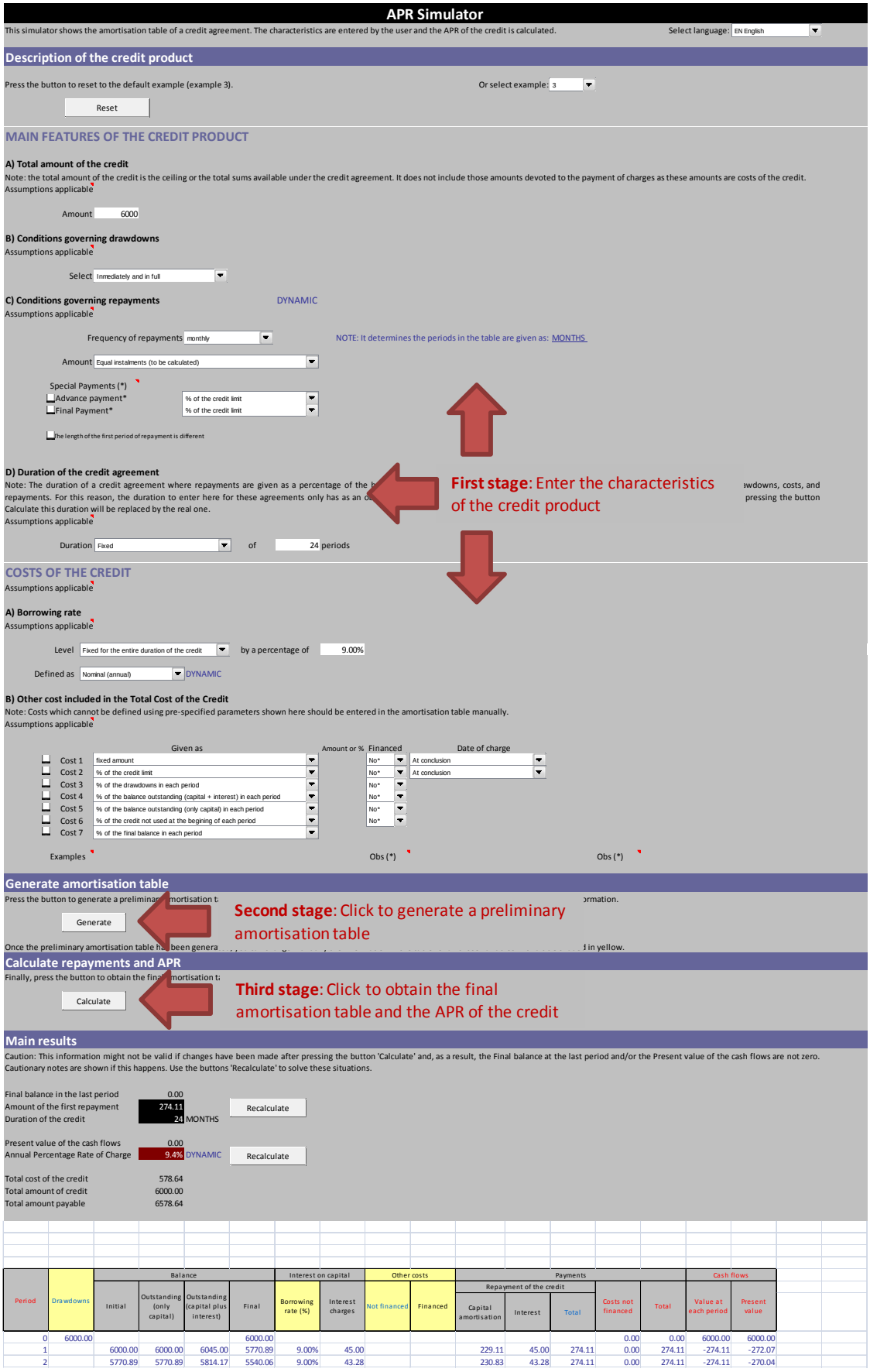
- *Interactivity*: Given that the amortisation table includes formulas instead of values, the user can see the relationships between most of the variables. Also, the user can change some characteristics of the credit and see immediately the effects of these changes on the amortisation table without creating a new table. The sections, characteristics and cells with this feature are marked by the word "DYNAMIC".

- *Multilingual usage*: The user can select the desired language from a list which includes all the official languages of the European Union.

4.3. INSTRUCTIONS

Obtaining the amortisation table and the APR of a credit agreement using the simulator consists of three stages, shown in Figure 1.

Figure 1. Stages of the simulator



Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000.00				6000.00								0.00	0.00	6000.00	6000.00
1		6000.00	6000.00	6045.00	5770.89	9.00%	45.00			229.11	45.00	274.11	0.00	274.11	-274.11	-272.07
2		5770.89	5770.89	5814.17	5540.06	9.00%	43.28			230.83	43.28	274.11	0.00	274.11	-274.11	-270.04

In the **first stage** the user is required to enter the characteristics of the credit product in the area 'Description of the credit product'. In the **second stage**, clicking on the button *Generate* in the area 'Generate amortisation table' generates a preliminary amortisation table from the information provided in the first stage. Some of the fields of the amortisation table can be changed by the user, thus providing additional flexibility in the treatment of characteristics of the credit agreement. Finally, in the **third stage**, clicking on the button *Calculate* in the area 'Calculate repayments and APR' returns the final amortisation table and the APR of the credit. These three stages are explained in more detail below.

FIRST STAGE

In the first stage the user is required to enter the characteristics of the credit product in the area 'Description of the credit product'. As shown in Figure 1, at the top, the button 'Reset' allows to initialize the simulator by replacing any existing data by the data of example 3 of the set of examples of calculation of the APR included in the study. The user can use this button to obtain such an example or when the simulator is not working properly, as a bad functioning might be due to wrong data introduced previously. Other examples provided in the study are available from the list at the right, by selecting the number of the desired example[82]. Once the selection is made, the simulator replaces any information by that corresponding to the example and also provides the amortisation table of the example.

Below the button and the list the area to enter information by the user is displayed. This area is comprised of two parts: 'Main features of the credit product' and 'Costs of the credit'. The first part includes the total amount of the credit (section A), the conditions governing the drawdowns (section B), the conditions governing repayments (section C; all the data in this section is dynamic), and the duration of the credit agreement (section D).The second part is devoted to costs, and includes the borrowing rate (section A, where the definition of the borrowing rate allows interactivity) and other costs included in the total cost of the credit (section B).

It is advisable to fill these areas and sections in order. In this case, the user would start from the area 'Main features of the credit product' and then:

- Specify the amount of the credit as a number.
- Select the conditions governing drawdowns among the options 'Immediately and in full' and 'Other'. In the later case, the user will have to fill manually the column of drawdowns in the amortisation table in the second stage.
- Define the conditions governing repayments. These include:

[82] The simulator includes all the examples of calculation of the APR contained in the study. These examples illustrate the use of the assumptions and some particulars of use of the simulator. For step-by-step explanations on how to obtain the solutions of these examples using the simulator see 'Credit information and amortisation tables' in section 3.3.

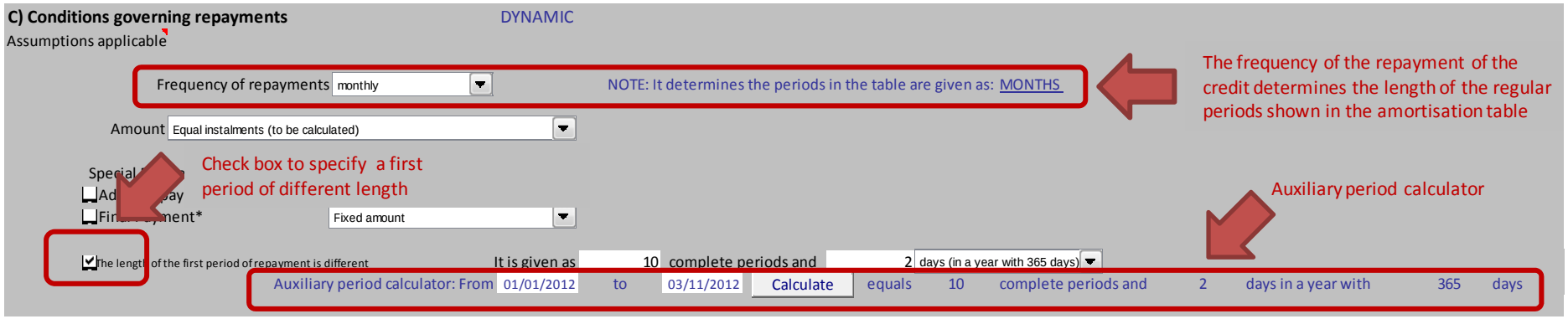
- The frequency of repayments, which can be specified as weekly, monthly, quarterly, half-yearly or yearly. Note that this frequency determines the length of the regular periods shown in the amortisation table.
- The amount of the repayments. This amount refers to the amount devoted to interest charges and capital amortisation. The options are[83]:
    - Equal instalments (to be calculated).
    - Increasing or decreasing instalments.
    - % of outstanding balance (capital + interest).
    - Interest plus a % of outstanding balance (only capital).
    - Constant amount known in advance.
    - Interest plus constant amount known in advance.
    - Interest regularly and repayment of capital at the end.
    - Interest plus capital at the end.
    - Interest plus equal repayments of capital regularly.
    - Successive drawdowns and repayment in full each period.
- Special payments, that is, payments which are different from the regular payments specified before. These include:
    - An advance payment, which is a sum payable when the agreement is signed. Note that this payment is not a part of the financing operation and hence will be deducted from the amount of credit specified before to obtain the amount of credit shown in the area 'Main results' and the amortisation table. This type of payment has been included in the simulator for completeness.
    - A final payment, which is a sum payable at the last period and in substitution of any regular repayment. Note that a final payment is not allowed under certain schemes of repayment (e.g. when the capital is repaid only in full or in equal payments).
- There is also the option to specify a first payment period of a length different to that of the regular payment periods. To this end, the user should check the box 'The length of the first period of repayment is different' and specify that first payment period as a number of regular periods in combination with a number of days. An auxiliary period calculator allows the user to obtain these

[83] The examples of the study cover all these schemes of repayment.

numbers from calendar days following the rules for the measurement of time intervals provided in the Guidelines on the Application of Directive 2008/48/EC. For example, using regular periods of one month, Figure 2 shows that the period from January 1 2012 to November 3 2012 is comprised of 10 months and 2 days in a year with 365 days. These numbers can be entered by the user in the previous row to define the length of the first period of repayment; the following periods would be of regular length.

- Specify the duration of the credit agreement. This duration can be defined as 'Fixed', in which case the user must enter the number of periods until full repayment, or is entered automatically by the simulator in the cases of 'Overdraft with unknown duration' and 'Open-end credit other than overdraft'. In the later case, the choice of an 'Open-end credit other than overdraft' implies that the duration is assumed to be 12 periods. This derives from assumption (e) of Directive 2011/30/EU. This assumption also forces monthly repayments and is compatible only with two schemes of repayments: 'Interest plus equal repayments of capital regularly' and 'Successive drawdowns and repayments in full each period'. The choice of any other frequency or other scheme of repayments will lead to an error message. On the other hand, when an 'Overdraft with unknown duration' is chosen, the simulator assumes that the duration is 3 months. This derives from assumption (d) of the Directive. This assumption also implies that the entire capital should be repaid at the end of the agreement, for which reason this choice is compatible with two schemes of repayments only: 'Interest regularly and repayment of capital at the end' and 'Interest plus capital at the end'. The choice of frequencies of repayment not coherent with the assumed duration of 3 months (e.g. half-yearly or yearly) or other scheme of repayments will lead to an error message. Finally, when the duration is defined as 'Fixed', the user must enter the number of periods until full repayment of the credit (e.g., for a credit for a period of 1 year and monthly repayments, the number of periods is 12). This duration will be respected by the simulator, except for those credits whose repayments are given as a percentage of the balance outstanding or as a constant amount known in advance. This is because for these credits, the real duration is given implicitly by the drawdowns, costs and repayments (e.g., if a credit for a total amount of €1000 should be repaid in monthly repayments of €500 plus interest charges, the duration will be 2 months necessarily, as this is the period until full repayment). For these credits, the user should enter, as duration of the credit agreement, an estimation of the real duration. This estimated duration will determine the number of periods to display in the preliminary amortisation table in the second stage and will be replaced by the real duration in the third stage, once the simulator obtains the final amortisation table. If the user plans to make manual changes in the preliminary amortisation table in the second stage, the estimated duration should be large enough to ensure that the table will not be extended by the simulator to further periods in the third stage. This is because if the table needs to be extended in the third stage to ensure full repayment of the credit at the last period, the variables in the new periods are obtained from the characteristics of the credit entered in the first stage only.

Figure 2. Specifying a first payment period of different length



- Specify the level and type of the borrowing rate. If the level is specified as 'Fixed for the entire duration of the credit' the user will be required to enter such a fixed value in terms of an annual percentage; otherwise, the user will have to fill manually the column 'Borrowing rate (%)' with the individual rates for each period in the preliminary amortisation table in the second stage. As to the definition of the borrowing rate, it can be expressed as a 'Nominal (annual)' or an 'Effective (annual)' rate. Nominal rates are charged periodically using a proportional conversion method and effective rates are charged periodically using the corresponding compounding frequency (e.g. a nominal rate of 9% implies monthly interest charges of 9/12=0.750% on capital, and an effective rate of 12% implies monthly interest charges of (1+0.12)^(1/12)-1=0.949% on capital).

- Enter other costs included in the total cost of the credit. For each cost, check one box at the right, then choose the option which describes it among the following options and specify the amount in euros or the percentage:

    - Fixed amount.
    - % of the credit limit.
    - % of the drawdowns in each period.
    - % of the balance outstanding (capital + interest) in each period.
    - % of the balance outstanding (only capital) in each period.
    - % of the credit not used at the beginning of each period.
    - % of the final balance in each period.

  Then, indicate whether the cost is financed with the credit or not:

    - If a cost is not financed, it is paid when it is charged.
    - If a cost is financed, it is not paid when it is charged but, instead, it is added to the amount owed, thus generating interest and being repaid within the repayments of the credit over the duration of the agreement.

  Finally, choose the dates of charge, being the options:

    - At conclusion, that is, when the agreement is signed (period 0).
    - Each time a drawdown takes place.
    - Each time a repayment takes place.
    - Other frequency (num. of periods). In this case, the number of periods between payments should be specified, and also if the cost is paid in arrears (at the end of each time interval) or in advance (at the

beginning of each time interval, assuming that the first payment coincides with the first repayment of the credit)[84].

The combination of these features allows a huge variety of costs. For example, a single sum (lump sum) cost of €60 payable on conclusion of the agreement (example 5 of the study) is specified as a cost of *fixed amount* of €60, *not financed* and with a date of charge given as *at conclusion*, as seen in Figure 3:

Figure 3. Single sum cost

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount	60	No*	At conclusion

As an example of a regular cost, administrative charges of €60 in total spread over 24 monthly repayments of a credit (example 6 of the study) are specified as costs of *fixed amount* of 60/24=€2.5, *not financed* and with a date of charge given as *each time a repayment takes place*, as seen in Figure 4:

Figure 4. Regular costs

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount	2.5	No*	Each time a repayment takes place

The combination of the preceding single sum cost of €60 payable on conclusion of the agreement and a cost of 5% of the total amount of credit which is financed with the credit (example 8 of the study) is entered as shown:

Figure 5. Combination of costs

	Given as	Amount or %	Financed	Date of charge
Cost 1	fixed amount	60	No*	At conclusion
Cost 2	% of the credit limit	5	Yes*	At conclusion

And an annual charge of a credit card of €25 payable at the beginning of each year (example 38 of the study) is specified a cost of *fixed amount* of €25, *not financed*, with a date of charge given as *other frequency* with a number of 12 periods (of one month) and payable *in advance*, as below:

Figure 6. Cost of a credit card

	Given as	Amount or %	Financed	Date of charge		
Cost 1	fixed amount	25	No*	Other frequency (num. of periods) *	12	in advance*

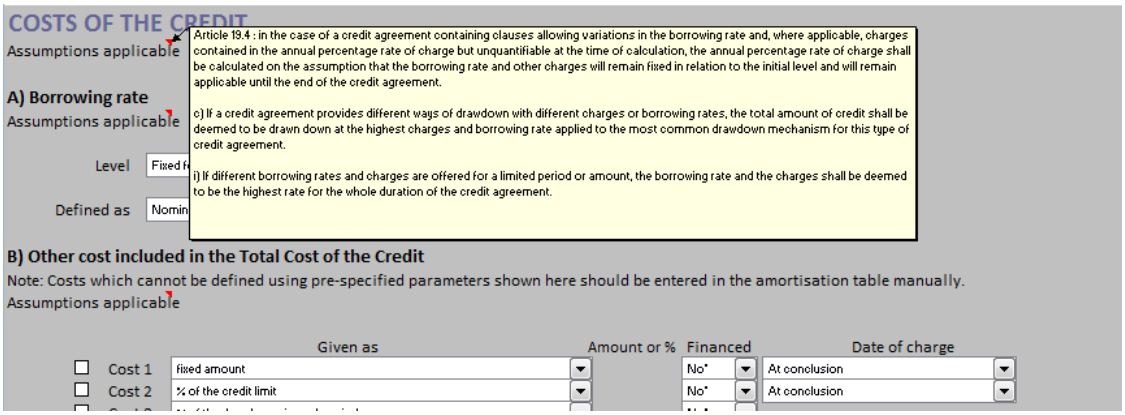
If the cost cannot be defined using these pre-specified parameters, then it should be entered manually in the preliminary amortisation table in the second stage.

Throughout the process of introduction of all the previous data, the user should read the explanatory notes and the assumptions applicable displayed in balloon messages, and provide

[84] If payment periods are expressed in months, and a cost is payable every month, there is no distinction between payment in advance and in arrears.

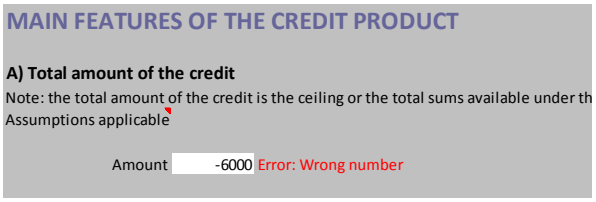
information consistent with them in order to obtain the APR at the third stage. The simulator is able to detect some of these inconsistencies and will inform the user accordingly, but there are cases where this is not feasible.

Figure 7. Balloon message



Finally, if the data entered is wrong, in the sense that it might imply an expected break down of the simulator, the user is also informed. The inconsistencies and errors are displayed in message boxes and error messages next to the cells affected by the errors or inconsistencies. They should be solved before proceeding.

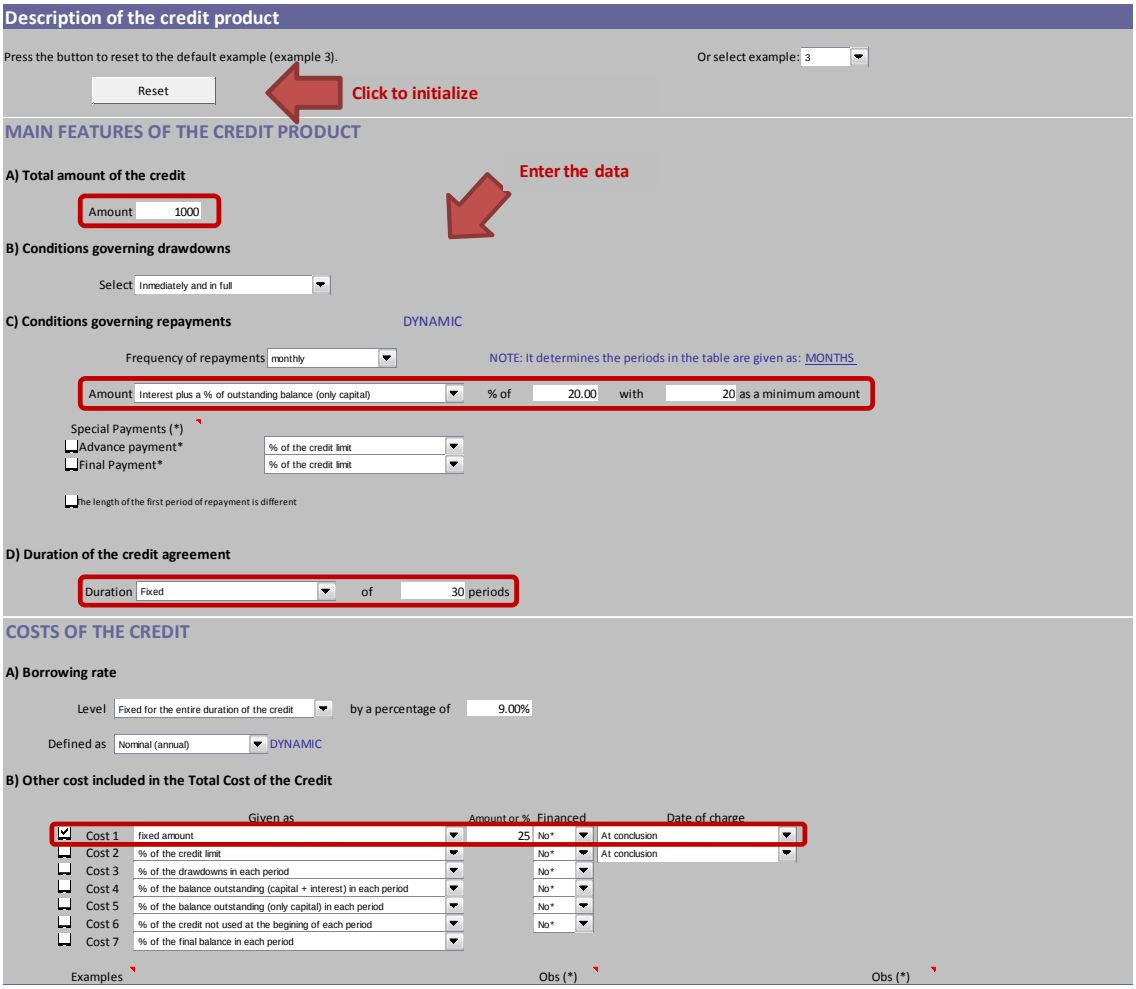
Figure 8. Error message



By way of illustration of this stage, consider the data to enter for example 21 of the study. It refers to a credit agreement for a total amount of credit of €1000 to be draw down immediately and in full on conclusion of the agreement; further drawdowns are not allowed. The credit agreement provides for payment of interest every month plus a monthly payment of 20% of the outstanding balance of capital with a minimum of €20. The borrowing rate (nominal rate) is 9%. Single sum (lump sum) cost of €25 payable on conclusion of the agreement.

As shown in Figure 9, first click on the button *Reset* at the top to initialize the simulator and then change default data as necessary. The data to change in this example is highlighted in red. The duration of the credit of 30 periods entered is an estimation of the real duration, which will be obtained by the simulator on the basis of the amounts of repayment in the third stage. This estimated duration is considered to be large enough to ensure that the preliminary amortisation table which will be obtained in the second stage will include all the periods of repayment.

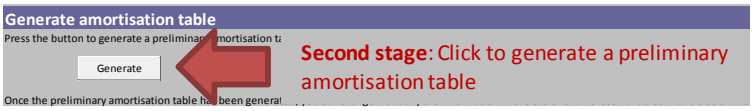
Figure 9. First stage: An example



SECOND STAGE

In the second stage the user obtains the preliminary amortisation table of the credit agreement specified in the first stage by clicking on the *Generate* button in the area 'Generate amortisation table', as shown in Figure 10.

Figure 10. Second stage: Button Generate



The internal procedures set off by this button first check that the data introduced in the first stage is error free and if errors are detected, the procedure is aborted. Otherwise the preliminary amortisation table is generated.

Figure 11 shows the preliminary amortisation table of example 21 of the study where, as mentioned above, an estimated duration of 30 periods is used. Note that the table is not completed; the column with the *Total* of *Repayment of the credit* is empty, revealing that the repayments have not been calculated yet. This will be done in the third stage. Also note that the characteristics of the credit entered in the first stage are reproduced in the table. For

example, the amount of credit of €1000 appears as a drawdown in period 0 (i.e. at the conclusion of the agreement), the borrowing rate is always 9%, and the cost of €25 appears as a cost not financed and due on period 0.

Figure 11. Second stage: An example

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	1007.50	9.00%	7.50			-7.50	7.50		0.00	0.00	0.00	0.00
2		1007.50	1007.50	1015.06	1015.06	9.00%	7.56			-7.56	7.56		0.00	0.00	0.00	0.00
3		1015.06	1015.06	1022.67	1022.67	9.00%	7.61			-7.61	7.61		0.00	0.00	0.00	0.00
4		1022.67	1022.67	1030.34	1030.34	9.00%	7.67			-7.67	7.67		0.00	0.00	0.00	0.00
5		1030.34	1030.34	1038.07	1038.07	9.00%	7.73			-7.73	7.73		0.00	0.00	0.00	0.00
6		1038.07	1038.07	1045.85	1045.85	9.00%	7.79			-7.79	7.79		0.00	0.00	0.00	0.00
7		1045.85	1045.85	1053.70	1053.70	9.00%	7.84			-7.84	7.84		0.00	0.00	0.00	0.00
8		1053.70	1053.70	1061.60	1061.60	9.00%	7.90			-7.90	7.90		0.00	0.00	0.00	0.00
9		1061.60	1061.60	1069.56	1069.56	9.00%	7.96			-7.96	7.96		0.00	0.00	0.00	0.00
10		1069.56	1069.56	1077.58	1077.58	9.00%	8.02			-8.02	8.02		0.00	0.00	0.00	0.00
11		1077.58	1077.58	1085.66	1085.66	9.00%	8.08			-8.08	8.08		0.00	0.00	0.00	0.00
12		1085.66	1085.66	1093.81	1093.81	9.00%	8.14			-8.14	8.14		0.00	0.00	0.00	0.00
13		1093.81	1093.81	1102.01	1102.01	9.00%	8.20			-8.20	8.20		0.00	0.00	0.00	0.00
14		1102.01	1102.01	1110.28	1110.28	9.00%	8.27			-8.27	8.27		0.00	0.00	0.00	0.00
15		1110.28	1110.28	1118.60	1118.60	9.00%	8.33			-8.33	8.33		0.00	0.00	0.00	0.00
16		1118.60	1118.60	1126.99	1126.99	9.00%	8.39			-8.39	8.39		0.00	0.00	0.00	0.00
17		1126.99	1126.99	1135.44	1135.44	9.00%	8.45			-8.45	8.45		0.00	0.00	0.00	0.00
18		1135.44	1135.44	1143.96	1143.96	9.00%	8.52			-8.52	8.52		0.00	0.00	0.00	0.00
19		1143.96	1143.96	1152.54	1152.54	9.00%	8.58			-8.58	8.58		0.00	0.00	0.00	0.00
20		1152.54	1152.54	1161.18	1161.18	9.00%	8.64			-8.64	8.64		0.00	0.00	0.00	0.00
21		1161.18	1161.18	1169.89	1169.89	9.00%	8.71			-8.71	8.71		0.00	0.00	0.00	0.00
22		1169.89	1169.89	1178.67	1178.67	9.00%	8.77			-8.77	8.77		0.00	0.00	0.00	0.00
23		1178.67	1178.67	1187.51	1187.51	9.00%	8.84			-8.84	8.84		0.00	0.00	0.00	0.00
24		1187.51	1187.51	1196.41	1196.41	9.00%	8.91			-8.91	8.91		0.00	0.00	0.00	0.00
25		1196.41	1196.41	1205.39	1205.39	9.00%	8.97			-8.97	8.97		0.00	0.00	0.00	0.00
26		1205.39	1205.39	1214.43	1214.43	9.00%	9.04			-9.04	9.04		0.00	0.00	0.00	0.00
27		1214.43	1214.43	1223.54	1223.54	9.00%	9.11			-9.11	9.11		0.00	0.00	0.00	0.00
28		1223.54	1223.54	1232.71	1232.71	9.00%	9.18			-9.18	9.18		0.00	0.00	0.00	0.00
29		1232.71	1232.71	1241.96	1241.96	9.00%	9.25			-9.25	9.25		0.00	0.00	0.00	0.00
30		1241.96	1241.96	1251.27	1251.27	9.00%	9.31			-9.31	9.31		0.00	0.00	0.00	0.00

Once the preliminary amortisation table has been obtained, the user can overwrite manually the values in the table for all those variables with a title shaded in yellow (drawdowns, borrowing rate and other costs). That is to say, the user can manually add, change or delete drawdowns at specific periods, change the borrowing rate, add new costs or replace or change existing costs. However, the rest of the variables should not be changed manually (i.e. period, balances, interest charges, payments, and cash flows) because the consistency of the table would be at risk and the simulator might provide incorrect information at this stage and at the third stage. Also, in order to obtain the APR, the manual changes introduced by the user should still conform the assumptions for the calculation of the APR indicated in the area 'Description of the credit product'.

By way of illustration, the borrowing rate of our credit of €1000 could be increased from 9% to 12% from the second year (from period 13) by changing the data highlighted in red in Figure 12. The use of two different borrowing rates in this case is coherent with the assumptions for the calculation of the APR[85].

[85] This is because lower rates should not be discarded on the basis of assumption (i), as this assumption is not applicable to this case. For an explanation see example 29 of the study and the Guidelines on the application of Directive 2008/48/EC.

Figure 12. Second stage: An example with manual changes

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	1007.50	9.00%	7.50			-7.50	7.50		0.00	0.00	0.00	0.00
2		1007.50	1007.50	1015.06	1015.06	9.00%	7.56			-7.56	7.56		0.00	0.00	0.00	0.00
3		1015.06	1015.06	1022.67	1022.67	9.00%	7.61			-7.61	7.61		0.00	0.00	0.00	0.00
4		1022.67	1022.67	1030.34	1030.34	9.00%	7.67			-7.67	7.67		0.00	0.00	0.00	0.00
5		1030.34	1030.34	1038.07	1038.07	9.00%	7.73			-7.73	7.73		0.00	0.00	0.00	0.00
6		1038.07	1038.07	1045.85	1045.85	9.00%	7.79			-7.79	7.79		0.00	0.00	0.00	0.00
7		1045.85	1045.85	1053.70	1053.70	9.00%	7.84			-7.84	7.84		0.00	0.00	0.00	0.00
8		1053.70	1053.70	1061.60	1061.60	9.00%	7.90			-7.90	7.90		0.00	0.00	0.00	0.00
9		1061.60	1061.60	1069.56	1069.56	9.00%	7.96			-7.96	7.96		0.00	0.00	0.00	0.00
10		1069.56	1069.56	1077.58	1077.58	9.00%	8.02			-8.02	8.02		0.00	0.00	0.00	0.00
11		1077.58	1077.58	1085.66	1085.66	9.00%	8.08			-8.08	8.08		0.00	0.00	0.00	0.00
12		1085.66	1085.66	1093.81	1093.81	9.00%	8.14			-8.14	8.14		0.00	0.00	0.00	0.00
13		1093.81	1093.81	1104.74	1104.74	12.00%	10.94			-10.94	10.94		0.00	0.00	0.00	0.00
14		1104.74	1104.74	1115.79	1115.79	12.00%	11.05			-11.05	11.05		0.00	0.00	0.00	0.00
15		1115.79	1115.79	1126.95	1126.95	12.00%	11.16			-11.16	11.16		0.00	0.00	0.00	0.00
16		1126.95	1126.95	1138.22	1138.22	12.00%	11.27			-11.27	11.27		0.00	0.00	0.00	0.00
17		1138.22	1138.22	1149.60	1149.60	12.00%	11.38			-11.38	11.38		0.00	0.00	0.00	0.00
18		1149.60	1149.60	1161.10	1161.10	12.00%	11.50			-11.50	11.50		0.00	0.00	0.00	0.00
19		1161.10	1161.10	1172.71	1172.71	12.00%	11.61			-11.61	11.61		0.00	0.00	0.00	0.00
20		1172.71	1172.71	1184.44	1184.44	12.00%	11.73			-11.73	11.73		0.00	0.00	0.00	0.00
21		1184.44	1184.44	1196.28	1196.28	12.00%	11.84			-11.84	11.84		0.00	0.00	0.00	0.00
22		1196.28	1196.28	1208.24	1208.24	12.00%	11.96			-11.96	11.96		0.00	0.00	0.00	0.00
23		1208.24	1208.24	1220.33	1220.33	12.00%	12.08			-12.08	12.08		0.00	0.00	0.00	0.00
24		1220.33	1220.33	1232.53	1232.53	12.00%	12.20			-12.20	12.20		0.00	0.00	0.00	0.00
25		1232.53	1232.53	1244.85	1244.85	12.00%	12.33			-12.33	12.33		0.00	0.00	0.00	0.00
26		1244.85	1244.85	1257.30	1257.30	12.00%	12.45			-12.45	12.45		0.00	0.00	0.00	0.00
27		1257.30	1257.30	1269.88	1269.88	12.00%	12.57			-12.57	12.57		0.00	0.00	0.00	0.00
28		1269.88	1269.88	1282.57	1282.57	12.00%	12.70			-12.70	12.70		0.00	0.00	0.00	0.00
29		1282.57	1282.57	1295.40	1295.40	12.00%	12.83			-12.83	12.83		0.00	0.00	0.00	0.00
30		1295.40	1295.40	1308.35	1308.35	12.00%	12.95			-12.95	12.95		0.00	0.00	0.00	0.00

As stated before, the new information entered by the user will be considered in the third stage as long as the periods covered in the preliminary amortisation table also appear in the final amortisation table. That is, in non open-end credit agreements with repayments given as a percentage of the balance outstanding or as a constant amount known in advance, new periods could be added in the third stage or existing periods could be removed in order to guarantee a full repayment of the credit in the last period. Obviously, the new periods will not include information other than that entered in the first stage, and the periods deleted will be removed together with the values entered by the user in the second stage in respect to these periods. In our example, the duration of 30 periods was considered large enough (longer than the real duration) and hence, we expect that some of these periods will be deleted. As a result, we expect the borrowing rate of 12% to be respected for the last periods of the final amortisation table.

THIRD STAGE

In the third stage the internal procedures run by the simulator allow to obtain the final amortisation table of the credit and the APR. These procedures are launched by clicking on the button *Calculate* in the area 'Calculate repayments and APR'.

Figure 13. Third stage: Button Calculate

As in the second stage, a check for errors in the information provided in the first stage is carried out at the beginning. If errors in this information are detected the procedures are aborted. However, the changes in the preliminary amortisation table entered by the user in

the second stage are not checked for consistency because of the infinite number of potential variations.

The action following the errors check consists of:

- If the credit is repaid by constant, increasing or decreasing instalments, the duration of the credit entered by the user in the first stage is respected, and the simulator obtains the instalments which pay off the credit in the last period (i.e., the final balance of the credit in the last period is zero). The amortisation table is updated and the amount of the first repayment of the credit is shown in the area 'Main results' as *Amount of the first repayment*.

- For non open-end credit agreements with repayment given as a percentage of the balance outstanding or as a constant amount known in advance, the scheme and definition of repayments entered by the user in the first stage are respected, and the simulator increases or decreases the number of periods in order to ensure full repayment of the credit in the last period (i.e., the final balance of the credit in the last period is zero). If it requires reducing the amount of the last repayment (or the previous one if the credit agreement includes a given final payment), the simulator does it automatically. The amortisation table is updated and the duration of the credit is shown in the area 'Main results' as *Duration of the credit*; also, it is copied to the cell with the duration of the credit agreement in the area 'Description of the credit product', in order to facilitate the design of new credit agreements with similar characteristics. Note that for these credits the cell *Amount of the first repayment* is kept empty because this amount is not confirmed nor determined by the simulator.

- For the rest of credit agreements, all the features of the credit entered by the user in the previous stages are respected, including the duration of the credit and, as in the previous case, the cell *Amount of the first repayment* is kept empty.

Finally, for all types of credit agreements the simulator calculates the APR and other relevant information of the credit, which is shown in the area 'Main results'. These other pieces of information include the total cost of the credit, the total amount of the credit and the total amount payable by the consumer (defined as the sum of these two last amounts).

Our example was that of a non open-end credit agreement with repayments given as a percentage of the balance outstanding. Hence, the simulator determines the number of periods and adapts the amortisation table accordingly. As expected, the final number of periods is lower than 30; specifically it is 16, as shown in Figure 14. Thus, periods 17 to 30 have been deleted, including all the information introduced manually for these periods. Notwithstanding, the higher borrowing rate of 12% is kept for the last periods of the agreement. Also note that the last repayment determined by the simulator, amounting to €5.96, is lower than the minimum payment of €20 because a lower amount is due. The area of ‘Main results’ reveals that the APR of the credit is 16.9%.

Figure 14. Third stage: An example with manual changes

Main results

Caution: This information might not be valid if changes have been made after pressing the button 'Calculate' and, as a result, the Final balance at the last period and/or the Present value of the cash flows are not zero. Cautionary notes are shown if this happens. Use the buttons 'Recalculate' to solve these situations.

Final balance in the last period	0.00		
Amount of the first repayment	[redacted]		Recalculate
Duration of the credit	16	MONTHS	
Present value of the cash flows	0.00		
Annual Percentage Rate of Charge	16.9%	DYNAMIC	Recalculate
Total cost of the credit	61.35		
Total amount of credit	1000.00		
Total amount payable	1061.35		

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.82
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.74
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.72
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.86
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.65
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.89
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.66
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.22
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.97
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.46
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.31
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.66
13		65.90	65.90	66.56	45.90	12.00%	0.66			20.00	0.66	20.66	0.00	20.66	-20.66	-17.45
14		45.90	45.90	46.36	25.90	12.00%	0.46			20.00	0.46	20.46	0.00	20.46	-20.46	-17.06
15		25.90	25.90	26.16	5.90	12.00%	0.26			20.00	0.26	20.26	0.00	20.26	-20.26	-16.67
16		5.90	5.90	5.96	0.00	12.00%	0.06			5.90	0.06	5.96	0.00	5.96	-5.96	-4.84

Once the actions have been carried out, the user still has control over the characteristics of the credit and the amortisation table. That is, the user can still change the dynamic cells in the input area and the variables with a title shaded in yellow in the amortisation table, and so see the effect of these changes on the credit. In the area of 'Main results' the cell *Annual Percentage Rate of Charge* is, besides, a dynamic cell, meaning that the user can change the APR and see immediately the effects of this change on the present value of cash flows. Finally, the repayments of the credit obtained after clicking on the button *Calculate* can also be changed (column Payments/Repayment of the credit/Total; its title is in a blue font).

However, it should be noted that any change made after clicking on the button *Calculate* might mean that the credit is not fully repaid in the last period and/or the present value of cash flows is not zero and hence, neither the amortisation table nor the information shown in the area 'Main results' are valid any longer.

In order to report these situations and address them, in the area of 'Main results', the *Final balance in the last period* and the *Present value of cash flows* are shown and two additional buttons are provided. When the changes made after clicking on the button *Calculate* imply that the credit is not repaid exactly at the last period, an error message in red font appears next to the *Final balance in the last period*, which obviously becomes non zero. To solve this situation, the button *Recalculate* next to the cell with the *Amount of the first repayment* is able to provide a new value of the first repayment which makes the *Final balance in the last period* equal to zero (thus assuring a full repayment of the credit) in credits with constant, increasing or decreasing instalments (the types of credit for which this first repayment is reported). For other credits the solution should be achieved manually. When the changes make the APR obtained not to be longer valid then an error message in red font appears next to the *Present*

value of cash flows, which becomes non zero. The button *Recalculate* next to the cell with the *Annual Percentage Rate of Charge* allows a new valid APR to be obtained which makes the *Present value of cash flows* equal to zero in any type of credit. In both cases, the number of periods of the credit remains the same.

As an illustration, Figure 15 shows the outcome of increasing the borrowing rate for periods 13 to 16 up to 15%. The final balance in the last period and the present value of the cash flows become non-zero, and the two error messages appear.

Figure 15. Third stage: Changes after clicking on the button Calculate (I)

Main results

Caution: This information might not be valid if changes have been made after pressing the button 'Calculate' and, as a result, the Final balance at the last period and/or the Present value of the cash flows are not zero. Cautionary notes are shown if this happens. Use the buttons 'Recalculate' to solve these situations.

Final balance in the last period	0.01	Caution: The credit is not repaid in full because the final balance in the last period is not zero.	Error message about repayment
Amount of the first repayment		Recalculate	
Duration of the credit	16 MONTHS		
Present value of the cash flows	-0.28	Caution: The APR is not valid because the present value of the cash flows is not zero.	Error message about APR
Annual Percentage Rate of Charge	16.9% DYNAMIC	Recalculate	
Total cost of the credit	61.68		
Total amount of credit	1000.00		
Total amount payable	1061.68		

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.82
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.74
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.72
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.86
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.65
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.89
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.66
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.22
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.97
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.46
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.31
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.66
13		65.90	65.90	66.72	45.90	15.00%	0.82			20.00	0.82	20.82	0.00	20.82	-20.82	-17.59
14		45.90	45.90	46.47	25.90	15.00%	0.57			20.00	0.57	20.57	0.00	20.57	-20.57	-17.15
15		25.90	25.90	26.22	5.90	15.00%	0.32			20.00	0.32	20.32	0.00	20.32	-20.32	-16.72
16		5.90	5.90	5.97	0.01	15.00%	0.07			5.88	0.07	5.96	0.00	5.96	-5.96	-4.84

To solve the errors, first change the amount of the last repayment manually, as shown in Figure 16. To provide full repayment of the credit in the last period, for this period substitute the amount of the last payment in the column with the *Total* of *Repayment of the credit* (its title is in a blue font and their values can be changed after clicking on the button *Calculate*, as stated before) by the reference to the cell where the amount of €5.97 of *Balance Outstanding (capital plus interest)* appears. That is, enter the formula =$E$124 in cell M124. As a result, the last payment coincides with the amount which is due and hence the *Final Balance* becomes 0, meaning that the credit is repaid exactly, and the first error message disappears.

Figure 16. Third stage: Changes after clicking on the button Calculate (II)

Main results

Caution: This information might not be valid if changes have been made after pressing the button 'Calculate' and, as a result, the Final balance at the last period and/or the Present value of the cash flo
zero. Cautionary notes are shown if this happens. Use the buttons 'Recalculate' to solve these situations.

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	16 MONTHS	
Present value of the cash flows	-0.28	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	16.9% DYNAMIC	Recalculate
Total cost of the credit	61.69	
Total amount of credit	1000.00	
Total amount payable	1061.69	

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.82
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.74
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.72
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.86
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.65
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.89
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.66
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.22
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.97
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.46
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.31
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.66
13		65.90	65.90	66.72	45.90	15.00%	0.82			20.00	0.82	20.82	0.00	20.82	-20.82	-17.59
14		45.90	45.90	46.47	25.90	15.00%	0.57			20.00	0.57	20.57	0.00	20.57	-20.57	-17.15
15		25.90	25.90	26.22	5.90	15.00%	0.32			20.00	0.32	20.32	0.00	20.32	-20.32	-16.72
16		5.90	5.90	5.97	0.00	15.00%	0.07			5.90	0.07	=$E$124	0.00	5.97	-5.97	-4.85

Afterwards, to obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 17.0% is obtained and the second error message disappears, as shown in Figure 17. Now the amortisation table is coherent.

Figure 17. Third stage: Changes after clicking on the button Calculate (III)

Main results

Caution: This information might not be valid if changes have been made after pressing the button 'Calculate' and, as a result, the Final balance at the last period and/or the Present value of the cash flows are not zero.
Cautionary notes are shown if this happens. Use the buttons 'Recalculate' to solve these situations.

Final balance in the last period	0.00	
Amount of the first repayment	[redacted]	Recalculate
Duration of the credit	16 MONTHS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	17.0% DYNAMIC	Recalculate
Total cost of the credit	61.69	
Total amount of credit	1000.00	
Total amount payable	1061.69	

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.81
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.72
3		640.00	640.00	644.80	512.00	9.00%	4.80			128.00	4.80	132.80	0.00	132.80	-132.80	-127.70
4		512.00	512.00	515.84	409.60	9.00%	3.84			102.40	3.84	106.24	0.00	106.24	-106.24	-100.84
5		409.60	409.60	412.67	327.68	9.00%	3.07			81.92	3.07	84.99	0.00	84.99	-84.99	-79.62
6		327.68	327.68	330.14	262.14	9.00%	2.46			65.54	2.46	67.99	0.00	67.99	-67.99	-62.87
7		262.14	262.14	264.11	209.72	9.00%	1.97			52.43	1.97	54.39	0.00	54.39	-54.39	-49.64
8		209.72	209.72	211.29	167.77	9.00%	1.57			41.94	1.57	43.52	0.00	43.52	-43.52	-39.20
9		167.77	167.77	169.03	134.22	9.00%	1.26			33.55	1.26	34.81	0.00	34.81	-34.81	-30.95
10		134.22	134.22	135.22	107.37	9.00%	1.01			26.84	1.01	27.85	0.00	27.85	-27.85	-24.44
11		107.37	107.37	108.18	85.90	9.00%	0.81			21.47	0.81	22.28	0.00	22.28	-22.28	-19.30
12		85.90	85.90	86.54	65.90	9.00%	0.64			20.00	0.64	20.64	0.00	20.64	-20.64	-17.65
13		65.90	65.90	66.72	45.90	15.00%	0.82			20.00	0.82	20.82	0.00	20.82	-20.82	-17.57
14		45.90	45.90	46.47	25.90	15.00%	0.57			20.00	0.57	20.57	0.00	20.57	-20.57	-17.13
15		25.90	25.90	26.22	5.90	15.00%	0.32			20.00	0.32	20.32	0.00	20.32	-20.32	-16.71
16		5.90	5.90	5.97	0.00	15.00%	0.07			5.90	0.07	5.97	0.00	5.97	-5.97	-4.84

As another functionality of the simulator, the user might only want to obtain the APR from the value of drawdowns and the value of repayments and payments of charges. In this case, the user should follow the three stages (this is necessary to define the repayment periods and the number of periods shown in the amortisation table) and then delete all the columns of the amortisation table except for those columns whose titles are in red font; then the user enters his or her own data at least in the columns whose titles are in blue font; finally he clicks on the button *Recalculate* next to the cell with the value of the APR to obtain a valid APR which equates the present value of drawdowns to the present value of repayments and payments of charges. This is illustrated in Figure 18, which shows the step-by-step explanations to obtain the APR of example 24 of the study. This example is of a credit agreement for a total amount of credit of €1000 repayable in two instalments of €500 after one year and €700 after two years. The total amount of the credit is draw down immediately and in full on conclusion of the agreement and further drawdowns are not allowed.

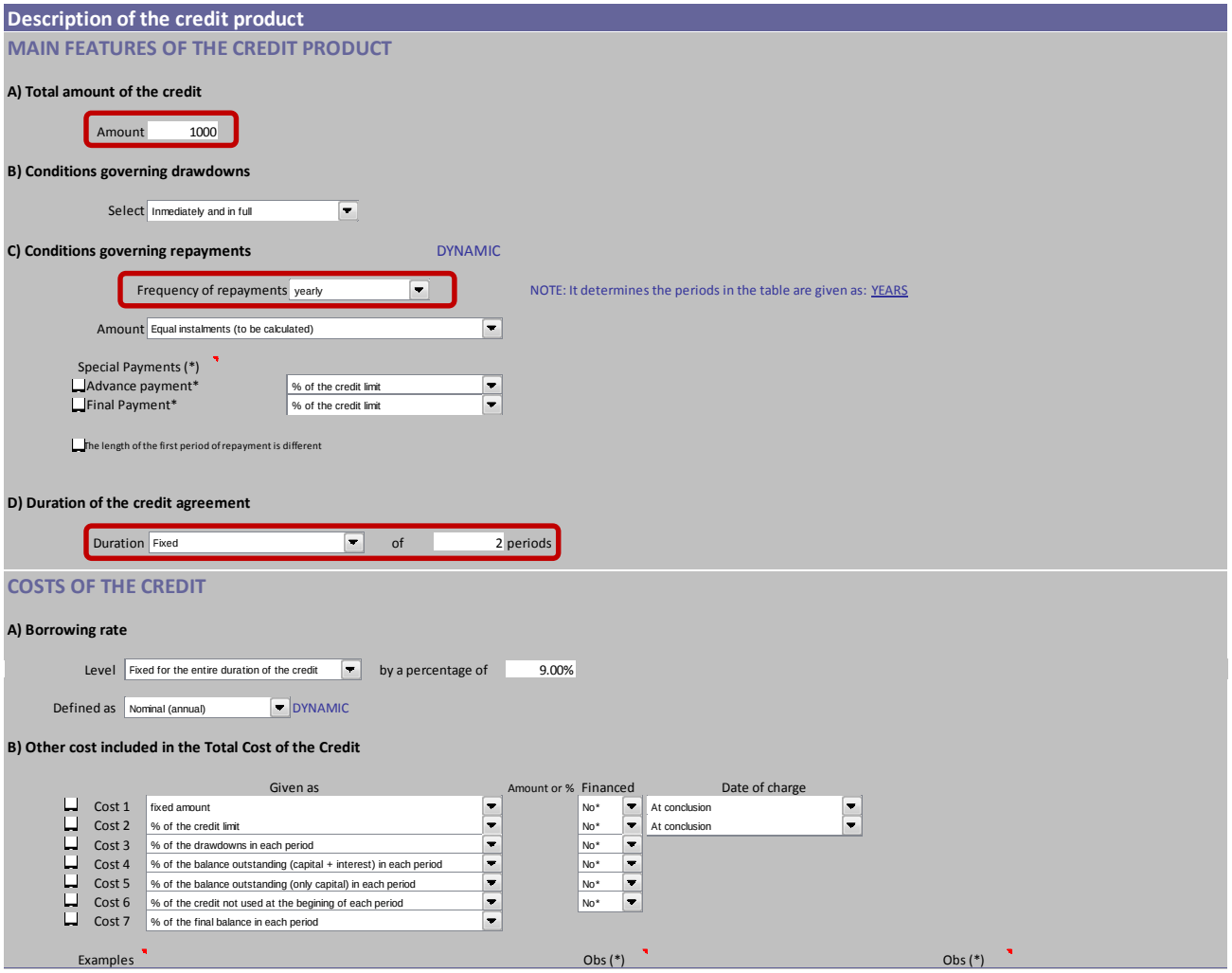
Figure 18. Obtaining the APR from the value of drawdowns and the value of repayments and payments of charges

EXAMPLE 24

This example requires changing manually the values in the amortisation table.

As a first step, click on the button *Reset* and then enter the information highlighted in red.

Do not specify the *Amount* of the repayments, as they will be entered manually in the amortisation table.



Click on the buttons *Generate* and then *Calculate* to obtain the preliminary results and amortisation table.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	568.47	Recalculate
Duration of the credit	2 YEARS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.0% DYNAMIC	Recalculate
Total cost of the credit	136.94	
Total amount of credit	1000.00	
Total amount payable	1136.94	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1090.00	521.53	9.00%	90.00			478.47	90.00	568.47	0.00	568.47	-568.47	-521.53
2		521.53	521.53	568.47	0.00	9.00%	46.94			521.53	46.94	568.47	0.00	568.47	-568.47	-478.47

In the amortisation table, delete the cells highlighted in red. Be aware of not deleting the cells under variables titled in red font (*Period, Costs not financed, Total*, and the two columns of *Cash flows*), as these cells cannot be changed under any circumstance.

Main results

Final balance in the last period	0.00	
Amount of the first repayment	568.47	Recalculate
Duration of the credit	2 YEARS	
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	9.0% DYNAMIC	Recalculate
Total cost of the credit	136.94	
Total amount of credit	1000.00	
Total amount payable	1136.94	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00								0.00	0.00	1000.00	1000.00
1		1000.00	1000.00	1090.00	521.53	9.00%	90.00			478.47	90.00	568.47	0.00	568.47	-568.47	-521.53
2		521.53	521.53	568.47	0.00	9.00%	46.94			521.53	46.94	568.47	0.00	568.47	-568.47	-478.47

Now enter the two repayments of €500 and €700 in the rows corresponding to periods 1 and 2 of the amortisation table.

Note that due to these changes, the area of *Main results* reports the error that *the APR is not valid because the present value of the cash flows is not zero*.

Main results

Final balance in the last period	0.00	
Amount of the first repayment		Recalculate
Duration of the credit	2	YEARS
Present value of the cash flows	-47.89	Caution: The APR is not valid because the present value of the cash flows is not zero.
Annual Percentage Rate of Charge	9.0%	DYNAMIC Recalculate
Total cost of the credit	200.00	
Total amount of credit	1000.00	
Total amount payable	1200.00	

Amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00												0.00	0.00	1000.00	1000.00
1												500.00	0.00	500.00	-500.00	-458.71
2												700.00	0.00	700.00	-700.00	-589.17

To obtain the correct APR, click on the button *Recalculate* next to the cell showing the *Annual Percentage Rate of Charge*. A new APR of 12.3% is obtained and the error message disappears.

Main results

Final balance in the last period	0.00	
Amount of the first repayment		Recalculate
Duration of the credit	2	YEARS
Present value of the cash flows	0.00	
Annual Percentage Rate of Charge	12.3%	DYNAMIC Recalculate
Total cost of the credit	200.00	
Total amount of credit	1000.00	
Total amount payable	1200.00	

Amortisation table

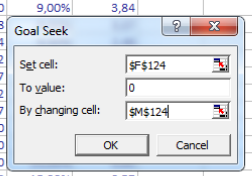
Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00												0.00	0.00	1000.00	1000.00
1												500.00	0.00	500.00	-500.00	-445.15
2												700.00	0.00	700.00	-700.00	-554.85

Finally, the simulator allows for other possibilities through the Excel tool Goal Seek. This tool allows to obtain the value of a variable, which makes another variable or function whose value depends on it, to take a specific value.

For example, the amount of the last repayment of the credit with the borrowing rates of 15% for periods 13 to 16 could be obtained using this tool as shown in Figure 19. Run Goal Seek with *Set cell*=Final balance in the last period cell (cell $F$124), *To value* = 0, and *By changing cell* = cell with the last repayment (cell $M$124). A final repayment of €5.97 will be obtained, as previously.

Figure 19. Using the tool Goal Seek

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
105			Balance				Interest on capital		Other costs		Payments					Cash flows	
106											Repayment of the credit						
107	Period	Drawdowns	Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
108	0	1000,00				1000,00			25,00					25,00	25,00	975,00	975,00
109	1		1000,00	1000,00	1007,50	800,00	9,00%	7,50			200,00	7,50	207,50	0,00	207,50	-207,50	-204,82
110	2		800,00	800,00	806,00	640,00	9,00%	6,00			160,00	6,00	166,00	0,00	166,00	-166,00	-161,74
111	3		640,00	640,00	644,80	512,00	9,00%	4,80			128,00	4,80	132,80	0,00	132,80	-132,80	-127,72
112	4		512,00	512,00	515,84	409,60	9,00%	3,84			102,40	3,84	106,24	0,00	106,24	-106,24	-100,86
113	5		409,60	409,60	412,67	327,68					81,92	3,07	84,99	0,00	84,99	-84,99	-79,65
114	6		327,68	327,68	330,14	262,14					65,54	2,46	67,99	0,00	67,99	-67,99	-62,89
115	7		262,14	262,14	264,11	209,72					52,43	1,97	54,39	0,00	54,39	-54,39	-49,66
116	8		209,72	209,72	211,29	167,77					41,94	1,57	43,52	0,00	43,52	-43,52	-39,22
117	9		167,77	167,77	169,03	134,22					33,55	1,26	34,81	0,00	34,81	-34,81	-30,97
118	10		134,22	134,22	135,22	107,37					26,84	1,01	27,85	0,00	27,85	-27,85	-24,46
119	11		107,37	107,37	108,18	85,90					21,47	0,81	22,28	0,00	22,28	-22,28	-19,31
120	12		85,90	85,90	86,54	65,90					20,00	0,64	20,64	0,00	20,64	-20,64	-17,66
121	13		65,90	65,90	66,72	45,90					20,00	0,82	20,82	0,00	20,82	-20,82	-17,59
122	14		45,90	45,90	46,47	25,90	15,00%	0,57			20,00	0,57	20,57	0,00	20,57	-20,57	-17,15
123	15		25,90	25,90	26,22	5,90	15,00%	0,32			20,00	0,32	20,32	0,00	20,32	-20,32	-16,72
124	16		5,90	5,90	5,97	0,01	15,00%	0,07			5,88	0,07	5,96	0,00	5,96	-5,96	-4,84



4.4. THE AMORTISATION TABLE

The amortisation table provides a set of variables which describe the evolution of the credit over time with respect to drawdowns, balances, financed and non-financed charges, repayments and net cash flows. This information goes beyond that required by the Directive for amortisation tables to be provided to consumers with credit agreements of a fixed duration (Article 10 (i)).

Figure 20. The amortisation table

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	1000.00				1000.00			25.00					25.00	25.00	975.00	975.00
1		1000.00	1000.00	1007.50	800.00	9.00%	7.50			200.00	7.50	207.50	0.00	207.50	-207.50	-204.82
2		800.00	800.00	806.00	640.00	9.00%	6.00			160.00	6.00	166.00	0.00	166.00	-166.00	-161.74

The description of the variables is as follows:

- Period: Each time interval within the duration of the credit. Period 0 refers to the starting date of the credit. Although it does not have an influence on the APR or other variables, according to remark (b) in part I of Annex I, it should be the period of the first drawdown. Except for the first period (which may be specified as different by the user), the lengths of the periods are equal and are assumed to be given by the frequency of repayments of the credit (e.g. weekly, monthly, annually).

- Drawdown: The sum of drawdowns of the credit in each period. When an advance payment to the creditor is required by the agreement, the amount of this payment is deducted from drawdowns in period 0, so that this amount is not included in the financing process.

- Balance: Balance of the credit, according to different definitions:

    - *Initial balance* is the balance at the end of the previous period.

    - *Outstanding balance (only capital)* is the balance prior to repayment and payment of the charge of any costs, and hence it includes the initial balance plus drawdowns in the period.

    - *Outstanding balance (capital + interest)* is the outstanding balance of only capital plus interest charges over the period.

    - *Final balance* is the amount owed at the end of the period and hence it is defined as the outstanding balance of capital plus interest charges minus the repayment of the credit including capital and interest made in the period (or, alternatively, the balance outstanding of only capital minus capital amortisation) plus the costs financed with the credit in the period (that is, costs charged but not paid from other resources of the consumer).

  The use of different definitions for the balance of the credit is justified by the numerous ways in which costs are defined. For example, maintenance fees in credit cards are usually given as 'Fixed amount' payable at 'Regular' intervals of 1 year 'in advance'; maintenance fees of credit accounts are usually given as a '% of the credit limit' payable at 'Regular' intervals of 1 month or 1 year and 'in arrears'; payment protection insurance (PPI) in revolving credit agreements is usually given as a '% of the final balance in each period', or PPI in instalment credit agreements is usually given as a 'Fixed amount' payable 'At conclusion' and 'Financed'.

  In this regard also note that: i) non-financed non-interest costs are excluded from any definition of outstanding balance because it is assumed that they are paid in full when they are charged and hence, they never imply a change of the amount owed; ii) financed costs imply a change in the amount owed at the end of the period (thus, they are included in the final balance).

- Interest: This includes

    - *Borrowing rate*: annual borrowing rate which applies to the amount owed at the beginning of each period (initial balance) expressed as a percentage and defined according to the information entered by the user.

- *Interest charges:* charges of the credit generated in the period and calculated on the basis of the borrowing rate[86].

- Other costs: Costs other than interest charged in each period. These can be:
  - *Not financed*: If a cost is not financed, it means that it is paid when it is charged, being added to the amount of the repayment of the credit to obtain the total payment made by the consumer.
  - *Financed*: If a cost is financed, when it is charged it is added to the amount owed. It is assumed that financed costs are charged after the repayment in the period, and hence they are included in the final balance of the period. Given this dependence between financed cost and the final balance, costs given as a percentage of the final balance cannot be financed (in order to avoid circular references), and in the last period of repayment of the credit (where the final balance should be zero) financed costs are omitted (they are assumed to be zero).

- Payments: Payments made by the borrower in each period in respect of:
  - *Repayment of the credit*: This includes the payments for interest and capital amortisation made by the borrower according to the repayment scheme defined by the user. It should be highlighted that if the repayment of the credit is not enough to pay the interest charges, the part of these charges unpaid implies an increase in the capital of the credit, and so the capital amortisation will be negative, meaning that instead of an amortisation (reduction) of the capital there is an increase in the capital owed.
  - *Other costs not financed*: they are a part of the payments in the period because, as stated above, they are paid as soon as (in the same period) they are charged.
  - *Total*: Sum of the repayment of the credit and the cost not financed, rounded to two decimals (euro cents).

- Cash flows:
  - *Value at each period*: Net amount received by the borrower in each period, defined as the sum of drawdowns of the credit minus the sum of total payments for the credit (for repayment of the credit and costs not financed).
  - *Present value*: The previous net amounts valued (discounted) at period 0 using the APR.

[86] The simulator assumes that these charges depend on the length of each period and hence, a first payment period of different length will imply different interest charges for such a period. Other cases might be covered by the simulator manually.

Other relevant comments about the amortisation table are the following:

- Except for borrowing rates and periods, all the values in the amortisation table refer to amounts.
- Values are assumed to refer to end of period values, except for the borrowing rate. As stated above, the borrowing rate specified for a period is the rate used to calculate interest charges over that period. Note that assuming values for end of periods implies that the simulator is unable to treat cash flows which take place before a period ends.

Finally, it should be noted that titles in the amortisation table are shaded in different colors and also use different font colors to indicate the possibility of changing the information at different stages as follows:

- If a title is shaded in yellow: the values can be changed by the user after obtaining the preliminary amortisation table (second stage, i.e. button *Generate*) and before calculating repayments and APR (third stage, i.e. button *Calculate*), as these value will be respected to obtain the repayments and APR. They can also be changed after calculating the repayments and APR, together with the values of the repayments of the credit (column Payments/Repayment of the credit/Total; its title is in a blue font) and any dynamic cell in the input area, but in this case it might be necessary to click on the buttons *Recalculate* to obtain a coherent amortisation table.
- If a title is in red font: the values cannot be changed under any circumstance.
- If a title is in blue font: information needed to obtain the APR only from drawdowns, repayments and payments of charges. In this case, all the columns in the table can be deleted except for those columns with a title in red font, then the user enter manually the information on drawdowns, repayments and payment of charges and finally he clicks on the button *Recalculate* next to the cell with the value of the APR to obtain a valid APR which equates the present value of drawdowns to the present value of repayments and payments of charges.

4.5. BRIEF INSTRUCTIONS

Obtaining the amortisation table and the APR of a credit agreement using this simulator consists of three stages.

During the three stages, you should read the explanatory notes and the assumptions applicable and provide information consistent with them in order to obtain the APR. Also, any error highlighted in red should be solved before proceeding.

STAGE 1

Enter the characteristics of the credit product in the area 'Description of the credit product'.

Notes:

- The frequency of the repayment of the credit determines the length of the regular periods shown in the amortisation table.

- All the periods are assumed to have the same duration except for the first period of repayment if you specified so.

- The duration of the credit is definitive for overdraft facilities with an unknown duration and open-end credit agreements (whose duration is automatically specified by the simulator on the basis of the assumptions for the calculation of the APR) and also for non open-end credit agreements, except for those whose repayments are given as a percentage of the balance outstanding or as a constant amount known in advance. For these excepted credits, the software will determine in stage 3 the duration which makes the full repayment of the credit possible in the last period. For this reason, for these credits you can enter a rough estimation of the duration of the credit or just the number of periods you want to see in the preliminary amortisation table, which will be obtained in stage 2.

STAGE 2

Click on the button *Generate* in the area 'Generate amortisation table' to obtain a preliminary amortisation table from the information provided in stage 1.

Notes:

- The new table will replace any existing information in the table by the information provided in stage 1.

- Once the preliminary amortisation table has been generated, you can change manually the information in the table for all those variables with a title shaded in yellow (drawdowns, borrowing rate and other costs). The rest of the variables should not be changed for consistency of the simulator. The information introduced in this way will be considered in stage 3 as long as the periods covered in the preliminary amortisation table also appear in the final amortisation table.

STAGE 3

Click on the button *Calculate* in the area 'Calculate repayments and APR' to obtain the APR and other relevant information about the credit.

Notes:

- For credits payable in equal, increasing or decreasing instalments, the simulator will obtain the instalments which pay off the credit in the last period according to the duration specified by the user. In stage 3 the amortisation table is updated and the amount of the first repayment of the credit is shown in the area 'Main results'.

- For non open-end credits with the repayment given as a percentage of the balance outstanding or as a constant amount known in advance, the simulator respects the scheme and definition of repayments entered in stage 1 and increases or decreases the number of periods in order to ensure full repayment of the credit in the last period. In stage 3 the amortisation table is updated and the duration of the credit is shown in the area 'Main results'; the duration is also copied to the cell with the duration of the credit

agreement in the area 'Description of the credit product' in order to facilitate the design of new credit agreements with similar characteristics.

- For all credit agreements the simulator displays the APR and other relevant information of the credit in the area 'Main results'.

AFTER STAGE 3

Once stage 3 is finished, you have control of the characteristics of the credit and the amortisation table. That is, it is possible to change the dynamic cells in the input area and the variables with a title shaded in yellow and also the repayments of the credit in the column *Payments/Repayment of the credit/Total* in the amortisation table. This allows you to view the effect of these changes on the credit.

Since these changes might mean that the credit is not fully repaid in the last period or the present value of cash flows is not equal to zero, you should be aware of any message in red next to the buttons *Recalculate* in the area of 'Main results'. If a message appears, it will be necessary to recalculate the amount of the first repayment or the APR clicking on the corresponding button.

4.6. Q&A

Following there is a list of frequent Q&A on the simulator.

- *Protection:* The simulator is locked to preserve its integrity and functionality; it is not foreseen to provide an unlocked version.

- *Calculation of interest charges by the simulator uses compound interest:* Yes, the simulator uses a nominal annual rate which is charged periodically using a proportional conversion method OR an effective annual rate which is charged periodically using the corresponding compounding frequency. Other rules or practices are not considered, but can be entered manually by the user (e.g. simple interest).

- *Frequency of payments/capitalization of interest*: The simulator uses five different frequencies for payments and capitalization of interest, namely weekly, monthly, quarterly, half-yearly and yearly. Other frequencies are not foreseen. However, credits with other frequencies might be solved using equivalences and manual changes. For example, daily capitalization of interest can be addressed converting nominal rates to effective rates (see approach 2 of example 10 of the study) and a single payment in some days can be addressed using a first period of different length (see approach 1 of the same example).

- *Interest charged on a fee*: Whether interest is charged, or not, on any fee can be specified in the two places shown in Figure 21: before generating the preliminary amortisation table by choosing No/Yes in the column *Financed* corresponding to the fee, or after generating this table by entering manually the fee (without interest charges) in the columns *Not financed*/*Financed* of *Other costs* in the amortisation table. For a case of cost financed, see example 8 of the study.

Figure 21. Financed costs

B) Other cost included in the Total Cost of the Credit

Note: Costs which cannot be defined using pre-specified parameters shown here should be entered in the amortisation table manually.

Assumptions applicable

		Given as	Amount or %	Financed	Date of charge
☐	Cost 1	fixed amount		Yes*	t conclusion
☐	Cost 2	% of the credit limit		No*	t conclusion
☐	Cost 3	% of the drawdowns in each period		No*	
☐	Cost 4	% of the balance outstanding (capital + interest) in each period		No*	
☐	Cost 5	% of the balance outstanding (only capital) in each period		No*	
☐	Cost 6	% of the credit not used at the begining of each period		No*	
☐	Cost 7	% of the final balance in each period			

Examples Obs (*) Obs (*)

Period	Drawdowns	Balance				Interest on capital		Other costs		Payments					Cash flows	
										Repayment of the credit						
		Initial	Outstanding (only capital)	Outstanding (capital plus interest)	Final	Borrowing rate (%)	Interest charges	Not financed	Financed	Capital amortisation	Interest	Total	Costs not financed	Total	Value at each period	Present value
0	6000,00				6000,00								0,00	0,00	6000,00	6000,00
1		6000,00	6000,00	6045,00	5770,89	9,00%	45,00			229,11	45,00	274,11	0,00	274,11	-274,11	-272,07

- *Manual changes*: As explained in previous sections of these instructions, manual changes in the amortisation table allows a large range of variations, such as entering specific drawdowns and payments at specific periods, applying several borrowing rates, calculating interest charges using user-specific methods, including other costs financed or not, dealing with repayments and costs at different frequencies, or considering grace periods, among others.

4.7. FINAL REMARKS

- To abort any procedure, press the ESC (escape) key.
- The button *Reset* at the top of the simulator clears the input area and enters the characteristics of the default example. Clicking on this button is advisable to delete user-specific information and start from scratch.
- If the user writes on the area below the amortisation table, the information will be deleted if the *Calculate* button s clicked on.

5. LIST OF TERMS

In the following we present a list of terms elaborated for the transposition workshop on Directive 2008/48/EC held in Brussels in March 2009. The Spanish terms are added in brackets after the English version.

INTEREST RATES

- Annual Percentage Rate of Charge (APRC or APR) [ES: Tasa Anual Equivalente (TAE)]: expresses the total cost of the credit to the consumer (including interest, fees and other charges connected to the credit) as an annual percentage rate of the total amount of credit.

- Interest Charges [ES: Cargas Financieras]: charges for interest on a credit agreement. These charges depend on the borrowing rate applied to the credit, the amount owed (or capital; c.f. definition below) and the period over which interest are charged.

- Non-interest Charges [ES: Cargas no Financieras]: charges other than interest on a credit agreement. For example, administrative charges, fees for early repayment, late payment charges, membership fees, taxes, etc.

- Borrowing Rate [ES: Tipo de Interés del Crédito]: interest rate used to calculate the finance charges on a credit agreement. The borrowing rate can be expressed as an effective rate (cf. the definition below) or as a nominal rate (cf. definition below), and can be either a fixed or a variable interest rate (cf. definition below).

- Introductory Rate [ES: Tipo de Interés Inicial]: a special borrowing rate (usually lower) that applies for a limited time only, called the introductory period.

- Fixed Interest Rate *versus* Variable Interest Rate [ES: Tipo de Interés Fijo versus Tipo de Interés Variable]: Interest rate is said to be fixed when it is given as a specific percentage which applies for the entire duration of the credit or as several specific percentages which apply to different periods. If, on the contrary, the borrowing rate is not fully established at the conclusion of the credit agreement, because it might change according to an index or reference rate or other events, the borrowing rate is said to be variable.

- Simple Interest *versus* Compound Interest [ES: Tipo de Interés Simple versus Tipo de Interés Compuesto]: Simple interest refers to a situation where interest is not added to the principal of the credit (cf. definition below). Compound interest refers to the opposite situation, where interest is added to the principal of the credit, thus increasing the amount owed. Adding interest to the principal means that interest is earned on interest from that moment on. For example, if interest on a credit of initial amount (principal) P is compounded monthly at a rate of 1% per month, the amount owed at the end of the first month is P x (1+0.01), at the end of the second month is P

x (1+0.01) x (1+0.01) = P x $(1+0.01)^2$, at the end of the third month is P x $(1+0.01)^3$, and so on.

- Anatocism [ES: Anatocismo]: principle of charging interest on interest.
- Compounding [ES: Capitalización]: act of declaring interest to be added to the principal of the credit (i.e. interest is compounded).
- Compounding Frequency [ES: Frecuencia de Capitalización]: indicates how often interest is added to the principal of the credit. Usual compounding frequencies are monthly (1 month) and yearly (1 year).
- Nominal Interest Rate *versus* Effective Interest Rate (or Annual Equivalent Rate -AER-, or Effective Annual Interest Rate -EAR-) [ES: Tipo de Interés Nominal versus Tipo de Interés Efectivo (Tipo de Interés Anual Equivalente o Tipo de Interés Efectivo Anual)]: The nominal interest rate is the periodic interest rate charged on a credit multiplied by the number of periods per year. For example, a 1% interest rate per month means a nominal interest rate of 1x12=12%. The effective interest rate is the interest rate restated from the nominal interest rate as an interest rate with annual compound interest. That is, using compound interest (see definition), after one year a credit with initial amount (principal) P increases to P x $(1+0.01)^{12}$ = P x 1.1268; the effective rate is then 1.1268-1=0.1268=12.68%. Using the effective rate we obtain that the amount owed at the end of the first year is P x (1+0.1268) = P x 1.1268, as we had before, and the amount owed at the end of the second year is P x $(1+0.1268)^2$, at the end of a period of two and a half years is P x $(1+0.1268)^{2.5}$, and so on.

AMOUNTS

- Principal versus Capital [ES: Principal versus Capital]: In a credit agreement, the borrower is granted for an amount of money (known as the principal of the credit) which he has to repay with interest and maybe other charges. Depending on the terms of the agreement, these charges may be paid as they are generated or not. If they are not paid (in full or part), they accumulate (in full or part) to the principal increasing the amount owed. The amount owed is the capital. Note that capital does not include interest or other charges unless they are accumulated. For this reason, it is said that repayments include a part for the amortisation of the capital and other part for interest (for the interest generated and not accumulated). Taking into account the terms defined in Directive 2008/48/EC, the principal of the credit is the *total amount of credit* (Article 3(l)), the term capital (or amount owed) has not any corresponce with the terms in the Directive, and the sum of the payments for principal, interest and other charges is the *total amount payable by the consumer* (Article 3(h)).
- Outstanding balance [ES: Saldo Pendiente o Remanente]: the remaining debt on a credit given by the amount owed.

- Minimum payment [ES: Pago Mínimo]: the smallest proportion or amount of a credit that can be paid in each repayment date. In revolving credit, it is usually expressed as a percentage of the outstanding balance, with a minimum fixed amount.
- Credit limit [ES: Límite de Crédito]: maximum amount that can be borrowed.
- Amortization [ES: Amortización]: gradual repayment of a credit over time.

PERIODS

- Grace period [ES: Periodo de Gracia]: length of time before any payment of interest or principal on a credit becomes due.
- Early repayment [ES: Pago Anticipado]: repayment of the loan by the borrower before due date.
- Period of withdrawal (or Cooling-off period) [ES: Periodo de Reflexión o Abandono]: the time allowed for a consumer to withdraw from a credit agreement shortly after its conclusion.

CREDIT PRODUCTS

- Instalment credit [ES: Crédito Pagadero en Cuotas]: provides the borrower with fixed amount to be repaid over a given period by a fixed number of payments called instalments. Instalments are usually constant over time, but they may be also increasing, decreasing or variable in amount. Examples of instalment credits are loans and hire-purchase agreements.
- Revolving Credit (or Line of Credit or Running Account Credit) [ES: Crédito Revolvente o Rotativo]: permanent reserve of credit whose limit is authorized by the creditor; the consumer repays the sum used according to the allowances stated in the credit contract and the reserve reconstitutes itself with the progression of the repayments. For example, if you have a credit limit of €1,000, spend €300 and then repay €100, you have €800 available to borrow. Examples of revolving credit are credit cards, revolving credit accounts, and overdraft facilities.
- Overdraft [ES: Descubierto (en cuenta)]: explicit credit agreement whereby a creditor makes funds available to a consumer which exceed the current balance in the consumer's current account.
- Overrunning [ES: Excedido (en cuenta)]: not arranged, but tacitly accepted overdraft.
- Linked Credit Agreement [ES: Contrato de Crédito Vinculado (a una compra)]: credit agreement where (i) the credit in question serves exclusively to finance an agreement for the supply of specific goods or the provision of a specific service, and (ii)those two agreements form, from an objective point of view, a commercial unit; a commercial

unit shall be deemed to exist where the supplier or service provider himself finances the credit for the consumer or, if it is financed by a third party, where the creditor uses the services of the supplier or service provider in connection with the conclusion or preparation of the credit agreement, or where the specific goods or the provision of a specific service are explicitly specified in the credit agreement.

- Open-End Credit Agreement [ES: Contrato de Crédito de Duración Indefinida]: credit agreement with an unlimited period of validity.
- Point of Sale (POS) Financing [ES: Financiación en el Punto de Venta]: credit facility linked to specific purchases (car, consumer durables, etc.) offered by the vendor.

CARDS

Types of cards:

- Prepaid card [ES: Tarjeta de Prepago]: a card that allows spending money which has been previously stored in the card.
- Debit card [ES: Tarjeta de Débito]: a card used to withdraw funds directly from a current account.
- Charge card [ES: Tarjeta de Cargo]: a payment card where the balance has to be paid off without interest charges at the end of an agreed period, usually one month.
- Credit card [ES: Tarjeta de Crédito]: a card account that allows borrowing of money up to a specified limit.

Mechanisms of drawdown in cards:

- Purchases [ES: Compras]: paying for items using the card.
- Cash Advance [ES: Anticipo de Dinero]: obtaining cash on the spot by using the card at a bank or an ATM. Usually, cards charge cash advance fees for this service.
- Balance Transfer [ES: Transferencia de Balance]: moving an outstanding balance or loan from one account or card to another. Usually, cards charge a balance transfer fee for this service.
- Money Transfer [ES: Transferencia de Dinero]: transferring money from one account or card to another.

SURETIES AND INSURANCE

- Credit Insurance [ES: Seguro de Crédito]: insurance that pays any outstanding credit balance usually in the event of the death or disability of the borrower.

- Payment Protection Insurance (or Income Protection Insurance, Loan Protection Insurance or Premium Protection Insurance) [ES: Seguro de Protección de Pagos]: insurance that provides an income to maintain a borrower's debt repayments during a certain period upon the occurrence of specific events such as accident, sickness, unemployment or redundancy.
- Premium [ES: Prima]: amount paid by the consumer in return for the insurance cover.
- Secured credit [ES: Crédito Asegurado]: credit backed by assets belonging to the borrower in order to decrease the risk assumed by the creditor. The assets may be forfeited to the creditor if the borrower fails to make the necessary payments.
- Collateral [ES: Colateral o Garantía]: guarantee for a credit given by borrower's assets such as accounts, investments, properties, etc.

OTHER

- Geometric Progressions and Geometric Series [ES: Progresión Geométrica y Serie de Progresión Geométrica]: in mathematics, a geometric progression is a sequence of numbers where each term after the first is found by multiplying the previous one by a fixed non-zero number called the common ratio. For example, the sequence 2, 6, 18 and 54 is a geometric progression with common ratio 3. The sum of the terms of a geometric progression is known as a geometric series. For the example, the geometric series is 2+6+18+54. The value of a geometric series can be obtained using a compact formula.
- Macro [ES: Macro] : a program composed of a sequence of instructions and commands written in a computer programming language.
- Visual Basic for Applications (VBA) [ES: Visual Basic para Aplicaciones]: Microsoft's programming language.

ANNEX: EXAMPLES OF THE CALCULATION OF THE APR IN THE 2002 PROPOSAL

ANNEX II – Examples of calculation of the annual percentage rate of charge

Preliminary remarks

Unless otherwise stated, all examples assume a single drawdown of credit equal to the total amount of the credit and placed at the consumer's disposal as soon as the credit agreement is concluded. In this connection, it should be noted that if the credit agreement gives the consumer freedom of drawdown, the total amount of credit is deemed to be drawn down immediately and in full.

Some Member States, in order to express the borrowing rate, have opted for an effective rate and the equivalent conversion method, thus avoiding a situation in which the calculation of periodical interest is carried out in countless ways using different *pro rata temporis* rules which have only a very vague relationship with the linear nature of time. Other Member States permit a nominal periodic rate using a proportional conversion method. This directive seeks to separate any further regulation of borrowing rates from the regulation of effective rates, simply stating the rate used. The examples in this Annex refer to the method that has been used.

Example 1

Total amount of credit (capital) of € 6 000.00, repayable in four equal annual instalments of € 1 852.00.

The equation becomes:

$$6000 = 1852.\frac{1 - \frac{1}{(1+X)^4}}{X}$$

or:

$$6000 = 1852\frac{1}{(1+X)^1} + 1852\frac{1}{(1+X)^2} + ... + 1852\frac{1}{(1+X)^4}$$

giving X = 9.00000%, i.e. an APR of 9.0%.

Example 2

Total amount of credit (capital) € 6 000.00, repayable in 48 equal monthly instalments of € 149.31.

The equation becomes:

$$6000 = 149{,}31\frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{48}}}{(1+X)^{1/12} - 1}$$

or:

$$6000 = 149{,}31\frac{1}{(1+X)^{1/12}} + 149{,}31\frac{1}{(1+X)^{2/12}} + ... + 149{,}31\frac{1}{(1+X)^{48/12}}$$

giving X = 9.380593%, i.e. an APR of 9.4%.

Example 3

Total amount of credit (capital) of € 6 000.00, repayable in 48 equal monthly instalments of € 149.31. Administrative charges of € 60.00 are payable on conclusion of the contract.

The equation becomes:

$$6000 - 60 = 149{,}31\frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{48}}}{(1+X)^{1/12} - 1}$$

or:

$$5940 = 149{,}31\frac{1}{(1+X)^{1/12}} + 149{,}31\frac{1}{(1+X)^{2/12}} + ... + 149{,}31\frac{1}{(1+X)^{48/12}}$$

giving X = 9.954966%, i.e. an APR of 10%.

Example 4

Total amount of credit (capital) of € 6 000.00, repayable in 48 equal monthly instalments of € 149.31. Administrative charges of € 60.00 are spread over the repayments. The monthly instalment is therefore (€ 149.31 + (€ 60/48)) = € 150.56.

The equation becomes:

$$6000 = 150{,}56\frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{48}}}{(1+X)^{1/12} - 1}$$

or:

$$6000 = 150{,}56\frac{1}{(1+X)^{1/12}} + 150{,}56\frac{1}{(1+X)^{2/12}} + ... + 150{,}56\frac{1}{(1+X)^{48/12}}$$

giving X = 9.856689%, i.e. an APR of 9.9%.

Example 5

Total amount of credit (capital) of € 6 000.00, repayable in 48 equal monthly instalments of € 149.31. Administrative charges are € 60.00, and insurance € 3.00 per month. The costs associated with insurance premiums must be included in the total cost of the credit if the insurance is taken out when the credit agreement is concluded. The instalment is therefore €152.31.

The equation becomes:

$$5940 = 152{,}31 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{48}}}{(1+X)^{1/12} - 1}$$

or:

$$5940 = 152{,}31 \frac{1}{(1+X)^{1/12}} + 152{,}31 \frac{1}{(1+X)^{2/12}} + \ldots\ldots\ldots + 152{,}31 \frac{1}{(1+X)^{48/12}}$$

giving X = 11.1070115%, i.e. an APR of 11.1%.

Example 6

Balloon-type credit agreement for a total amount of credit of € 6 000.00 (purchasing price of a car to be financed), repayable in 47 equal monthly instalments of € 115.02 plus a final payment of € 1 915.02 representing the residual value of 30% of the capital (balloon agreement), plus insurance of € 3.00 per month. Again, the costs associated with insurance premiums must be included in the total cost of the credit if the insurance is taken out when the credit agreement is concluded. The instalment is therefore € 118.02, and the final payment will amount to € 1 918.02.

The equation becomes:

$$6000 = 118{,}02 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{47}}}{(1+X)^{1/12} - 1} + 1918{,}02 \frac{1}{\left[(1+X)^{1/12}\right]^{48}}$$

or:

$$6000 = 118{,}02 \frac{1}{(1+X)^{1/12}} + 118{,}02 \frac{1}{(1+X)^{2/12}} + \ldots\ldots\ldots 118{,}02 \frac{1}{(1+X)^{47/12}} + (1800 + 115{,}02 + 3).\frac{1}{(1+X)^{48/12}}$$

giving X = 9.381567%, i.e. an APR of 9.4%.

Example 7

Credit agreement for a total amount of credit (capital) of € 6 000.00, with administrative charges of € 60.00 payable on conclusion of the contract, and two payment periods of 22 and 26 months respectively. The second-period instalment corresponds to 60% of the first-period instalment. The respective monthly instalments are € 186.36 and € 111.82.

The equation becomes:

$$5940 = 186{,}36 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{22}}}{(1+X)^{1/12} - 1} + \left\{ \left[111{,}82 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{26}}}{(1+X)^{1/12} - 1} \right] . \frac{1}{\left[(1+X)^{1/12}\right]^{22}} \right\}$$

or:

$$5940 = \left[186{,}36 \frac{1}{(1+X)^{1/12}} + 186{,}36 \frac{1}{(1+X)^{2/12}} + ... + 186{,}36 \frac{1}{(1+X)^{22/12}} \right] +$$

$$\left\{ \left[111{,}82 \frac{1}{(1+X)^{1/12}} + 111{,}82 \frac{1}{(1+X)^{2/12}} + ... + 111{,}82 \frac{1}{(1+X)^{26/12}} \right] . \frac{1}{\left[(1+X)^{1/12}\right]^{22}} \right\}$$

giving X = 10.04089%, i.e. an APR of 10.0%.

Example 8

Credit agreement for a total amount of credit (capital) of € 6 000.00, with administrative charges of € 60.00 payable on conclusion of the contract, and two payment periods of 22 and 26 months respectively, the first-period instalment corresponding to 60% of the second-period instalment. The respective monthly instalments are € 112.15 and € 186.91.

The equation becomes:

$$5940 = 112{,}15 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{22}}}{(1+X)^{1/12} - 1} + \left\{ \left[186{,}91 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{26}}}{(1+X)^{1/12} - 1} \right] . \frac{1}{\left[(1+X)^{1/12}\right]^{22}} \right\}$$

or:

$$5940 = \left[112{,}15 \frac{1}{(1+X)^{1/12}} + 112{,}15 \frac{1}{(1+X)^{2/12}} + ... + 112{,}15 \frac{1}{(1+X)^{22/12}} \right] +$$

$$\left\{ \left[186{,}91 \frac{1}{(1+X)^{1/12}} + 186{,}91 \frac{1}{(1+X)^{2/12}} + ... + 186{,}91 \frac{1}{(1+X)^{26/12}} \right] . \frac{1}{\left[(1+X)^{1/12}\right]^{22}} \right\}$$

giving X = 9.888383%, i.e. an APR of 9.9%.

Example 9

Credit agreement for a total amount of credit (price of goods) of € 500.00, repayable in three equal monthly instalments calculated by applying the borrowing rate T of 18% (nominal rate), plus administrative charges of € 30.00 spread over the payments. The monthly instalment is therefore € 171.69 + € 10.00 charges = € 181.69.

The equation becomes:

$$500 = 181{,}69 \frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{3}}}{(1+X)^{1/12} - 1}$$

or:

$$500 = 181{,}69\frac{1}{(1+X)^{1/12}} + 181{,}69\frac{1}{(1+X)^{2/12}} + 181{,}69\frac{1}{(1+X)^{3/12}}$$

giving X = 68.474596%, i.e. an APR of 68.5%.

This example typifies practices still used by certain specialist "vendor-credit" establishments.

Example 10

Credit agreement for a total amount of credit (capital) of € 1 000, repayable in two instalments of either € 700.00 after one year and € 500.00 after two years, or € 500.00 after one year and € 700.00 after two years

The equation becomes:

$$1000 = 700\frac{1}{\left[(1+X)^{1/12}\right]^{12}} + 500\frac{1}{\left[(1+X)^{1/12}\right]^{24}}$$

giving X = 13.898663%, i.e. an APR of 13,9%.

or:

$$1000 = 500\frac{1}{\left[(1+X)^{1/12}\right]^{12}} + 700\frac{1}{\left[(1+X)^{1/12}\right]^{24}}$$

giving X = 12.321446%, i.e. an APR of 12.3%.

This example shows that the annual percentage rate of charge depends on the payment periods and that stating the total cost of the credit in the prior information or in the credit agreement is of no benefit to the consumer. Despite the total cost of credit being € 200 in both cases, there are two different APRs (depending on the speed of repayment).

Example 11

Credit agreement for a total amount of credit of € 6 000, with a borrowing rate of 9%, repayment in four equal annual instalments of € 1 852.01, and administrative charges of € 60.00 payable on conclusion of the agreement.

The equation becomes:

$$5940 = 1852{,}01\frac{1-\frac{1}{(1+X)^4}}{X}$$

or:

$$5940 = 1852{,}01\frac{1}{(1+X)} + 1852{,}01\frac{1}{(1+X)^2} + \ldots\ldots\ldots + 1852{,}01\frac{1}{(1+X)^4}$$

giving X = 9.459052%, i.e. an APR of 9.5%.

In the event of early repayment, the equations become:

After one year:

$$5940 = 6540\frac{1}{(1+X)}$$

where 6540 is the sum due, including interest, before payment of the first scheduled payment according to the amortisation table,

giving X = 10.101010%, i.e. an APR of 10.1%.

After two years:

$$5940 = 1852{,}01\frac{1}{(1+X)} + 5109{,}91\frac{1}{(1+X)^2}$$

where 5109.91 is the sum due, including interest, before payment of the second scheduled payment according to the amortisation table,

giving X = 9.640069%, i.e. an APR of 9.6%.

After three years:

$$5940 = 1852{,}01\frac{1}{(1+X)} + 1852{,}01\frac{1}{(1+X)^2} + 3551{,}11\frac{1}{(1+X)^3}$$

where 3551.11 is the sum due, including interest, before payment of the third scheduled payment according to the amortisation table,

giving X = 9.505315%, i.e. an APR of 9.5%

This shows how the provisional APR decreases in the course of time, especially where charges are payable on conclusion of the agreement.

This example can also serve to illustrate the case of a mortgage credit intended to refinance current credit agreements where the costs (notary's fees, registration, taxes) are due when the authenticated act is completed and the funds are made available to the consumer from the same date.

Example 12

Credit agreement for a total amount of credit of € 6 000, with a borrowing rate T of 9% (nominal rate), repayment in 48 monthly instalments of € 149.31 (calculated proportionally), and administrative charges of € 60.00 payable on conclusion of the agreement.

The equation becomes:

$$5940 = 149{,}31\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{48}}}{(1+X)^{1/12}-1}$$

or:

$$5940 = 149{,}31\frac{1}{(1+X)^{1/12}} + 149{,}31\frac{1}{(1+X)^{2/12}} + ... + 149{,}31\frac{1}{(1+X)^{48/12}}$$

giving X = 9.9954957%, i.e. an APR of 10%.

However, in the case of early repayment, this becomes:

After one year:

$$5940 = 149{,}31\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{11}}}{(1+X)^{1/12}-1} + 4844{,}64\frac{1}{\left[(1+X)^{1/12}\right]^{12}}$$

where 4844.64 is the sum due, including interest, before payment of the 12th scheduled payment according to the amortisation table,

giving X=10.655907%, i.e. an APR of 10.7%.

After two years:

$$5940 = 149{,}31\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{23}}}{(1+X)^{1/12}-1} + 3417{,}58\frac{1}{\left[(1+X)^{1/12}\right]^{24}}$$

where 3417.58 is the sum due, including interest, before payment of the 24th monthly instalment according to the amortisation table,

giving X = 10.136089%, i.e. an APR of 10.1%.

After three years:

$$5940 = 149{,}31\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{35}}}{(1+X)^{1/12}-1} + 1856{,}66\frac{1}{\left[(1+X)^{1/12}\right]^{36}}$$

where 1856.66 is the sum due, including interest, before payment of the 36th monthly instalment according to the amortisation table,

giving X = 9.991921%, i.e. an APR of 10%.

Example 13

Total amount of credit (capital) of € 6 000.00, repayable in four equal annual instalments of € 1 852.00. Let us now assume that the borrowing rate (nominal rate) is variable and increases from 9.00% to 10.00% after the second annual instalment. This results in a new annual instalment of € 1 877.17. Remember that, in calculating the APR, it is normally assumed that

the borrowing rate and other costs remain fixed at the initial level and apply until the end of the credit agreement. In that case (example 1), the APR will be 9%.

In the event of any change to the rate, the new APR must be communicated and calculated on the assumption that the credit agreement will remain in force for the rest of the agreed duration, and that the creditor and consumer will fulfil their obligations under the terms and by the dates agreed.

The equation becomes:

$$5940 = 1852{,}01\frac{1-\frac{1}{(1+X)^2}}{X} + \left[1877{,}17\frac{1-\frac{1}{(1+X)^2}}{X}\cdot\frac{1}{X^2}\right]$$

or:

$$5940 = 1852{,}01\frac{1}{(1+X)} + 1852{,}01\frac{1}{(1+X)^2} + \left\{\left[1877{,}17\frac{1}{(1+X)^3} + 1877{,}17\frac{1}{(1+X)^4}\right] + \frac{1}{X^2}\right\}$$

giving X = 9.741569, i.e. an APR of 9.7%.

Example 14

Total amount of credit (capital) of € 6 000.00, repayable in 48 equal monthly instalments of € 149.31, with administrative charges of € 60.00 payable on conclusion of the agreement, plus insurance of € 3.00 per month. The costs associated with insurance premiums must be included in the total cost of the credit if the insurance is taken out when the credit agreement is concluded. The instalment is therefore € 152.31 and the calculation, as in example 5, gives X = 11.107112, i.e. an APR of 11.1%.

Let us now assume that the borrowing rate (nominal) is variable and increases to 10% after the 17th payment. This change requires a new APR to be communicated and calculated on the assumption that the credit agreement will remain in force for the rest of the agreed duration, and that the creditor and consumer will fulfil their obligations under the terms and on the dates agreed.

The equation becomes:

$$5940 = 151{,}91\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{17}}}{(1+X)^{1/12}-1} + \left[154{,}22\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{31}}}{(1+X)^{1/12}-1}\cdot\frac{1}{\left[(1+X)^{1/12}\right]^{17}}\right]$$

or:

$$5940 = \left[151{,}91\frac{1}{(1+X)^{1/12}} + 151{,}91\frac{1}{(1+X)^{2/12}} + ... + 151{,}91\frac{1}{(1+X)^{17/12}}\right] +$$

$$\left\{\left[154{,}22\frac{1}{(1+X)^{1/12}} + 154{,}22\frac{1}{(1+X)^{2/12}} + ... + 154{,}22\frac{1}{(1+X)^{31/12}}\right].\frac{1}{\left[(1+X)^{1/12}\right]^{17}}\right\}$$

giving X = 11.542740%, i.e. an APR of 11,5%.

Example 15

Credit agreement of the "leasing" type for a car with a value of € 15 000.00. The agreement stipulates 48 monthly instalments of € 350. The first monthly instalment is payable as soon as the car is placed at the consumer's disposal. At the end of the 48 months the purchase option may be taken up by paying the residual value of € 1 250.

The equation becomes:

$$14650 = 350\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{47}}}{(1+X)^{1/12}-1} + 1250\frac{1}{\left[(1+X)^{1/12}\right]^{48}}$$

or:

$$14650 = 350\frac{1}{(1+X)^{1/12}} + 350\frac{1}{(1+X)^{2/12}} + ... + 350\frac{1}{(1+X)^{47/12}} + 1250\frac{1}{(1+X)^{48/12}}$$

giving X = 9.541856%, i.e. an APR of 9.5%.

Example 16

Credit agreement of the "financing", "vendor credit" or "hire purchase" type for goods with a value of € 2 500. The credit agreement provides for a down-payment of € 500 plus 24 monthly instalments of € 100, the first of which must be paid within 20 days of the goods being placed at the consumer's disposal.

In such cases the down-payment is never part of the financing operation.

The equation becomes:

$$(2500-500).\frac{1}{\left[(1+X)^{1/365}\right]^{\left[\frac{365}{12}-20\right]}} = 100\frac{1-\frac{1}{\left[(1+X)^{1/12}\right]^{24}}}{(1+X)^{1/12}-1}$$

or:

$$2000.\frac{1}{(1+X)^{\frac{10{,}4316}{365}}} = 100\frac{1}{(1+X)^{1/12}} + 100\frac{1}{(1+X)^{2/12}} + ... + 100\frac{1}{(1+X)^{24/12}}$$

giving X = 20.395287, or an APR of 20.4%.

Example 17

Credit agreement for a credit line of € 2 500 for a period of six months. The credit agreement provides for payment of the total cost of the credit every month and repayment of the total amount of the credit at the end of the agreement. The annual borrowing rate (effective rate) is 8 %, and the charges amount to 0.25 % per month. The assumption that the amount of credit is drawn down immediately and in full applies here.

The monthly borrowing interest payment is calculated on the basis of an equivalent monthly rate, using the equation:

$$a = 2500.\left\{\left[(1{,}08)^{1/12} - 1\right] + 0{,}25\right\}$$

or:

$$a = 2500.(0{,}006434 + 0{,}0025) = 22{,}34$$

This becomes:

$$2500 = 22{,}34\frac{1 - \frac{1}{\left[(1+X)^{1/12}\right]^{6}}}{(1+X)^{1/12} - 1} + 2500\frac{1}{(1+X)^{6/12}}$$

or:

$$2500 = 22{,}34\frac{1}{(1+X)^{1/12}} + 22{,}34\frac{1}{(1+X)^{2/12}} + \ldots\ldots\ldots + 22{,}34\frac{1}{(1+X)^{6/12}} + 2500\frac{1}{(1+X)^{6/12}}$$

giving X = 11.263633 i.e. an APR of 11.3%.

Example 18

Credit agreement for an open-end credit line of € 2 500. The agreement provides for a minimum half-yearly payment of 25% of the outstanding balance (capital and interest), with a minimum of € 25. The annual borrowing rate (effective rate) is 12%, and the administrative charge payable on conclusion of the agreement is € 50.

(The equivalent monthly rate is obtained by the equation:

$$i = (1 + 0{,}12)^{6/12} - 1 = 0{,}00583$$

or 5.83%).

The 19 half-yearly repayments (D_l) can be obtained from an amortisation table, giving D_1 = 661.44; D_2 = 525; D_3 = 416.71; D_4 = 330.75; D_5 = 262.52; D_6 = 208,37 ; D_7 = 165.39; D_8 = 208.37; D_9 = 104.20; D_{10} = 82.70; D_{11} = 65.64; D_{12} = 52.1; D_{13} = 41.36; D_{14} = 32.82; D_{15} = 25; D_{16} = 25; D_{17} = 25; D_{18} = 25; D_{19} = 15.28.

The equation becomes:

$$2500-50=661{,}44\frac{1}{(1+X)^{6/12}}+525\frac{1}{(1+X)^{12/12}}+.....+25\frac{1}{(1+X)^{108/12}}+15{,}28\frac{1}{(1+X)^{114/12}}$$

Giving X = 13.151744%, i.e. an APR of 13.2%.

Example 19

Credit agreement for an open-end credit line involving the use of a card for drawdowns. Total amount of the credit: € 700. The agreement provides for a minimum monthly payment of 5% of the outstanding balance (capital and interest), and the scheduled instalment (a) may not be less than € 25. The annual cost of the card is € 20. The annual borrowing rate (effective rate) is 0% for the first instalment and 12% for the subsequent instalments.

The 31 monthly repayment amounts (D_l) can be obtained from an amortisation table, giving D_1 = 55.00; D_2 = 33.57; D_3 = 32.19; D_4 = 30.87; D_5 = 29.61; D_6 = 28.39; D_7 = 27.23; D_8 = 26.11; D_9 = 25.04; D_{10} à D_{12} = 25.00; D_{13} = 45; D_{14} à D_{24} = 25,00 ; D_{25} = 45 ; D_{26} à D_{30} = 25.00; D_{31} = 2.25.

The equation becomes:

$$700=55\frac{1}{(1+X)^{1/12}}+33{,}57\frac{1}{(1+X)^{2/12}}+.....+25\frac{1}{(1+X)^{30/12}}+2{,}25\frac{1}{(1+X)^{31/12}}$$

giving X = 18.470574, i.e. an APR of 18.5%

Example 20

Open-end credit line in the form of an advance on a current account. Total amount of credit: € 2 500. The credit agreement does not impose any requirements in terms of repayment of capital, but provides for monthly payment of the total cost of the credit. The annual borrowing rate is 8% (effective rate). The monthly charges amount to € 2.50.

It is assumed that the full amount of credit will be drawn down, with repayment in theory after one year.

First of all, the theoretical scheduled payment of interest and charges (a) is calculated

$$a=\{2500.[(1{,}08)^{1/12}-1]+2{,}50,$$

then:

$$2500=18{,}59\frac{1-\frac{1}{[(1+X)^{1/12}]^{12}}}{(1+X)^{1/12}-1}+2500\frac{1}{\left(1+X^{1/12}\right)^{12}}$$

i.e.:

$$2500=18{,}59\frac{1}{(1+X)^{1/12}}+18{,}59\frac{1}{(1+X)^{2/12}}+.....+18{,}59\frac{1}{(1+X)^{12/12}}+2500\frac{1}{(1+X)^{12/12}}$$

giving X = 9.295804, i.e. an APR of 9.3%.