The International Journal of Business Management and Technology, Volume 3 Issue 5 September–October 2019
ISSN: 2581-3889

Research Article Open Access

Credit risk - The Importance of Credit Portfolio Management

Eduardo Sá e Silva * Adalmiro Pereira* Ângela Vaz**

* *School of Accounting and Administration of Porto (ISCAP) | Polytechnic Institute of Porto (IPP), Portugal e CEOS.PP.*
***School of Accounting and Administration of Porto (ISCAP) | Polytechnic Institute of Porto (IPP), Portugal*

JEL classification: *G14; G32*

Abstract: Credit risk is the major risk that an institution, whether financial or non-financial, faces. In this paper, we begin by defining what is the credit risk, then turn on the parameters considered fundamental by the Basel Accords, namely PD - probability of default, LGD - loss given default, EAD - exposure the date of default and M - maturity. It is then expected loss of the connection between what is considered an expense to the concepts of impairment. Currently the International Accounting Standards, in particular, IFRS9 is noted that the calculation of the impairment should be based on the expected loss, that while it is pressing on credit institutions, regardless of the rules that exist, a requirement also for SMEs (small medium enterprises) in credit management. It highlights that the SNC (Accounting System in Portugal – "*Sistema de Normalização Contabilístico*"), with particular emphasis on NCRF27 (Standard number 27), does not address this aspect, since there can be impaired as long as there is objective evidence. It should, in conclusion, that in Portugal the national regulatory and tax regulations were compatible with international standards

Keywords: credit risk, PD - probability of default (default), LGD - loss given default, expected loss, impairment, concentration

I. The Concept of Credit Risk

The credit risk includes all risks where one institution incurs because of the possibility of non-compliance, or compliance with late payment (principal and / or interest) by a borrower - usually referred to as counterpart - anytime time. It includes possible restrictions on the transfer of payments from abroad. This is undoubtedly the main risk to which an institution is subject and is divided into:

> Default risk: the risk of the debtor (borrower) does not meet the debt service resulting from a loan from a default event in a certain period of time;
>
> Concentration risk: the possibility of losses due to the high concentration of loans to a small number of borrowers and / or risk groups, or a few sectors of activity;
>
> Warranty degradation risk (collateral): probability of a default by the fall of the quality assurance offered event occasionally by a depreciation of collateral in the market, or the disappearance of the borrower's assets

The credit is considered the key to business organizations expand and realize their business opportunities. In contrast to the CI's (Credit Institutions), lending may lead to a threat of the debtor does not repay the same credit. Showing Carvalho (2009), the threat of non-payment of debt can take overwhelming proportions, affecting market confidence and directing banking activity to a level of least efficient.

Credit risk is evidenced in the whole business as a risk with more long history. Thus, an organization is subject to this risk when there is a probability of not being paid due consideration or the capital invested repaid, in whole or in part. BP (Portuguese Central Bank - 2007) defines this risk as "the probability of negative impacts on earnings or capital due to the inability of a counter party to meet its financial commitments to the institution, including possible restrictions on the transfer of payments from abroad. Credit risk exists mainly in credit exposures (including the title), lines of credit, guarantees and derivatives. "

II. Credit Risk Analysis

The most important challenge in the credit risk management has been and continues to be, to find a balance between the quality of the credit portfolio and portfolio growth. In the case of SMEs, unlike credit institutions, there are regulatory and supervisory requirements. However, we can only say that good management of credit risk in SMEs passes to impose national rules, for example, based on limits per customer and a supervision to be performed by internal or external audit bodies. Therefore, the rules imposed by the supervisory authorities to credit institutions can be adapted in a context, probably different, SMEs, but based on the same principles, which will explain below.

Credit risk is present throughout the life cycle of the transaction, which begins with the granting of credit, followed by its monitoring, and its termination, in situations of non-compliance with the credit recovery process.

The portfolio management should be based on the most current methodologies of risk quantification, as well as in the said more traditional risk analysis by which it assesses the customer's credit profile.

The process of analysis of the credit risk takes into account the response to two fundamental aspects:

1) What is the purpose of the credit, meaning, what needs are going to be financed?
2) What is the customer's repayment capacity, namely that supplies will be available?

The rating and scoring models are the basic parts in risk analysis and decision of customers and operations. These models complement the more traditional analysis of subjective bias, for example, customer knowledge and the way of settling debtsrating.

Also called a credit rating, risk rating, credit rating, risk assessment, credit rating or financial credit rating assesses the emissions credit worthiness of the debt of a company or government. It is analogous to credit ratings for individuals.

Credit scoring was first introduced in the 1940s, and over the years, evolved and developed significantly.

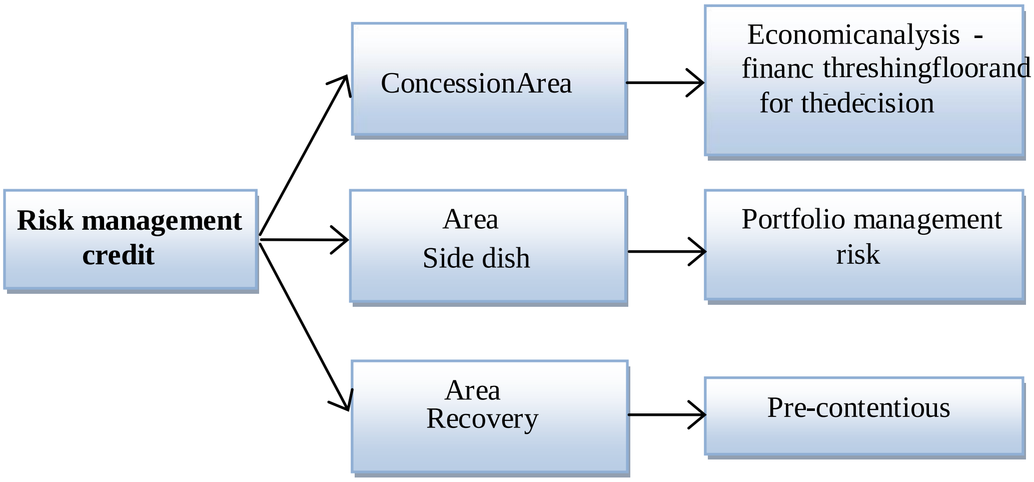
The credit scoring is an analysis of credit quality, measure the credit risk of non-compliance based on a set of data and characteristics of the contracting parties, that is called loan variables. Through these data, it built a model that estimates the probability of candidates go into default (Raymond, 2007 Semedo, 2009).

In the corporate segment it is usual that the analysis is performed using the economic and financial assessment that evaluates the performance of the company (or group of companies) over time, comparing it to other companies in the market, particularly with other companies in the same sector.

This analysis requires not only quantitative information in an objective nature, on profitability, financial structure, debt capacity and liquidity, but also qualitative information, such as the nature of the partners and shareholders, the team's ability management, strategy and competitive position and the business sector.

Figure 1 shows a possible organization of a framework for credit management.

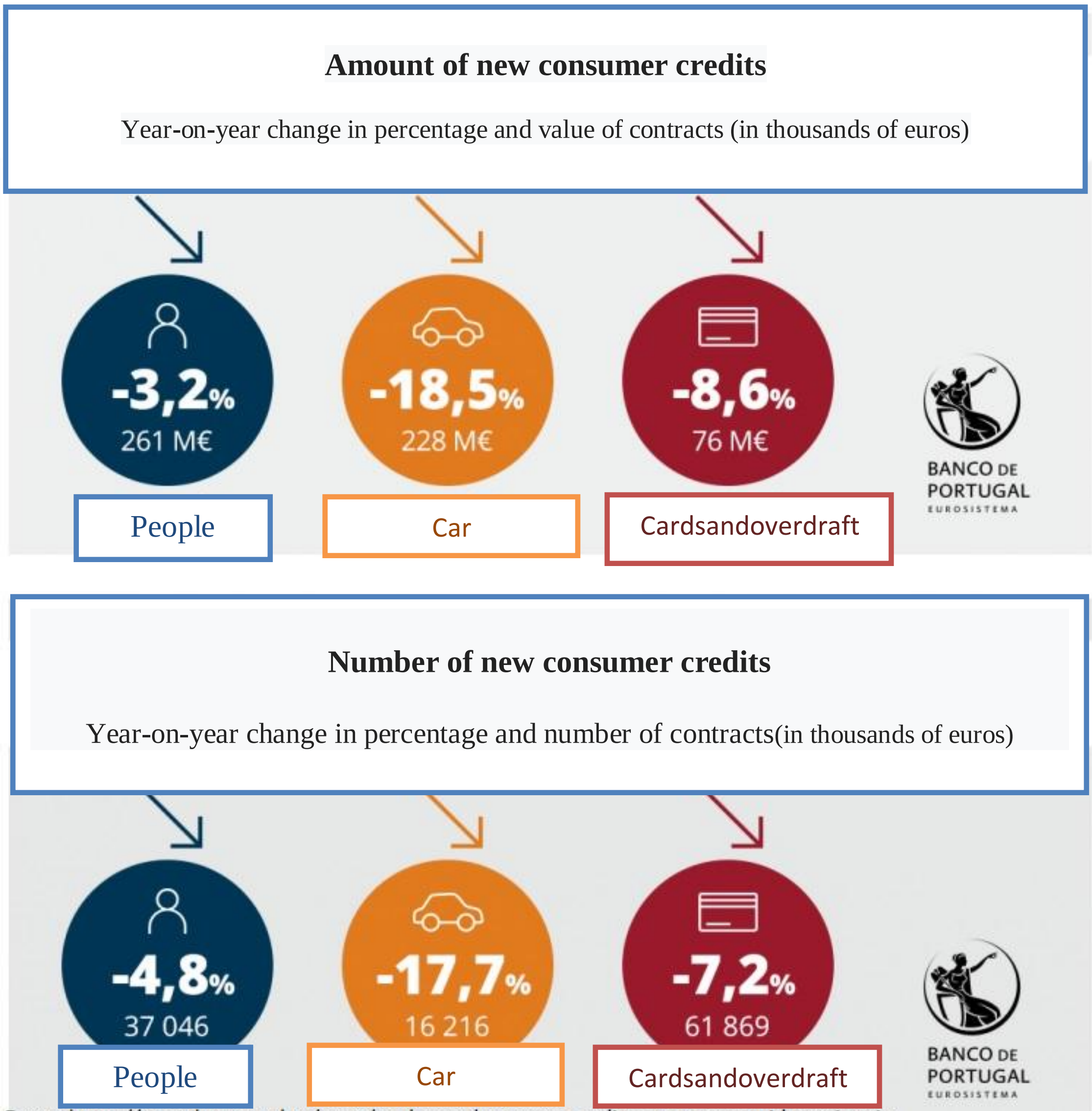
Figure 1 - Middle Office Segmentation: Credit Risk Management



Source: Adapted from Alcarva (2011)

The evolution in Portugal of loans to households over the past year suffered a contraction as you can see in the following figure

Figure 2 - Evolution of credit to individuals in Portugal

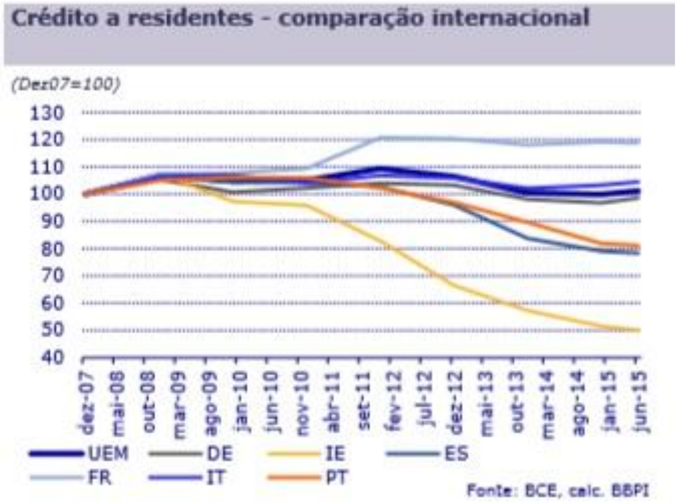


Fonte: https://www.bportugal.pt/page/evolucao-dos-novos-creditos-aos-consumidores-janeiro-de-2017https://www.bportugal.pt/page/evolucao-dos-novos-creditos-aos-consumidores-janeiro-de-2017; acedido Setembro 2019

These developments compared with other countries is not surprising as there is in general terms a stabilization or decline credit given to residents.

Figure 3 - Loans to residents - international comparison

Residentloans - internationalcomparison



Source: Bank of Portugal

III. Quantification of credit risk

According to the current methods of risk assessment recommended by the Basel Accords, beyond the traditional analysis of credit risk, credit institutions shall perform the quantification, taking into account the minimum capital requirements and determination of expected loss and the unexpected loss.

To estimate the amount of the expected loss, it is necessary to estimate the following risk factors, or, in other words, the risk parameters that are inputs to determine the risk weights that will be applied to each of the exhibits to determination of capital requirements:

- *PD - probability of default*- That is, the probability of failure;
- *LGD - loss given default*, - Meaning the loss given default;
- *EAD - exposure at default* - The exposure to the date of default;
- *M – maturity* - residual maturity of operation

The PD is performed by rating or scoring models based on historical data, the probability of default associated with the quality of the debtor's credit. Each grade and type of exposure should match a certain probability of failure associated to that debtor.

It should be considered that there is compliance[1] When:

---

[1]Normally, the default signals are at the level of cash and its typology is varied. Amongothersignsrefer to thefollowing:

- Delays in regular responsibilities with banks;
- Returncheck;
- Delays in reformeffects;
- Delay in wagespayment;
- Delays with Social Security and the Tax Authority

To these signs, they may join other more structural nature, such as:

- Increaseddebt;
- Frequent litigation with suppliers and customers;
- Delays in providing economic and financial information;
- Debt restructuring to the banks

- The lender finds that the debtor cannot fulfill its obligations without recourse to coercive actions (for example, judicial execution);
- The debtor is in arrears for over 90 days, relative to the performance of its obligations

It is proposed that in the case of SMEs, these should be able individually or through business associations, to estimate the probability of default in order to determine the rating of notes associated with their groups of debtors.

Thus, the PD should be estimated by degree of debtor from the long-term average annual failure rates. By degree of debtor means the risk category within a rating scale, which are the debtor affections based on a set criteria, from which the PD is estimated.

The following example clarifies this situation. For a rating class, for example A+ and on a specific year, is the number of defaults for this risk category A+ that happened over a year divided by the number of existing credits in the same earlier this year. This calculation is performed at the end of the year, taking into account the credits that were normal and that enter in default until the end of the year

Take the following case for year 1:

. number of current credits at the beginning of the year in the level of debt A +: 2000

. number of defaults observed at the end of the year associated with this degree: 20

. default probability: 20/2000 = 1%

Far would be the same for the other years and in order to calculate would be the average

Table 1 - Exampleof formal study

	1	2	3	4	5	Accumulated	Average
Number ofcredits earlier this year A+	2000	1800	2100	2200	2050	10150	2030
Numberdefaults A +	20	15	22	26	23	106	21.2
Thedefault rate A+	1.00%	0.83%	1.05%	1.18%	1.12%	1.04%	1.04%
Averagefailure rate							1.04%

Source: Prepared by the Authors

In the case of having an A + credit with maturity of one year, would have the associated PD be 1.04% which would apply to customers classified as A +. Annually this PD would be revised, taking into account a type moving averages procedure, in which the oldest observation would be removed, replaced by a newer one.

While the PD associated with a given borrower does not depend on the characteristics of each particular operation, LGD is intrinsic to each operation. The magnitude of the loss is generally associated with particular aspects of each operation and the way in which it may or may not be guaranteed (for example, securities in the case of a credit). Thus, in an installment sale it is important to know if the credit that results or not secured by a personal guarantee[2] or actual[3].LGD is associated with the risk of collateral degradation / warranty.

[2] Personal guarantees are there when a person or entity other than the borrower, ensures compliance with contractual obligations of a second person or entity if it enters into default

[3] Real guarantees ensure payment to the creditor, if there is non-compliance, by the value of goods or the proceeds of certain goods

The EAD will be equivalent, in general, the nominal value of the transaction. In the event of potential commitments (for example, if it is granted to a customer a credit line) its determination will involve an estimate of future exposure through a conversion factor (linked to potential credit likely become effective credit) where the value of the unused exposure is multiplied by this factor to obtain a position equivalent credit but below

Example potential credit conversion in cash credit:

. credit line (potential credit): 1000

. maturity of the credit line: 1 year

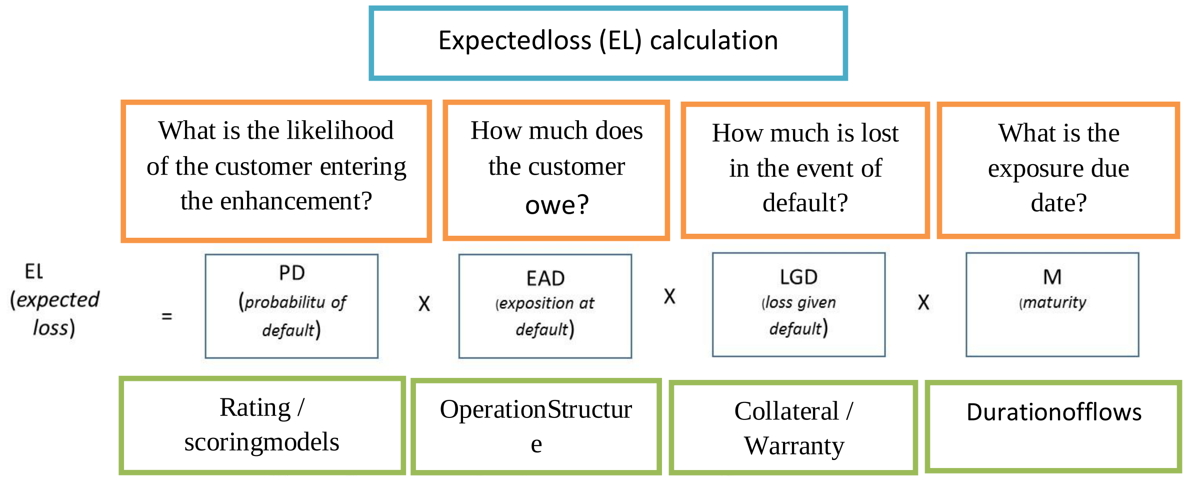
. conversion factor: 80%

. Effective credit% = 1000 x 80 = 800

Regarding the maturity (M) shall be determined from the effective contractual term exposure and financial flows generated by it (in the case of having multiple payments). In the case of credit sales is the most common, meaning less than 1 year. However, in Basel does not consider this parameter in the calculation of expected loss, as it is assumed to be equal to one.

It is just as important parameters: the type of product, the operation period and existing safeguards that may be shown in the following figure:

Figure 4 - ELCalculation



Source: Prepared by the Authors

Example application:

Term sale: 1000 (nominal value)

Time: 6 months

Customers rated A +, with a PD of 1.04%

Loss Given Default (LGD) which is linked to the guarantees of 20% (part on the assumption that there is an agreement of the partners, where they assume the debt in case of debtor default). The higher, the worse.

So it has been as expected loss (EL):

EL = 1000 x 1.04% x 20% x 6/12 =

client	A +
EAD	1000
PD	1.04%
LGD	20.00%
M	0.5
EL	1.04
% EL	0.10%

If indeed we had a C client in which the DP was greater and the recovery was less have would

Client	W-
EAD	1000
PD	20.00%
LGD	60.00%
M	0.5
EL	60
% EL	6.00%

This expected loss should be part of the cost (expenditure) of the activity and must be properly passed on in the price of transactions

In turn, the unexpected loss or unexpected loss relates to a very high level of loss, but unlikely. They are disasters or consequence of extraordinary events and unforeseen. Thus, their nature is not recurring, so according to the rules of Basel should be covered by own funds

IV. The impairment loss concept and the accounting and tax regulations in Portugal

A 'Impairment' expression entered the Portuguese accounting lexicon with the adoption of new accounting standards introduced by the Accounting Standardization System (SNC). These losses are regulated in the accounting standard and financial reporting 12 (IAS 12) - Asset impairment, which is based on International Accounting Standard IAS 36 - Asset Impairment, which defines the amount by which the sum carrying a given asset exceeds its recoverable amount. This concept has application, for example, in calculating the amount by which a particular asset should be carrying.

Whenever a particular asset is carrying (registered for accounting purposes) for an amount to its recoverable amount through their use or their disposal on the market, the entity shall make the correction value by recognizing an impairment loss . On the other hand, shall assess at each reporting date whether there is any indication that an asset may be impaired - if there said indication, the entity shall estimate the recoverable amount of the asset and proceed to the recognition of loss calculated impairment as difference between the carrying amount and the recoverable amount.

With regard to impairment losses on accounts receivable, particularly in client debts, the accounting framework is set out in IAS 27 - Financial Instruments. In this case, the date of each reporting period, an entity shall evaluate the impairment of all financial assets that are not measured at fair value through profit or loss. If there is objective evidence of impairment, the entity shall recognize an impairment loss in the income statement. Objective evidence that a financial asset or group of assets is impaired includes observable data that draw attention to the holder of the same on the following loss events:

1. Significant financial difficulty of the issuer;

2. Breach of contract, such as non-payment or default in payment of interest or repayment of debt;

3. The lender, for economic or legal reasons related to financial difficulties of the debtor, the debtor provides grants that the lender would not otherwise consider;

4. It becomes probable that the borrower will enter bankruptcy or other financial reorganization;

5. The disappearance of the market for a financial asset because of financial difficulties of the debtor;

6. Observable information indicating that there is a decrease in the measurement of estimated future cash flows of a group of financial assets since their initial recognition, although the decrease cannot yet be identified for financial assets given the group, as are national economic conditions local or industry adverse.

Thus, the losses impaired customers only exist when there is information that allow doubt the normal receivable. This information takes place, for example, of being exceeded the normal time limits of credit granted, there have been other payments or default of the debtor be in the process of insolvency / bankruptcy. So, there is impairment loss when the carrying amount recognized in the balance sheet cannot be recovered in whole or in part.

This is an issue of growing importance, given that the receivables in claims resulting from business transactions is a daily concern for many companies. Often the period of delay extends beyond the due date of the invoice, giving rise to the dreaded scenario of the definitive failure.

The existence of a significant number of customers in arrears in payments, or at risk of collectability, can lead the company to have serious financial difficulties or even put into question the continuity of their business.

The Economic Journal in its online version (May 2018) states that the average payment period of companies in Portugal in 2017, was 74 days. Given the liquidity requirements that companies face on a daily basis this is obviously significant.

It is required so the companies with credit sales, the manager always has need for regular information available on the credit in default, including the period of delay and the total value, and the probability of getting your payment.

In accounting terms, the assessment of the risk of collection in relation to overdue credits and still in arrears will have to be held at the end of each financial period for the financial statements of this entity reflect a true and fair view of the financial position, its performance and changes in this financial position.

It concerns the recognition of impairment losses in respect of credits granted that are not measured at fair value. And such recognition should be performed when there is objective evidence that such credit is impaired and not only in the period when can such inherent spending were to be accepted for tax purposes, meaning, the accounting criteria should not overwhelm the fiscal criterion.

Article 28 of the CIRC has an understanding that is not exactly what was said previously.

So, to be recognized impairment loss for tax purposes it should meet the following requirements:

"For the determination of impairment losses ... are considered doubtful debts those where the risk of uncollectible amounts is substantiated, which is found in the following cases:

a) the debtor has pending enforcement proceedings, insolvency proceedings, special process of revitalization or company recovery procedure extrajudicial under Recovery System Enterprises by Via Extrajudicial (SIREVE), approved by Decree-Law No. 178/2012 of 3 August.

b) The credits have been claimed in court or arbitral court;

c) Loans outstanding for more than six months from the date of the respective maturity and there are objective evidence of impairment and have been made arrangements for the receipt.

The cumulative annual amount of the impairment loss of loans referred to in subparagraph c) above shall not exceed the following percentages of loans in arrears:

a) 25% to claims overdue for more than 6 months and within 12 months

b) 50% to claims overdue for more than 12 months and 18 months

c) 75% to claims overdue for more than 18 months up to 24 months;

d) 100% for loans in arrears for more than 24 months. "

A credit with a live only one month may already have a high risk of not being charged, for example, already be aware that the entity is already in default with respect to the majority of its creditors, if we can forecast that will be presented to insolvency.

In this case, under the relevant accounting standards, the entity shall recognize the impairment loss for the entire amount of credit, but not for tax purposes.

Thus, the expense inherent to such recognition should be fixed in the frame 07 of the model 22 that period, because they are not verified any of the conditions of Article 28 of the IRC Code. It notes that the company can come to retrieve this correction in subsequent periods.

Model 22 - Table 7

Field 718 - Adjustments to inventories beyond legal limits (Article 28) and impairment losses on loans that are not tax deductible or beyond legal limits (Article 35).

Also entered in this field impairment losses not deductible for tax purposes, for example, those who do not respect:

1) Credits resulting from normal activity in the conditions of paragraph a) of paragraph 1 of article 35 and article 36;
2) Receipts pending collection of insurance undertakings [article 35, paragraph 1 b)];
3) Impairment losses and other value adjustments made mandatory by the Bank of Portugal, under article 35, paragraph 2 and 37;
4) Are also increased impairment losses which, while being fiscally deductible, exceed the legal limits provided in article 36 and 37.

Example:

The Company X, Lda. recognized in the 2018 tax period, impairment losses in respect of receivables in the amount of € 180,000.00.[4]

The impairment loss of receivables represents the value (total) of the following credits, for which there is objective evidence of impairment and have been made arrangements for the receipt.

About evidenced customers as doubtful:

Manuel Joaquim, Ltd., outstanding for 25 months € 60,000.00

Antonio Leal, Lda., In default 17 months € 80.000,00

The first company is participated by 15% by the Company X, Lda.

On other debtors and creditors:

Victor Archangel, outstanding for 10 months 40,000.00€

This person is a former managing director / Finance

<u>Corrections in Table 07:</u>

Credit on Manuel Joaquim, Lda.

- As a subsidiary company of more than 10%, the impairment is not considered spent for tax purposes [article 36, paragraph 3, d)]→ € 60,000.00

- Loans to António Leal, Lda. → consideredwas spent as the amount corresponding to 50% of € 80,000.00, or € 40,000.00 [article 36, paragraph 2, point b)]

[4] Taken and adapted from AT Handbook - Model Explained 22

- Credit on Victor Archangel → Not result from normal activity, the impairment loss is not tax deductible [article 35, paragraph 1, point a), point reading opposite] € 40,000.00

So in the field 718 - Increase of € 140,000.00 (60,000.00 + 40000.00 + 40000.00)

V. IFRS9 and the expected loss.

Since January 2018 is in force IFRS 9 (*International Financial Reporting Standard*9). This standard brings fundamental changes in the accounting for financial instruments and replaces IAS 39.

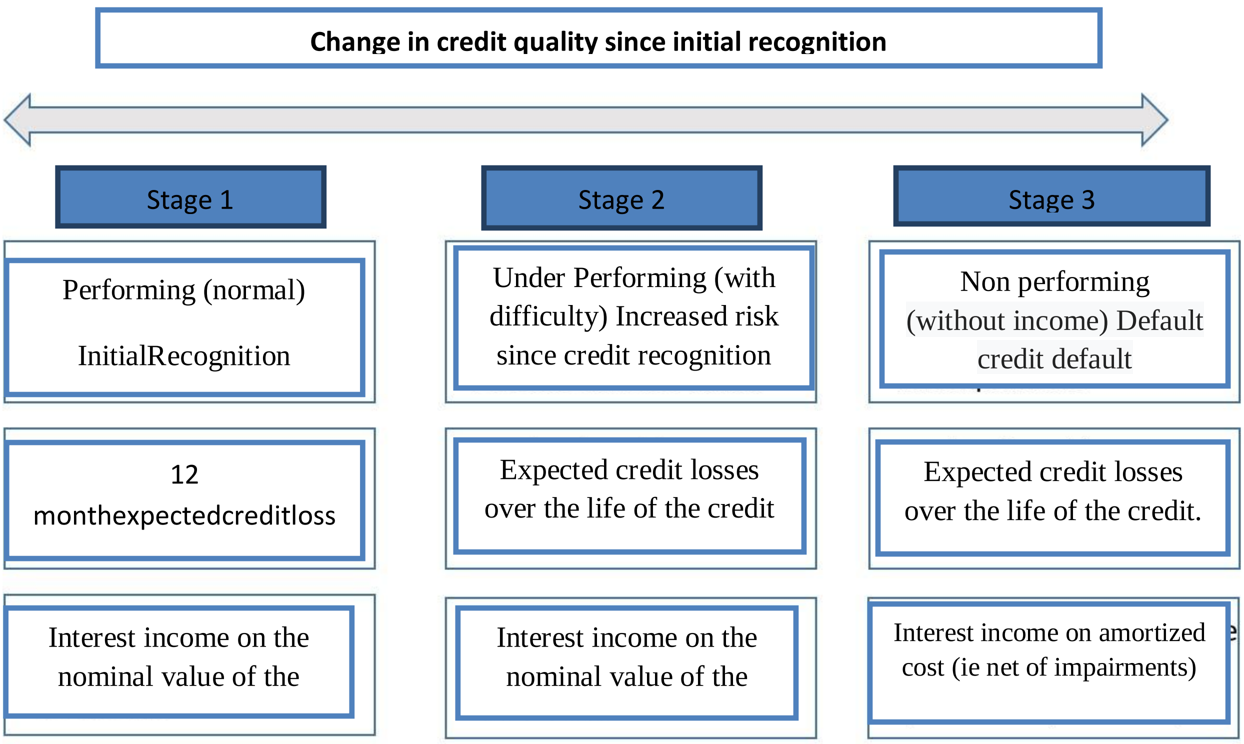
IFRS 9 standardizes accounting procedures and existing policies among countries providing a single view of interpretation of financial statements and comparative analysis between managers and investors.

The requirements of impairment (impairment) provided for in IFRS 9 loss introduce a model of expected credit rather than an incurred loss model. So, losses are treated as predictable or expected and not as incurred, as was considered by IAS 39 no longer need an objective evidence, such as, proof of financial difficulty of the debtor.

The model of expected losses based on the concept of economic loss, that any credit will always have a certain level of loss, even if reduced. This is a different way to consider the impairment is part of a risk model.

Thus, it is necessary to obtain the calculation of the expected loss, taking into account the gradual deterioration of the credit or credit set when it comes to a portfolio.

FIGURE 5 - Recognitioncreditquality



Source: Prepared by the Authors

If the credit risk of a financial instrument has not increased significantly since the initial recognition, an entity shall measure the impairment with an amount equivalent to the expected credit losses for 12 months. If other available information indicate that the credit risk has increased significantly since the initial recognition, the asset does not need to have payments due in order to proceed to an increase in impairment.

As already mentioned the Expected Loss (EL) under Basel:

EL = PD x EAD x LGD wherein:

- PD = Probability of default (default) (Point-in-time);
- EAD = financial exposure at the time of default;
- LGD =% of the amount of the financial loss that went into default.

The EAD and LGD parameters can be obtained via flow of payments and based on history it is possible to projections of these parameters in the future.

Regarding the PD parameter, first is to estimate the PD TTC (Through the Cycle) by some methodology. Then it is necessary for requirement of IFRS 9, to calibrate the TTC PD using macroeconomic variables in order to adjust the PD TTC with market behavior. This calibrated PD is called PIT (Point-in-time). At this stage, it is possible to consider the macro-economic variables in extreme conditions, meaning, perform stress testing (stress testing) in order to obtain the expected loss in adverse situations.

There are different methodologies to estimate the PD TTC, citing as an example Time Series Models, Roll Models, Logistic Model Ordinal and Survival Model. Each methodology has its complexity of application.

The choice of methodology has to do with the complexity binomial / certainty in the results. There are more complex methodologies perhaps more certain results, but with a time of longer and more costly development, or a less complex methodology, with a time of lower and less costly development, and get satisfactory results.

VI. Credit portfolio management

Credit risk can be studied in aggregate terms, going from the individual credit risk analysis for a portfolio management approach, which will take into account another risk factor: the concentration measured by the correlation.

If the concentration is relevant is up before the designated concentration risk: possibility of losses due to the high concentration of loans to a small number of borrowers and / or risk groups, or a few sectors of activity, so there must be diversification.

To build a diversified credit exposure mix that allows mitigate the concentration risk, they can use specific tools and techniques, such as the definition of customer exposure limits (or customer group) and the analysis of the portfolio structure by sectors activity, products, geographical areas, maturities or currencies. Also, it is important to conduct stress test - for example, the impact of recession with GDP reduction in impairment losses and the results of the institution? And what is the impact on the amount of overdue loans and / or restructured loans?

Saunders and Cornett (2008, p. 355) argue that, in general, "the correlation between claims is weak." Quote, by the way, it is very unlikely that IBM and General Motors enter into bankruptcy simultaneously. Estimate the correlation coefficient is between 0.002 and 0.15. Highlight that it is an American reality that can possibly be different from what happens in Portugal, for which you are unaware of studies.

Low positive correlation between claims is a positive aspect, because if there is a diversification of loans to several companies, this may represent a significant reduction in portfolio risk.

In case of over-concentration, for certain credit segments can be used certain instruments such as, for example, securitization and credit derivatives, which allow you to transfer the risk of the portfolio and the balance sheet of the institutions.

VII. Conclusion

This work was made an approach to various types of credit risks and the need for quantification. Associated with credit risk is the concept of impairment. Concept that is not uniform. According to the perspective of the Accounting Rules in Portugal, must exist an objective indication of impairment, or that is observable. According to the tax regulations, in addition to the objective statement, it is necessary to fulfill the lives generally has a certain maturity. The IFRS9 goes further, since any credit always has a future perspective of being impaired, by calculating the expected loss, based on the PD - probability of default. Loss that can be seen in a 12-month horizon for credits that are normal (performing), or for life when they're not.

Excessive concentration of credits should be avoided using for the effect of imposing limits exposure and analysis of the portfolio structure.

Bibliography

[1.] Alcarva, P. (2011). *O guia completo sobre a Banca e as PME. Vida Económica* - Editorial, SA.

[2.] Colquitt, J. (2007), *Credit Risk Management: How to Avoid Lending Disasters and MaximizeEarnings*, McGraw-Hill.

[3.] Comissão de Normalização Contabilística (CNC) (2019) *Normas Internacionais de Contabilidade*

[4.] Código do Imposto sobre Pessoas Coletivas (CIRC) (2019)

[5.] Raymond, Anderson, The credit scoring toolkit theory and practice for retail credit risk management and decision automation, New York, 2007

[6.] Saunders, A. & Cornett, M. (2008), *Financial Institutions Management*, sixth edition, McGraw-Hill

[7.] Saunders, A. & Allen, L. (2010), *Credit Risk – Measurement in and out of the Financial Crisis,* third edition, Willey Finance

[8.] Servigny, A. & Renault, O. (2004), Measuring and Managing Credit Risk, McGraw-Hill.

[9.] Silva, E. (2017*), IFRS9 – Instrumentos Financeiros – Introdução às Regras de Reconhecimento e Mensuração,* Vida Económica

[10.] BIS (2011), Basel III: *A Global Regulatory Framework for More Resilient Banks and Banking Systems.*

[11.] BIS (2006), Basel II*: International Convergence of Capital Measurement and Capital Standards*