



Politecnico di Milano
Department of Management Engineering
MASTER IN MANAGEMENT ENGINEERING

**REVIEW OF CREDIT RISK MODELLING UNDER IFRS 9 –
AND APPLICATION IN CHILE**

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ABSTRACT

The management of credit risk represent a day-to-day most critical area for financial entities, affecting their results and long/medium-term collocations. Therefore, a proper model must satisfy different objectives at the same time as well as shall be used for different applications.

Two years ago, the IASB issued the latest version of IFRS 9 Financial Instruments. The new approach considers the transition from a loss given default model (IAS39) allowing banks to provision credit losses when was enough evidence of losses to an expected losses model (IFRS 9) which seeks to recognize losses towards the life of the financial asset.

A review of the new IFRS 9 model is presented for the analysis and modelling of components of credit risk for a financial institution in Chile. It can conclude that the entity incorporate in their model many of the essential requirements of aligned with the requirements under IFRS9, even tough, there is still plenty work to do to improves the entity's risk management.

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2. INTRODUCTION

The end of the latest real-estate bubble, the sub-prime mortgages losses, the subsequently liquidity restriction, the increasing of default ratios and the most recent sovereign-debt crisis, are complete and fresh examples of financial risks.

The management of credit risk represent a day-to-day most critical area for financial entities, affecting their results and long/medium-term collocations. Therefore, a proper model must satisfy different objectives at the same time as well as shall be used for different applications. The generic objective is to help quantify, aggregate and manage risk considering variables such as different credit qualifications, product lines, geographical distribution and the economic cycle.

Traditionally the financial regulator had tried to control the risk towards the establishment of standardized system control based on external evaluations. However, the latest economical setting requires management models more strong whose development demand one of the main challenges of the financial community the forthcoming years.

Financial models are ruled by the International Accounting Standard Board (IASB), which seeks to develop regulation in order to provide greater transparency to financial information and improve the efficiency of financial markets, ultimately contributing to long-term financial stability towards the global economy.

Two years ago the IASB issued the latest version of IFRS 9 Financial Instruments, which come into force compulsorily on January 2018. IFRS 9 replace IAS 39 Financial Instruments: Recognition and Measurement and include important changes for the classification of financial instruments, updating the methodology of valuation, accountability and relevant processes for organizations.

The new approach considers the transition from a loss given default model (IAS39) allowing banks to provision credit losses when was enough evidence of losses was provided towards an expected losses model (IFRS 9) which seeks to recognize losses towards the life of the financial asset.

The change involves different consequences for financial entities on areas such as classifications and measurement of financial instruments, so it will be necessary to anticipate changes, impacts and complexities that will be presented in terms of implementation.

In Chile, IFRS 9 began to rule since January 1, 2018. Accordingly it is important to highlight that possible future changes were taken into account a few years ago by the “Superintendencia de Bancos e Instituciones Financieras” (SBIF), which it is the institution that supervise banking companies and other financial entities, safeguarding depositors or other creditors and the public interest., being incorporated at Compendium of Accounting Standards for Banks, establishing that those institutions must provide provisions to cover expected losses.

In this work a review of the new IFRS 9 model is presented for the analysis and modelling of components of credit risk for a financial institution in Chile. Later, a methodological study for data quality and reprocess is made to conclude based on the validation obtained.

3. SCOPE

The purpose of this document is to review the expected losses model under IFRS 9. The review demands to establish an opinion based on the methodological reasonability of used approaches for the parameter of the expected losses model estimation and the quality study of the data.

3.1 Methodological review

On a methodological perspective the review of the process requires the understanding of the approach made and the review of the process documentation. This in order to verify the conceptual reasonability of the proposed approach to check whether is aligned with the normative requirements of IFRS 9.

3.2 Data review

On a data point of view the review requires the verification of information's quality for the development of the estimations made. Through this process it is possible to confirm that the data treatment is reasonable enough and does not present relevant distortions in order to reply the estimation processes in an optimal way.

The review contemplates 3 bases, mentioned below:

❖ Estructural Review

On this approach the review is constituted by 4 dimensions seeking to provide metrics for the structural quality of the data bases used in the process. In this approach the following dimensions are considered:

- **Completeness:** (Columns and registers). The quantity of null or empty registers are quantified and whether this make sense in a logical or business perspective on each variable. Is all the relevant information available?
- **Validation:** A review of every field in format, data type and homogeneity is made. The data are according to the standards and format requirements?

- **Temporality:** (Story, date, changes). A review of whether every variable temporality is according to the necessities. An appropriate register of the changes in data is performance?
- **Uniqueness:** A review of whether every register is identifiable and whether their contain all the necessary fields in order to be unique. The registers are unique or some duplication is presented in some way?

❖ **Content Review**

Through this approach the review is based on the verification of the used data base's quality, with an emphasis in the review of significance (data dictionary review), coherence and semantics.

❖ **Business Review**

Through this approach the review is based on the verification of the business razonability, namely whether the final estimations are according with the used information and whether the intermediate (if exists) processes can be replicated on a independent way by a third part.

3.3 Reprocesses and Documentation

Through a mythological and information's quality review it is expected the replication of the model. On this context partial reprocesses of the model construction will be performed. Among them: Bucket assignment rules, probability of default lifetime (PDLT), incorporating forward looking variables and expected losses.

In addition, through the project development, a documentation's quality review will be performed in order to identify possible improvements, documenting their reasons and criteria.

4. LITERATURE REVIEW

The confidence crisis in the financial system generated by the quick default of banking entities that were classified with strong credit qualities, bring into light not only the deficiencies on vigilance on international banking, but also the deficiencies in the accountable normative which was not providing relevant information about financial instruments and credit activities (Financial Stability Forum, 2008)

In the wake of the financial crisis, the International Accounting Standards Board (IASB) worked towards the development of expected-loss-based methods of accounting for credit-loss impairment, finally publishing the IASB's 2014 final version of IFRS 9 Financial Instruments.

The new model of expected credit losses (ECL) aims to address the "too Little, too late" critics posed through the most recent financial crisis, caused by the restriction on normative about when could be recognized losses and also by the information that was provided in the accountability when those losses were measured. It was allowed to banks to provisionate credit losses when evidence of the effective loss have had actually occurred.

With the scheme of incurred losses, the entity recognized losses by credit risk only at the moment of materialization, therefore it did not reflected the changes on economic risk on a appropriated way, generating a false security and high-profit feeling.

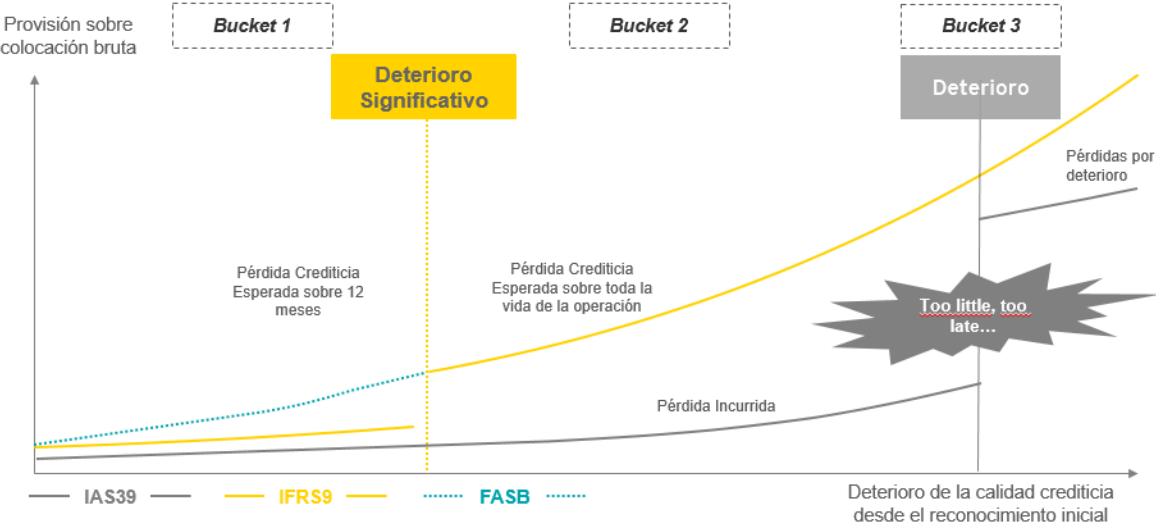
Based on that, through times of economic prosperity the potential future risks of generated financial assets were ignored, since the credit deterioration were not recognized by the possible losses about which signs were not available. This produces a overestimation of financial incomes on recession times. At the same time, the recognition grow up exponentially, provoking a decapitalization of the financial system producing restriction on credit (Albertazzi & Gambacorta, 2009; Bikker & Metzemakers, 2005; Dugan, 2009; González-Mota, 2005; Laeven & Majnoni, 2003)

The transition from IAS 39 towards IFRS 9 will lead to a change in the level of provision for credit losses. The transition is likely to have significant impact on shareholder equity, net

income and capital ratios. This is due the principal changes on the normative are being reflected by the fact that the entity recognize the expected losses throughout the whole life of the financial assets, considering the risk profile as a base for the calculation of provisions for credit risk.

As it is observed on figure 0.1 “General approach of expected loss”, the most significant focus on the new model correspond to the criteria of deterioration, where it is reflected graphically the impact of provisions by estimate the credit losses under IFRS 9 approach. Exist a change in the risk of financial assets from the initial recognition, since a significant deterioration of credit quality of the instrument is observed, therefore the deterioration is measured using expected credit losses through the lifetime rather than the 12-month expected credit losses where has been a significant increase of credit risk.

Fig.01 General approach of expected loss



The assignment of credit risk, in general, depends on the borrower’s capacity to satisfy its contractual cash flow obligations on the date and the adverse changes on economic conditions. This last idea is a relevant new approach of the newest normative, which recognizes that macroeconomical factors are a key driving force behind impairments of financial assets, by contemplating prospective estimations under different possible

macroeconomic scenarios. In line with the previous idea, additional guidance on incorporating macroeconomic factors might encourage greater consistency between entities and allow users of financial statements to make better comparisons based on the possible outcome's range.

Additionally, based on IFRS requirements, it is necessary to estimate new risk parameters that are not currently required for the local regulation, as are the estimation of the previously mentioned: significant increase of risk, lifetime and macroeconomical scenarios, which together with: CCF, discounting rates and forward-looking adjustment. All the definitions will be described on the next chapter, Chapter 5 "Methodology".

Regarding to the information for the measurement of the parameters that affect the estimation of expected credit losses, it must be considered the use of reasonable and sustainable information that is available without cost or disproportionate effort on the date of presentation about past events, current and future economic conditions. Due to this and in conjunction with the proposed changes already mentioned, many financial institutions must go through a long development path in their projects for the full implementation of IFRS 9.

The challenges of a successful implementation cannot be underestimated. The wide-ranging scope of IFRS 9 across the finance, risk and IT areas of the business, as well as the additional complexities of data collection and interpretation mean that implementation projects are complex and time consuming, since entities has as main necessity the development of systems and processes that generate all the information available in terms of quality, robustness and consistency for the implementation of IFRS 9 expected credit loss model (Beerbaum, 2015).

Currently, the implementation of IFRS 9 it i son first stage, because there is still a lot of uncertainty from entities about the totality of their implementation, including the real quantification on financial states and their regulatory fulfillment, as well as changes due to their impact in the update of processes, controls and systems.

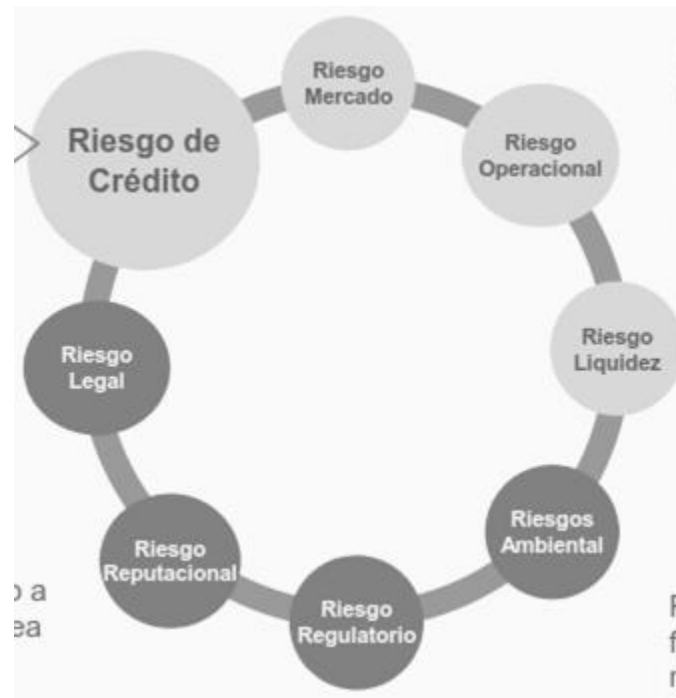
5. METHODOLOGY

The theories, theoretical approaches, concepts and ideas that sustain the model and research are presented through this chapter.

5.1 Financial Risk

The concept of risk is based on the consequence of the occurrence of some event that will have a negative impact on some business organization. Observe that the impact is not necessarily negative since represents the different possibilities that can occur, because can be either positive or negative. Additionally, because the role of every firm goes around factors and elements of different type: juridical, ecologic, socials, etc, it is possible to classify risk into financial and non-financial risk.

Fig.02 Type of Risk



Financial risk allude to the uncertainty produced by the return on an investment, since the changes produced on the industry, the impossibility on capital devolution by a counterpart and the instability of financial markets. Since financial markets faces continues threats from

different sources, financial risk can be classified on: credit risk, market risk, liquidity risk and operational risk.

The definition for each of the typologies are provided as follows:

- Market Risk: Risk that the value of a portfolio, either of business or investment, will reduce due to adverse movements on value of market risk factors (type of rate and market).
- Operational Risk: Risk of financial losses originated by failures of insufficiencies on processes, people, internal systems, technology and on presence of suppressive external events.
- Liquidity risk: risk of loss based on incapacity of liquidate financial assets or finance disequilibrium on cash flows.
- Credit Risk: Risk of economic losses or decreasing on the value of assets that can be produces by the non-compliance or incomplete compliance of obligation from a third party to the entity.

On the other side, non-financial risk is defined by the internal factors and external developments, as a results of market changes that each time are harder to predict, altogether with political development and increase of laws and regulations.

The measurement of risks is fundamental for an appropriated management of themselves since, if entities are capable of quantify risks, they will be able to manage them (penalize, restrict and limit them). Also, a precise measurement guarantee the solvency, even in moments of crisis, since it is the base to stablish the level of capital to maintain on each moment. At the same time, a correct quantification of risk demands to previously identify and classify the different typologies already described.

5.2 Credit Risk

Through this document we will focus on credit risk defined as the probability that on expiration, an entity does not face, total or partially, to their obligations of pay a debt or return over a financial instrument, due default, illiquidity or any other reason (Chorafas, 2000). Consequently it converts it on a inherent approach to every economic activity. For that financial entities must be capable of measure and manage it trying to cover against it or transposing it out of the entity.

The risk management approach is to maximize the return rate adjusted by banking risk, maintaining the exposition to credit risk between the defined tolerance.

The approach on credit risk management is to maximize the adjusted return rate by bank risk, maintaining the exposition to credit risk on the defined tolerance, therefore having an advance model for credit losses can bring a realistic expected amount on credit losses, more relevant, realistic and precise reflecting the future economic developments. This is exactly where IFRS 9 plays an important role.

5.3 Main Definitions

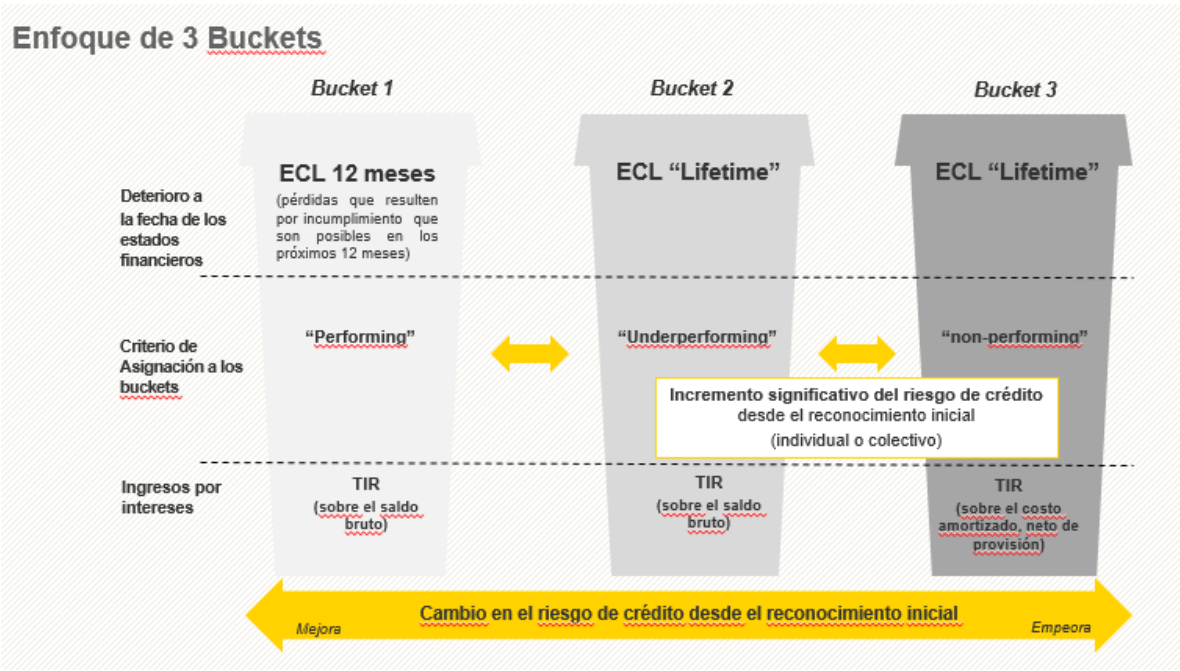
5.3.1 Financial Classification

Financial instruments must be classified based on a Bucket approach, which consist on three phases based on the change on credit quality of financial instruments from the initial recognition. The assessment of whether there has been a significant increase in credit risk is based on an increase in the probability of a default occurring since initial recognition.

This phases or stages establishes how an entity measures the losses from deterioration or applied the method of effective type of interest. The deterioration is measured using the expected credit losses through the lifetime rather than the 12-month expected credit losses where has been observed a significant increase of credit loss.

It can be observed in the fig.03 "Approach of the three buckets" that in the first bucket there is no evidence on credit deterioration and therefore the losses are recognized 12-months forward. On the other side, financial instruments by being exposed to a significant increase on credit risk from the initial recognition but not deteriorated are classified on Bucket 2, recognizing losses through all the life on the operation. The third stage includes financial assets for which objective evidence of impairment at the reporting date has taken place. For these assets, lifetime ECL is recognized and their probability default is assumed to be 100%.

Fig.03 Approach of the three buckets



The most influence bucket on the expected loss estimation correspond to Bucket 2 since the asset lifetime on which credit losses are recognized depends on the significant increase of risk, which depends on the capacity of the lender to fulfill their cash flows contractual obligations on the defined dates and the adverse changes on economic conditions. According to the paragraph 5.5.9 of NIIF 9: "by performing an evaluation, the entity will use the change on default risk through the expected life of a financial instrument, rather than the change on amount of expected losses" (Jose Morales-Díaz, 2018).

Depending on the bucket classification of the financial instruments the credit losses will be calculated to 12-months or through the whole life of the financial operation.

5.3.2 Default Definition

The definition address the default of assumed obligations by a contract counterpart. This definition must be aligned with the enteral credit risk management and be applied consistently to whole the instruments. Exists a refutable presumption that after 90 days of arrear a financial asset presents default, where an entity can define it on a different way if has enough reasonable and sustainable information on the criterion.

5.3.3 Portfolio Segmentation

An entity needs to group the financial instruments based on the shared credit risk features, therefore the portfolio must be segmented into different groups of assets/loans with similar risk characteristics. This will likely align with the portfolio risk segmentation, Basel segmentation and operational segmentation (Pwc-middle east, 2013), all this with the objective of facilitate a design tailored to detect significant increases on credit risk on a oportunely way.

The groups of instruments should respond to historical and current environments, as well as to forward looking information and macroeconomic factors in a similar way, with respect to changes in credit risk level. As was mentioned before, the method should be granular enough to assess changes in credit quality leading to migration to a different credit risk rating, thus impacting the estimation of expected credit losses.

The segmentation must be reevaluated in case of existence of relevant new information or whenever credit risk expectations change. In addition, the operations should not be grouped in such a way that the performance of the segment as a whole shows an increase in a particular exposure's credit risk. If the operations suffers a significant change on their credit risk from their initial recognition, this must impact only on the corresponding segments, and therefore those exposures should be segmented out into appropriate subgroups.

5.3.4 Expected Loss Measurement

The expected loss correspond to the difference between all the contractual cash flows that are owed to an entity according to the contract and all the cash flows that the entity expects to receive (i.e. all the cash insufficiencies) discounted by the original effective interest rate.

NIIF 9 5.5.17: An entity will measure credit losses of an instrument in a way that reflects:

- a. An amount of weighted probability not biased that it is determined through an evaluation from a range of possible results.
- b. The temporal value of time
- c. The information is reasonable and sustainable and available with no cost or disproportionate effort at date of presentation about the past events, actual conditions and future economic condition forecasts.

The simplified formula corresponds to:

$$LECL_T = \sum_{t=1}^T \frac{SR_{t-1} * PD_t * EAD_t * LGD_t}{(1 + EIR)^t}$$

Where:

LECL: Expected loss for the lifetime.

SR: Survival Rate.

PD: Probability default conditional to a survival on time t.

LDG: Loss Given Default.

EAD: Exposure at Default.

EIR: Effective Interest Rate.

t: Residual Lifetime.

T: Contractual lifetime.

No-payment probability, as EAD, LGD and discounting effect, reflects the expected life or the exposed period. The bank calculates each one of those components for a series of time interval through the period of exposition (e.g. monthly, quarterly, annually) and are summed in order to derive the ECL through Lifetime.

However, prospective adjustments must be considered based on the macroeconomical expected performance and the weighted adjustments resulting under different macroeconomical scenarios.

5.4 ECL Parameters of Estimation

5.4.1 Probability Default

Under the Probability Default normative, is not directly indicated by the normative, but corresponds to the international interpretation under which the alignments of risk management by the Basel Committee.

La probabilidad de default es la probabilidad de que una contrapartida no haga frente a sus obligaciones contractuales en un horizonte temporal determinado de tiempo. Se caracteriza por una variable Bernoulli que puede tomar valores 0 (no default) o 1 (default).

A continuación se definen las distintas adaptaciones de la PD en términos de la nueva normativa:

- PD 12 meses: Pérdidas crediticias esperadas en los próximos 12 meses, debido a que el riesgo crediticio de un instrumento financiero no se ha incrementado de forma significativa.
- PD PIT: Se ajusta la información histórica sobre la base de la información observable actual para reflejar los efectos de las condiciones actuales que no afecten al período sobre el cual se basa la información histórica, y así eliminar los efectos de las condiciones en el período histórico que no son relevantes para los flujos de efectivo contractuales futuros.

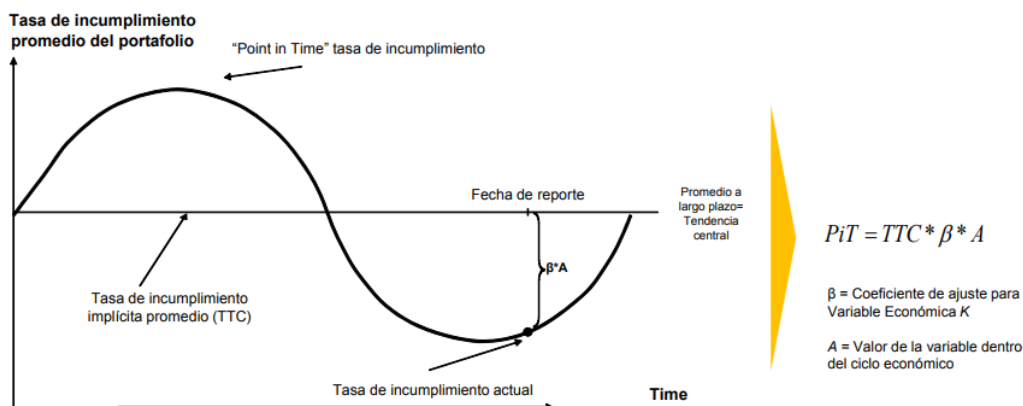
- PD FWL: Incorpora el pronóstico de condiciones futuras que no afecten al período sobre el cual se basa la información histórica.
- PD LT: Pérdidas crediticias esperadas para toda la vida de la operación, debido a que el riesgo crediticio de ese instrumento financiero se ha incrementado.

The new IFRS9 model and the accounting standards require institutions requires to use point in-time (PIT) projections, since the risk factors of the model are influenced by macroeconomic changes. By accounting for the current state of the credit cycle, PIT measures track closely the variations in default and loss rates over time. It is define as estimates of default rate over any specified horizon, but which are derived based on occurrence of a particular macroeconomic or credit-factor scenario. A good conditional PIT estimate accounts for all relevant information including the current state of the credit cycle till today but only the specified macroeconomic or credit-factor scenario in the future. (Gaurav Chawla Lawrence R. Forest Jr. & Scott D, 2015)

In this context, entities must realize an adjustment to the PD “Through The Cycle” (TTC) into a PD PIT. PDs obtained based on multiple periods (i.e., 5 years) are considered Through The Cycle as far as they capture the average behavior of credit index along the various sections of an economic cycle.

As can be seen on figure 04 “PD Adjustments: from TTIC to PIT” it can be adjusted in order to go from a PD Through the cycle towards a PD Point in time.

Figure 04: “PD Adjustments: from TTC to PIT”



The standard does not provide any guidance on how to adjust TTC PD to PiT PD. The process is complex and will require the use of judgment.

5.4.2 Loss Given Default

It is important to mention that LGD is not literally called like this on the normative, but it corresponds to the international interpretation under the alignments on risk management of Basel committee.

It is defined as the percentage over the exposition on risk that is not expected to recover due to default, which is obtained based on the historical behavior on each section of loans, dividing values not expected to be recovered of credits on default by the remnants amounts by the date of default.

NIIF 9: The LGD must considered:

- Collection expenses incurred through the recovery process.
- Recovered value on the execution of guarantees.
- Present value of recoveries according to effective interest rate.

The estimation of the LDG reflects expected changes on the exposition (consistently with the assumptions used on the EAD modellation), in a way that is not biased (for example, it can emerge a conservative estimate if the quantity expected on exposition falls with time but this is not take into account on the estimation of LGD).

Additionally, LGD forecasts will be required for all segments / pools. This must reflect a discounted loss rate and be based on the portfolio loss experience of the bank. This must be based on the portfolio loss experience of the bank.

5.4.3 Exposure at default

EAD is another mandatory input for the calculation of expected default and capital, defined as the amount of pending debt on payments at the moment of default of the client.

It is calculated for each pending year of the loan discounting each future cash flow with the effective interest rate (EIR), approximately equivalent to the rate this was provided.

The exposition on a contract usually coincides with the amount of the same one, but although for products with explicit limits, as credit cards or credit lines, the exposition must incorporate the potential increment of the amount that could be produce from a referential date until the moment of default.

Given the approach of the normative, the exposition must consider the following three relevant points:

- Not only considers the actual exposition, but rather the future one, since includes expected flows as well..
- The expected exposition depends greatly on residual term of the instruments for the measurement of expected losses on lifetime.
- Considers contingent exposition (available amounts) for products with revolving.

5.4.4 Significant increase of Risk

IFRS 9 requires assessing financial instruments for significant credit risk increases since initial recognition. Firms must use change in lifetime default risk (considering quantitative and/ or qualitative information), a low credit risk exemption, and a rebuttable presumption of 30 days past-due. For instruments whose default occurrences are not concentrated at a specific point in time during the expected life, firms can use changes in one-year in default risk to approximate changes in lifetime default risk. (Crossen & Wang, 2016)

On each date of presentation an entity will evaluate whether there has been an significant increase of credit risk of financial assets from the initial recognition, where is realized the evaluation of changes on default risk on a lifetime of the financial assets in order to compare it with the initial credit risk with risk on the presentation date.

On this context, the entity must recognize on which classification of bucket is assigned the operation in order to estimate credit losses on the corresponding range, that is to say on Bucket 1: 12-months or Bucket 2: whole life of the operation.

A refutable presumption of that the credit risk is a financial assets has been increased significantly from the initial recognition, when contractual payments are delayed for more than 30 days, consequently the whole operation is assigned to Bucket 2. On this scenario, the company must justify and document on a congruent way if its change on significant risk will be considering another range of time.

5.4.5 Lifetime Period

Correspond to the maximum contractual period to be considered to measure expected credit losses along time on which is exposed each operation, resulting from possible default events.

However, there exists financial instruments with a lending and not-used compromise components. For this financial instruments, and only for this ones, entity will measure credit risk along the period on which is exposed to credit risk and this will not be mitigated by credit risk management actions, even if this period is extended beyond the maximum contractual period.

For the estimation factor such as historical information and experience about the following should be considered:

- a. Period along the one entity was exposed to credit risk on similar financial assets.
- b. Term for the occurrence of similar defaults on financial instruments after a significant increase of credit risk.
- c. Credit risk management actions that an entity expected to take once the credit risk over the financial instruments has taken part, such as decrease of disposal of non-disposed limits.

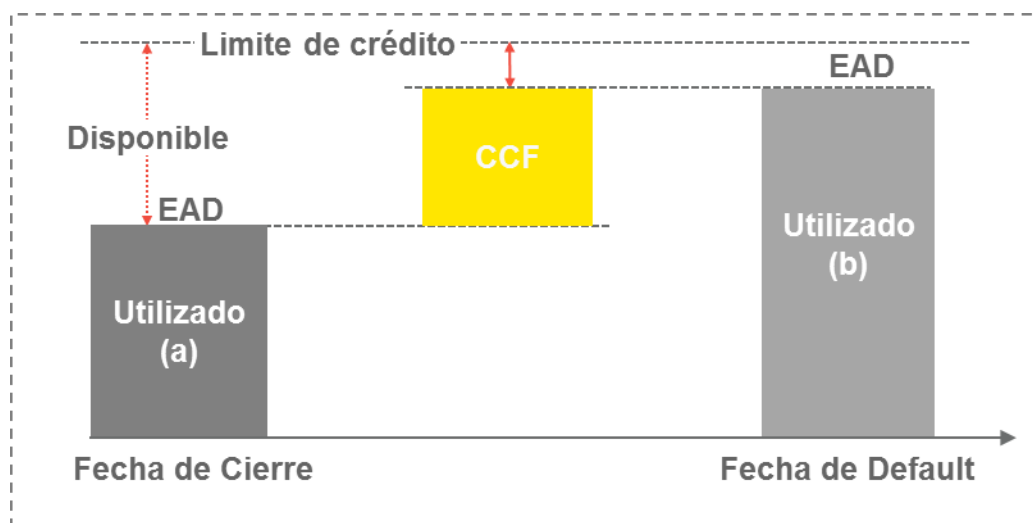
5.4.6 Factor of Credit Conversion

For financial instruments with a component of non-used compromise (Credit Lines and Credit Cards) it is necessary to estimate the contingent exposition. This type of products does not have a predefined cash flow structure, and therefore the calculation of its exposition differs and is subject to changes either on utilization segmentation terms and/or term.

The exposition shall incorporate the potential increase of amount that could be taken from a referential date until the moment of default. Therefore, EAD is obtained as the summation of risk over an operation plus a percentage of non-disposed risk. This percentage over the non-disposed amount that is expected to be use before the default has occurred is known commonly as CCF, that is to say, it correspond to the available amount of the available that will be used until the moment of default.

As shown in Figure 05 "CCF", the transaction on the closing date has a balance due but there is still one available that at the time of the default decreases and that difference is classified as CFF.

Figure 05. CCF



The effect of changes in committed limits must be taken into consideration (in other words "Credit Limit"), so it must be simulated based on samples that represent the changes in the limits granted in order to estimate the impact of these variations.

6. RESULTS AND DISCUSSION

In the present chapter the results of the performed review are presented for the expected credit losses estimation (ECL) and of each of their components of the parameters.

The entity provided documentation and calculation files for the proposed analysis, which will be presented below

A. Methodological Review

6.1 Documentation

The following documentation was provided for the institution to be used as part of the study:

- a. Methodology:
 - "Documentación nuevo modelo de provisiones_V2.docx"
 - "Justificación decisiones.docx"
- b. Balance Provisiones:
 - "DIC ENE new efectos finalhacer71.xlsx"
 - "SALDOS-PROVISIONES_ULT_5_ANOS.xlsx"
- c. PD Lifetime
 - "AM_FINAL.xlsx"
 - "Copia de DIC ENE new efectos finalhacer10.xlsx"
 - "Copy of ssssss.xlsx"
 - "calculo julio 2017 a FEB 2018 28ccf.sav"
 - "baseparaLT.sav"
 - "Base AM.sav"
- d. Macroeconomical Analysis
 - "ANALISIS MACRO.xlsx"
 - "SELECCION DE VARIABLES.xlsx"
 - "Test de Causalidad.xlsx"
 - "Analisis variables CONS_V2.xlsx"

- "Análisis variables Normal_V2.xlsx"
 - "Análisis variables RENE_V2 - copia.xlsx"
 - "Análisis variables TRNAL_V2.xlsx"
- e. Reprocessing base
- "reprocessing base"
- f. Prepayment factors
- "Base Análisis vintage de prepagos.docx"
 - "Análisis final vintage prepagos.xlsx"
 - "TasaDePrepagos_nuevas marcas.xlsx"
- g. Credit Conversion Factor
- Utilización Total.xlsx
 - Copy of CCF_v3.xlsx
- h. Justification of the Buckets
- "Copy of ssssss.xlsx"
- i. Loss Given Default
- "RECUPEROS - LGD.xlsx"

6.2 General concepts review

6.2.1 Methodological description

The definition of default, segmentation and heal are one of the considered parameters are the bases of the estimation of ECL. Below the results of the review are provided for this parameters.

a. Definition of Default

The definition of default used by the entity is as follow:

- Clients with delay equal or superior to 90 days of arrears on interest rate payments or some loan's capital.
- Clients provided with a loan to cover an operation with more than 60 days of arrears in payment's delay.

- Clients that have been part of a forced restructuring or partial forgiveness of a debt.

b. Portfolio segmentation

Even though the portfolio of collocations of Walmart Financial Services is originated by a credit lined provided to clients to be used in purchasing and advances of money, exists additionally other product associated with the offer provided to a client regarding a temporal increase of the principal line, which allows to realize withdraw money over this amount (called "Super Avance"). Considering that clients that withdraw this line of "Super Avance" has unique conditions and the terms associated with this collocations are usually longer, this will be considered as a segmentation of the portfolio and will be studied in a independent way and will be called Consumption.

1. Consumption: Clients who a part of the current amount correspond to a withdraw in Super Avance, using the temporal increase of the line. This clients represents half of the weight's portfolio of the institution.
2. Renegotiated: Clients who has a current renegotiation of debt of defaulting type and have had not payed enough coupons to be qualified as normal. This clients represents a 9% of the total portfolio of the entity.
3. Normal: Clients whose portfolio classification is not one of the above. They represent around a 41% of the portfolio.
4. Transactional: From the group above, clients with specific characteristics are separated, since their default rates are smaller than the rest of the portfolio (< 1%). This clients have their debts in order at the moment of the classification, does not register any withdrawal of advance in the last 90 days, does not have refinancing or renegotiated transactions or in default and register purchasing in the last 90 days for a total amount of more than \$100.000 CLP with actual amount lesser than the purchasing amount.

Therefore, the following segments are considered from bad to good quality: Renegotiated, Consumption, Normal and Transactional.

Additionally, an analysis or rate “Bad” for each segment is performed in order to justify according to the proposed segmentation.

6.3 Definiton of Healing

The local normative point out that a debtor and their respective credits won't be removed from the default portfolio unless a good and punctual behavior has been observed for at least 4 months according to the terms and amounts agreed for capital and interest in all their obligations with the financial entity. This is the used definition by the company.

6.3.1 Observations

The proposed definitions to identify default in a operation is framed by the normative, in this case 90 days of arrears and additionally correspond to a local normative by SBIF, Additionally, the same definition of no-payment is applied on a uniform basis on every aspect of the ECL's modelation. Consequently this is the definition used for intern credit risk management.

The proposed definitions of the segmentation are framed currently on the normative, since they could be associated to different risk or product qualifications. On the other hand, the segmentation is associated to the opportunity of available information, consequently it is suggested to evaluate other segments as far as possible that information of the clients is available. To develop new procedures to corroborate that groups share credit characteristics and therefore a re-segmentation of the portfolio if needed.

Despite of the fact that the definition of healing is not considered under IFRS9, does not contradict the spirit of the norm that holds that a client would need to demonstrate in a congruent way a good payment behavior through a long period of time before the risk quality has been considered to effectively decrease.

6.4 Estimation of Expected Losses Review

The objective of the ECL review, is to verify the integration of the different parameters conforming it are according to the methodology.

6.4.1 Methodological description

The estimation of expected losses under the IFRS 9 approach in a group portfolio correspond to an estimation based on the 3 buckets according to the normative guidelines, whose incorporate quantitative and qualitative components for both the classification and the measurement of the deterioration of financial instruments.

The general formula of estimation of the entity is based in obtain the expected losses through the probability of default (PD), the loss given default (LGD) and the exposure at default (EAD). Additionally a macroeconomical adjustment is needed and applied to the model through a modelling considering three scenarios: increasing of provisions, decreasing of provisions or continuous provisions.

To determine the losses the following formula show the general form of the model:

$$IFRS\ 9 = PD \times EAD \times LGD \times D$$

Based on the above, the instruments are classified on their level of deterioration according to the following:

- Bucket 1: Financial assets that has been not significantly deteriorated their credit quality according to their original evaluation. For this assets a 12-month expected losses are considered.
- Bucket 2: Financial assets not in default but presenting a significant credit risk with respect to the original performance. For this assets the expected losses are considered towards all the instrument's life.

The PD correspond to a 12-month PD, FP is the prepayment factor and Lifetime efect is determined through the use of PD LT.

- Bucket 3: Deteriorated financial assets currently in default status.

The expected default does not use the discount rate, according with what the client expressed. The rational is that EAD are amounts without interests.

6.4.2 Observaciones

In general, it is observed from a methodological perspective that the proposed approach in the documentation is aligned with the requirements on IFRS 9, whose is based in anual expected losses according to the remaining life of operations, considering the new approach of the normative about the classification of increasing risk of instruments.

6.5 12-month Probability Default

6.5.1 Methodological description

The 12-month probability default, is constructed according to each client. A simple random sample is constitute where each client is considered only one time per period. The time period for the construction was from 201201 to 201607 where the observed interval finish one year later on 201707.

The variable selection process is made according with two statistic indicators: Information value and Correlations. Later, the variables are categorized and segmented in order to correctly consider them for the logistic regression.

Finally, the 12-month probability default for each client and segment is calculated according to the logistic regression:

$$PD = \frac{1}{1 + e^{logit}}$$

Where logit is defined for each segment according to the following rule:

Consumo:

$$\begin{aligned} \text{logit} = & \beta_0 + \beta_1 * \text{AMAX3}_{\text{woe}} + \beta_2 * \text{PSOBREF3}_{\text{woe}} + \beta_3 * \text{NPAGOS3}_{\text{woe}} \\ & + \beta_4 * \text{MONINFCOM}_{\text{woe}} + \beta_5 * \text{UTILIZACION}_{\text{woe}} + \beta_6 * \text{ANTCTA}_{\text{woe}} \end{aligned}$$

Normal:

$$\begin{aligned} \text{logit} = & \beta_0 + \beta_1 * \text{DIAS_MORA}_{\text{woe}} + \beta_2 * \text{MONINFCOM}_{\text{woe}} + \beta_3 * \text{UTILIZACION}_{\text{woe}} \\ & + \beta_4 * \text{ANTCTA}_{\text{woe}} + \beta_5 * \text{NPAGOS6}_{\text{woe}} + \beta_6 * \text{PSOBREF6}_{\text{woe}} + \beta_7 * \text{CTACUP}_{\text{woe}} \end{aligned}$$

Transaccional:

$$\begin{aligned} \text{logit} = & \beta_0 + \beta_1 * \text{UTILIZATION}_{\text{woe}} + \beta_2 * \text{ANTCTA}_{\text{woe}} + \beta_3 * \text{PAGOS12}_{\text{woe}} \\ & + \beta_4 * \text{AMAX12}_{\text{woe}} + \beta_5 * \text{MONINFCOM}_{\text{woe}} \end{aligned}$$

Renegociados:

$$\begin{aligned} \text{logit} = & \beta_0 + \beta_1 * \text{DIASMORA}_{\text{woe}} + \beta_2 * \text{NPAGOS3}_{\text{woe}} + \beta_3 * \text{NUMIFOCOM}_{\text{woe}} \\ & + \beta_4 * \text{PAGOS6}_{\text{woe}} + \beta_5 * \text{RELCUOMYCUPO}_{\text{woe}} + \beta_6 * \text{ANTCTA}_{\text{woe}} + \beta_7 * \text{SALDO}_{\text{woe}} \end{aligned}$$

The variables considered for the logit calculation are described as follow:

- AMAX: Maximum days of default in N months
- PSOBREF: Percentage of payment over the invoiced in N months
- NPAGOS: Number of payments in N months
- MONINFCOM: Amount of debt in infocom
- UTILIZATION: Percentage of the card used (balance / quota)
- ANTCTA: Account age
- RELCUOMYCUPO: Division between quota and greater historical quota
- PAYMENTS: Amount paid in N months
- CTACUP: Quota
- BALANCE: Balance

The predictive model of each beta is calculated using SPSS Modeler, considering the 80% for the estimation and 20% for validation in order to satisfy an adequate cross-validation and avoid over-calibration on the parameters.

Attached in the Appendix (9.1 "PD Calibration"), the routine for the calculation is provided and the respective results.

6.5.2 Observations.

The normative suggest that the 12-month PD should be a Point in Time, therefore it is advised to the management board to realize an adjustment for the 12-month PD to obtain the corresponding PD Point in Time.

Also, the normative demands to adjust the historical information according to the actual observed information in order to integrate the actual conditions and their forecast for future constrains (not affecting the period over the historical information), and to eliminate the effects of constrains on the historical period which are considered not relevant for future contractual cash flows.

Regarding the local normative, the PD must be adjusted in an appropriated way if it is going to be used for IFRS 9 contexts, since is determined through an "through the cycle" approach of an hybrid "Point in Time" approach.

6.6 Probability default Lifetime (PDLT)

The entity made PD Lifetime curves to reflect the expected movements on no-payment risk through the lifetime on exposition by considering all the operations that from their initial recognition have been suffered a significant increase on credit risk quality.

Since the documentation is under construction, the details on analysis might be find in the next files, which where previously analyzed:

- CURVAS DE MORA_V3.xlsx

- EJEMPLO_LT.xlsx

- AM_v3.0.xlsx

At first glance, a calculation of arrears is made by segments (consumption, normal and renegotiated), where the considered period was from 201201 to 201607 and the client base that fell into default through this period (a unique rut is considered). The total base consist on 660.000 samples of which the clients with more than 60 days of arrears were selected. On Walmart syntax this correspond to Bucket 2 consisting on 10.148 samples of clients.


A table constructed by segment the months at default (60 periods) is provided as following:

Fig.05 Probability of Default Lifetime

Meses al Default									
Segmento	0	1	2	3	...	12	13	...60	Total
CONS	27	879	25	11		0	1	0	978
NORM	504	7634	144	60		11	12	0	8809
RENE	11	316	21	7		0	0	0	361
Total	542	8.829	190	78		11	13	-	10.148

#Default Total Clientes	CONS	89,88%	2,56%	1,12%		0,00%	0,10%	0,00%
	NORM	86,66%	1,63%	0,68%		0,12%	0,14%	0,00%
	RENE	87,53%	5,82%	1,94%		0,00%	0,00%	0,00%

Construcción PDLT	CONS	89,88%	92,43%	93,56%		96,42%	96,52%	97,24%
	NORM	86,66%	88,30%	88,98%		92,61%	92,75%	94,28%
	RENE	87,53%	93,35%	95,29%		96,68%	96,68%	96,95%



+	2,56%
+	1,63%
	5,82%

+	1,12%
+	0,68%
	1,94%

Aquellos clientes que tengan un PPP menor o igual a 12, se les considera la PD del modelo.

Aquellos clientes que tengan un PPP mayor a 12, se les considera la PDLT del mes correspondiente.

Each column correspond to the quantity of months that each client took to felt into default, denoting as "0" a client selected but not into default, month "1" the amount of clients that felt into default over the first month and so on and so forth.

Lather, for each segment a ratio study was performed between the amount of clients in default over the total amount of observed clients and this operation is performed for the whole columns. It is considered the first ration (in percentage) as the corresponding PD for at month "1" since the probability of being in default at the first observation is greater than

in the later months (60 and 90-days), and then the ratios of later months are summed in order to construct the PD of each observed month (PD Lifetime).

Values “12” are considered for clients with less than 12-months term of weighted average, corresponding to: 96,42% for consumption segment, 92,61% for normal segment and 96,68% for renegotiated segment.

The PDs are used for the calculation of provisions on bucket 2 (more than 60 days of arrears), which may be observed in the following case:

Fig.05 Case PDLT

DEUDA	\$ 505.044
PPP	14
PD	1,1%
SEGMENTO	NORMAL
DIAS_MORA	61

PERIODO	A1	A2	A3	...	A11	A12	A13	A14
PD	0,926	0,926	0,926		0,926	0,926	0,9274	0,9296
PD Marginal	0,926	0	0		0	0	0,0014	0,0022

Caso 1	1	2	3	...	11	12	13	14
Devoluciones	\$ 36.075	\$ 36.075	\$ 36.075		\$ 36.075	\$ 36.075	\$ 36.075	\$ 36.075
PD * Devoluciones	\$ 33.405	\$ 33.405	\$ 33.405		\$ 33.405	\$ 33.405	\$ 33.456	\$ 33.535

$$Devoluciones = \frac{Deuda}{PPP} \sum_{i=1}^{14} PD_i * Devoluciones_i$$

Caso 2	1	2	3	...	11	12	13	14
Exposición	\$ 505.044	\$ 468.969	\$ 432.895		\$144.298	\$ 108.224	\$ 72.149	\$ 36.075
PD Marginal * Exposición	\$ 467.671	\$ -	\$ -		\$ -	\$ -	\$ 101	\$ 79

$$Exposición_n = Exposición_{n-1} - Devoluciones_n \sum_{i=1}^{14} PD Marginal_i * Exposición_i$$

The amount is divide by the average weighted term, which is called money returns, which are multiplied by the corresponding PD on each month in order to consider as resul the sum of the product on each period.

With this result, the LGD is included as well as the prepayment factor in order to calculate the provision.

6.6.1 Observations

It is recommended to the management board to check the analysis of determination of the probability of default lifetime, since the determination of this probability is subject to the change of measurement on the significant increase of risk (more than 60 days for the entity). Additionally, for the calculation of the ECL is advised to use the cumulative marginal probabilities applied to the debt exposed.

6.7 Review of Significant increase of Credit Risk

6.7.1 Methodological Description

The Company has defined that a client with more than 60 days of arrear (tier 3) presents a significant increase of risk, contradicting the normative, which establish the following:

“B5.5.11: If the forward reasonable looking information and sustainable is available at no cost or at no disproportionate effort, an entity cannot only trust on arrear information to determine whether the credit risk has been increased in a significant way from the initial recognition. However, when the information with more forecasting relevant than past historical late payments(either on an individual or collective base) is not available at non cost or disproportionate effort, an entity cannot trust only on the information about late payments to determine of whether the credit risk has been increased significantly from the initial recognition. Independently of the path on which an entity measure the significant increase of credit risk, exists a refutable presumption of whether the credit risk of a financial asset has been increased significantly from the initial recognition, when the contractual payments has been delayed for more than 30 days.”

According to the above information, the entity justify the fact of contradict the normative in the following procedure:

The initial base for the calculation of significant increase of risk considers a simple window between 2012-01 and 2017-06 period based on 4months samples for each segment. The used data by segment correspond to arrear segments from 0 to 3.

Segments sections:

0: 0 days

1: 1 a 30 days

2: 31 a 60 days

3: 61 a 90 days

4: 91 a 120 days

5: 121 días a 150 days

6: 151 días a 180 days

7: 181 días a 210 days

It is important to mention if the operation gets into the segment 7, corresponding to more than 180 days, it means it entered to a deteriorated portfolio.

An interval analysis is performed considering the amount of clients in default, the amount of clients recovered (clients returning to segment 0) and amount of clients with no clear classification (clients paying the minimum amount and neither classified as 0 nor in default).

Later, for segments 0, 1, 2 and 3 the operation state is identified for movements on 4 months more, where the resulting ratio percentage between defaulting clients over total observations and the ratio percentage of amount of clients recovered over the total observations.

To obtain the inflexion point on risk the percentage of clients falling into default and the percentage of clients recovered is calculated. The previous procedure is resumed in the following table:

Tramo Mora	% Default	% Recuperación	Se mantiene en Mora sin Default	Diferencia %Rec vs %Pérdida
0	1,4%	81,5%	17,1%	-80,1%
1	17,9%	64,3%	17,8%	-46,4%
2	49,9%	36,8%	13,3%	13,1%
3	73,2%	16,7%	10,1%	56,4%

6.7.2 Observations

Was recommended to the management board to reevaluate their metric for significant increasing on risk since the presented reason does not establish a solid argument to contradict the regulation. Besides that, by observing the past table the percentage of inflexion clients on default versus percentage clients recovering take place into the second tier (because it can be observe an increase of the percentage in the change from arrear segment 1 to arrear segment 2), i.e. more than 30 days of arrear but less than 60 as is well established before.

Additionally, by using information layer for the calculation is being observed the same operation of each segment of arrear, repeating the information of each state.

It is important to mention that the significant increase of risk strikes over the methodology used in the calculation of the PD Lifetime.

6.8 Review of Loss Given Default

6.8.1 Methodological Description

The general formulation to calculate the loss given default is provided as follow:

$$\text{LGD} = 1 - \text{Tasa de Recuperos}$$

To estimate the recovering rate, the real payments made by the client from the default til the observed posterior months are considered (considering only the first default of each client).

The recovers are moved to present value by using a discount rate (last present average rate presented by the client before falling into default), this recoveries does not include collection expenses.

Later, to estimate the rate the sum of recoveries is divided by the total amount exposed at moment of default, therefore all flows are considered at the same temporal moment to finally calculate the LGD.

For each segment a LGD is calculated, which is considered constant through the life of the operation.

6.8.2 Observations

The calculation of the loss given default is according to the framework established by the normative, the estimations are based on historical observed experience in the entity through the use of discounting cash flows observed in the recovery process of contracts that have falling into default at some moment,

Due to the available information, the entity does not considered collection expenses, and it is point out to be included in future models.

6.9 Review of Exposure at Default and CFF

6.9.1 Methodological description

a. Prepayments

To calculate the segment factor of credit conversion, the entity use a vintage analysis of prepayments. First, for each segment the total average of sum of balances per period from 201202 to 201608, to its later use in the vintage table.

The table is constructed for each segment considering from 201202 to 201706, where the period is considered as the initial observation point to establish the pre-paid amount at the first moth, second month, third month and so on. This means, if my observed point is 201204 then we begin at this period.

Then the calculation of the sum per each observed month of each one of the segment is performed. For example, for the first month, it is considered the first observed amounts on each period. Then is divided by the amount of pending months (including the actual one) and then the ratio is constructed by dividing it by the one calculate at first glance.

To the final calculation, the cumulative sum of ratios by observed month is performed.

b. CCF

To calculate the CCF was considered the segmented portfolio on default of the sample between periods 201201 to 201607.

Later, for each client is analyzed the use of available amount from month to month. The calculation it is considered for the available amount in Chilean pesos as for the available amount in dollars (considering the changing rate at the end of each month).

$$Disponible = Cupo\ inicial - (Saldo - Saldo\ Super\ Avance)$$

Then the average amount of use for each client considering months from the observation till the defaulting month is determined.

For the calculation of the use constrains are imposed. Therefore, if it is negative then is replaced by zero and if is greater to one is replaced by one.

Fig. 06 CCF Analysis

# Cientes	201201	201202	201203	201204	201205	...	201607
1	0,36	0,28	0,29	0,33	0,27		0,29
2	0,31	0,36	0,30	0,29	0,34		0,32
3	0,29	0,35	0,29	0,31	0,31		0,31
4	0,3	0,31	0,32	0,27	0,3		0,31
5	0,29	0,28	0,34	0,35	0,29		0,29
6	0,31	0,32	0,31	0,32	0,3		0,28
⋮	⋮	⋮	⋮	⋮	⋮		⋮
1.974.090	0,3	0,29	0,31	0,3	0,29	...	0,32

Utilización de cada cliente entre un mes y el siguiente

$$Utilizacion = \frac{\sum_{i=1}^{d-1} \left(\frac{saldo_{i+1} - saldo_i}{disponible\ inicial} \right)}{d - 1}$$

d = numero de meses desde la observacion hasta el default.

Afterwards, to the calculation of CCF, the average of utilization for whole clients is considered, therefore the expression is resumed below:

$$CCF = \frac{\sum_{j=1}^{1.974.090} Utilizacion_j}{1.974.090} \quad \text{Donde: } j = j\ cliente, \text{ desde cliente 1 a cliente 1.974.090}$$

The final CCF determined was of 27,6%.

Now that the CCF is known, the exposure at default available is calculated via the expression:

$$EAD_{IFRS_{DISP}} = Disponible \times CCF$$

Finally, the factor is applied to the available amount of all the present operations with 5 days of arrear or less:

CL:

$$PROV_{IFRS_{DISP}} = EAD_{IFRS_{DISP}} * PD * LGD * FP$$

USD:

$$PROV_{IFRS_{USD}} = EAD_{IFRS_{USD}} * PD * LGD * FP$$

6.9.2 Observations

Was recommended to the management board that in context of bucket two, the exposure should be projected towards the whole life of the operation.

According to the GPPC, "... While IFRS 9 does not demand in an explicit way to model the EAD for banks, the understanding of how the expositions of loans are expected to change over time is critical in order to measure the ECL with no bias. This is particularly important for bucket two loans, where the no payment point can change over the future years. Ignoring the expected decrease on the exposition (e.g. in a reimbursable coupon loan) should drive to too high ECL. Ignoring the expected increase on the exposition (e.g. decreasing inside a limit of a rotative faculty) could drive to too low ECL measures."

Afterwards will be evaluated the inclusion of behavioral of an increase or decrease of available amount of credit products and it is suggested to realize an impact test of each of this behaviors, since the normative demands to reflect the expected changes in the pending amount through the lifetime of the exposition to loans allowed by the ordinary contractual terms.

6.10 Review of the determination on exposition period

6.10.1 Methodological description

The Company determines a Weighted Average Term (WAT) by client, considering all the current transactions.

For example, if a client A belonging to consumption segment (due to a super avance) has a debt of \$1.330.000 by the end of the period, considering the following current transactions:

Super Avance	Monto	\$ 800.000
	Cuotas	16
Avance	Monto	\$ 150.000
	Cuotas	8
Compra Supermercado	Monto	\$ 80.000
	Cuotas	3
Compra Comercio Asociado	Monto	\$ 300.000
	Cuotas	12

PPP 13

$$PPP = \frac{\sum_{t=1}^T \text{Monto}_t * \text{Cuotas}_t}{\text{Deuda Total}}$$

Donde:

T: Total de transacciones vigentes

Monto: Saldo de cada transacción

Cuotas: Número de cuotas de cada transacción

6.10.2 Observations

Remind to the management board to check the estimation methodology of the exposing period, since the period must be estimated through the lifetime of the operation, the period during which the entity is expected to be exposed to the credit risk of the financial instrument.

It is suggested at first step to use the maximum contractual period for financial assets whose payment program is known (Renegotiated and Consumption Portfolio) and for Cards (Normal and Transactional segments), in this case it could be evaluated the use of behavioral life.

6.11 Review of Forward Looking information incorporation and Weighted Probability

6.11.1 Methodological description

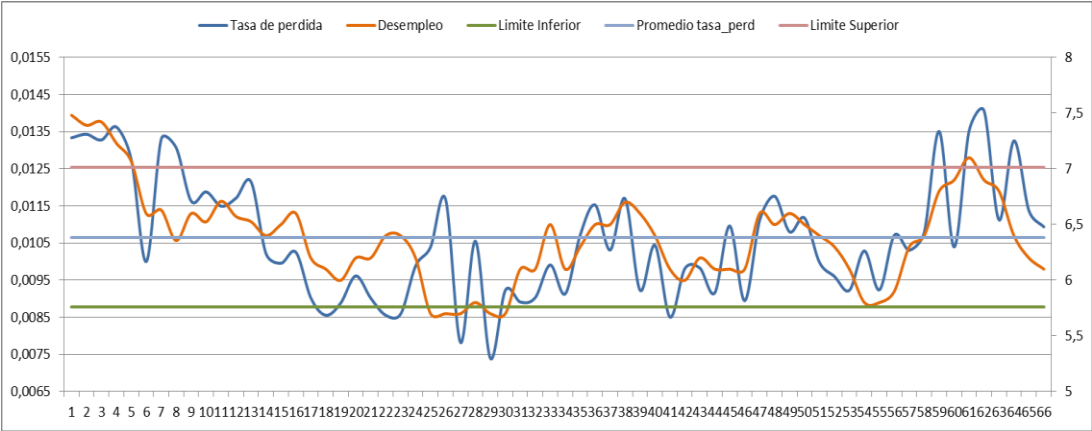
The entity has a methodology that incorporates the PWL to the expected loss in order to allow the effect of deterioration of credit risk.

On the analysis 8 macroeconomical variables were incorporated (6-month Retarded unemployment, IPC, IMACEC, Copper, Dollar, BCP, BCU and IPI), this are correlated (> 0.5) with the loss rate and also a causality test was performed.

The 6-month unemployment rate was the only variable that filled out both conditions.

The following plot show the historical time series of the loss rate and unemployment.

Fig.07 Forward Looking Analysis



The Company has a methodology of calculation under risk scenarios for the credit risk impairment, as defined as follows:

- **Pessimistic:** When unemployment is greater than 7,011%, in this case the historical average rate is 1,33%
- **Neutral:** when the unemployment is between 7,011% and 5,759%, in this case the historical average rate is 1,06%

- **Optimistic:** when unemployment is below 5,759%, in this case the historical average rate is 0,93%

After the scenarios are defined the entity determined the provisions and average amounts over the past 5 years, and from this generates a multiplier for the PD, as is shown in the next results:

PROMEDIOS	VALOR
PROV_PROMEDIO ULTIMOS 5 AÑOS	28.651
SALDO_PROMEDIO ULTIMOS 5 AÑOS	361.962

Escenario	Cargo	Dif	Dif/Prov. Prom.	MULTIPLICADOR_PD
Pesimista	4.814,09	977,30	0,034110412	1,0341
Neutro	3.836,80			
Optimista	3.366,25	470,55	0,016423531	0,9836

Finally, the loss is determined on the 3 scenarios, and according to the unemployment index at the end of each month, the provision is determined in the punctual scenario.

6.11.2 Observations

The entity by considering only one scenario accomplish to impact in a underestimation of the expected credit quality, since expected losses are different on each scenario, this caused by the non-linear nature of the credit losses on different scenarios.

Besides that the calculation for scenarios is done considers the first part of the “incorporate scenario-based analysis”, it is important to include the complete methodology. It is necessary to define weights for each scenario in order to correctly estimate the most likely scenario, as it is observed on the analysis, the probabilities for each scenario are contained on the interval [0,01 – 0,03]. Even though are relatively small probabilities, they in fact impact the calculation of the expected credit losses since they are weighted with the neutral scenario.

Considering the last two ideas, it is recommended to the management board to determine the expected loss based on a weighted average of each risk scenario, their occurrence and additional factors.

B. Data Review

Following up the final results for the review of data quality is presented for the data bases used to construct the following statistical indicators:

- Probability default construction (hereafter PD)
- Loss given default construction (hereafter LGS)
- PD-Lifetime construction
- Provided results from July-2017 to January-2018

In general, the expected results were obtained for each segment with a level of accomplishment over the 95% on every data base studied. However it is important to incorporate improvements on the details of each variable in order to be at Forefront in this kind of practices.

6.12 General Observations

Based on the review, points regarding development and application of the proposed methodologies should be attended mainly in documentation aspects according to the suggested points contained in this work as well as of the provided memos of the pasts reviews.

Most of the observations appointed by the team were obtained as a result of meetings with analysts of Walmart's Risk Management Team. Due to the lack of information on operative documents (documents that contain the information regarding the used variables) it would have had not be possible to realize the review with no help of this team.

6.13 Results

The provided results for the review on data quality for this 4 data bases provided by the client: Probability default construction (PD)

- Loss given default construction (GS)
- PD-Lifetime construction
- Provided results from July-2017 to January-2018

6.13.1 Results on the PD database

Risk team of Walmart provided the following files used to construct the PD:

- *NORMAL_RU_V2.sav*
- *CONSUMO_RU_V2.sav*
- *RENEGOCIADO_RU_V2.sav*
- *TRANSACCIONAL_RU_V2.sav*

This files contained variables that according to the March-13 meeting of the present year, were not finally used for the construction. It was corroborated therefore, that only the variables included in the file “Documentación nuevo modelo de provisiones_V2” were used.

a. Structural results on the review

The detail of the review may be found on the “Revisión de Calidad de Datos PI.xlsx” file (Ver anexo 4.1).

b. Result of content’s review

It was validated that even though the dictionary counted with the description of all the variables to be used, it is pointed out to include more information in order to follow the top trends.

Based on that, it is suggested to include a field for the description of the variable;

- Domain: Range of possible values
- System of origin: Origination Database for the variable
- Data type: Definition of the data nature (numerical real, integer, categorical, etc).
- Periodicity: Definition on the measurement of the variable (monthly, quarterly, etc).
- Definition of special values: Indicate character used for null-values, e.g. -999.

6.13.2 Results of LGD database review

The Walmart's risk team provided the following file used to construct the LGD;

- base3_lgd.sav
 - a. Structural Review

The detail of the review may be found on the "Revisión de Calidad de Datos PDI Walmart.xlsx" file (See Append 4.2).

- b. Content Review

Despite of the fact that the meaning of the variables was corroborated by the responsible analyst of its construction on Walmart, there is no dictionary nor file that actually describes the variables contained on the database. Regarding to this last idea, it is pointed out the necessity of the construction of a dictionary explaining the different characteristics of the variable.

6.13.3 Results on PD-Lifetime database review

The Walmart's risk team provided the following file used for the construction of the PD-Lifetime

- baseparaLT.sav
 - a. Structural Review

The details of the review may be found on the "Revisión de Calidad de Datos PI Lifetime Walmart.xlsx" file (See Append 4.3).

- b. Content Review

It was checked the meaning of some variable with the responsible analyst, however in this case is also not available a dictionary for the variables contained on the database. Regarding this, it is pointed out as before the necessity of construction a dictionary as was mentioned on the section 3.2.1.2 of this document.

6.13.4 Results of database July-2017 to January-2018

The financial institution's risk team provided the following file used to construct:

- calculo julio 2017 a enero 2018.sav
- a. Structural review

The detail regarding the review can be found on the "Revisión de Calidad de Datos Resultados julio-2017 a enero-2018.xlsx" file (See Append 4.4).

Is it possible to observe that the completeness in general is of 100%, i.e. the information used is relevant and necessary, and also the quantity and quality of the records is correct. Even though exists variables with completeness below the 100%, this are coherent and accepted since are limited cases or are not being used as is shown in the following table. To see more details see the document "Revisión Estructural Base Resultados julio-2017 a enero-2018".

The incomplete variables are specified in the following table:

Field	% Completeness	Valid registers	Null values	Blank spaces	Remark
SUBSEGMENTO	88%	14.412.373	0	1.921.262	Sólo se usa en Segmento Normal y Renegociado
SEGMENTO_O	97%	15.922.004	411.631	0	Sin uso
SALDO_SAV_201801	6%	968.838	15.364.797	0	No Todos Tienen Súper Avance
fec_teradata	2%	315.335	16.018.300	0	sin uso

It is pointed out to indicate the variables which are not being used for the calculation on a documentation file with some flag allowing to identify this variables, as well as the reason for null or blank spaces. Besides that, the variables not being used could have been discovered with help of the responsible analyst of the database construction on the meeting of March-13.

Regarding the unicity it is observed that it does not exist a key description to identify each operation,. Through the study it is identified that the key is composed by CTARUT and codoperiodo. Thus it is concluded that the data base satisfy the unicity meaning that each used register is unique, identifiable and unambiguous.

The database satisfy the time period needed, since correctly provide the changes on data realized from July 2017 to January 2018.

b. Content Review

After the meeting from March 13, 2017, the variables meaning was backed up by the Walmart's analyst. It is considered that the existence of a dictionary for each data base is necessary since will allow to identify the related components to each variables as was describe don section 3.2.1.2. of this document.

C. Reprocess Review

In the present chapter the results of reprocess and expected credit losses and of each parameter fitted. The objective is to verify the quantitative integration from different parameters according to the methodology.

The revision involves recalculate provisions under the consumption, normal and renegotiated models of the portfolio until December 31, 2017.

It will be carried the replication of the models parameter and data reasonableness used for that. It will be considered the Walmart approach through the process.

6.14 Information provided

An information requirement was arise by the entity's team covering the following information:

Ámbito	Nombre Archivo	Detalle
1. Reportes	Copy of DIC ENE new efectos finalhacer71.xlsx	Provisiones Reportadas a Diciembre 2017
2. Bases de datos	AM_MG_v1.0.sav	PD marginales por tramo de mora perteneciente al bucket 2 a Diciembre 2017
	calculo julio 2017 a FEB 2018 28ccf.sav	Cartera a Diciembre de 2017 con la determinación de la provisión Consumo, Normal y Renegociado
	PPP_SE.sav	Periodo de exposición por cliente a Diciembre 2017

6.15 Provision reprocess December 2017

The calculation was realized independent of the provision for December 2017, using the documents and methodologies provided by Walmart in the context of this revision. For this purpose the following files were used:

1. "Copy of DIC ENE new efectos finalhacer71.xlsx"
2. "AM_MG_v1.0.sav"
3. "calculo julio 2017 a FEB 2018 28ccf.sav"
4. "PPP_SE.sav"

Furthermore, the provisions were calculated by segments: consumption, normal and renegotiated.

The reprocesses revision was based on interviews and file analysis and databases from the implementation since the documentation was not still made.

6.16 Recalculation description

The estimation of expected losses under the IFRS 9 approach of the global portfolio follows a 3 buckets approach according to the normative guidelines incorporating the quantitative components for the measurement of the instruments deterioration.

The general formula for the estimation is based on obtaining the expected losses through the probability default (PD), losses given default (LGD) and exposure at default (EAD). The recalculation considers the provision as a sum of: 12-month provision, contingent provision in chilean pesos (CLP), contingent provision in dollars and lifetime effect. It was considered each one of the parameters, separately, depending on the bucket at which the client below to estimate the final number.

Base on the preceding the instruments were classified base on their deterioration level according to the following:

- Bucket 1: Financial assets which has not deteriorated their credit quality substantially according to the original performance. To this a 12-month expected losses are considered:

$$ECL = Prov_{saldo} + Pro_{IFRS_{DISP}} + Pro_{IFRS_{USD}}$$

Donde:

$$Prov_{saldo} = EAD_{saldo} * PD * LGD * FP$$

$$Pro_{IFRS_{DISP}} = EAD_{IFRS_{DISP}} * PD * LGD * FP$$

$$Pro_{IFRS_{USD}} = EAD_{IFRS_{USD}} * PD * LGD * FP$$

The PD correspond to the 12-month PD and FP is the prepayment factor¹.

- Bucket 2: Financial assets not in default but presenting a significant credit risk with respect to the original performance. For this assets the expected losses are considered towards all the instrument's life.

$$ECL = Prov_{saldo} + EfectoLifetime$$

where:

$$Prov_{saldo} = EAD_{saldo} * PD * LGD * FP$$

The PD correspond to a 12-month PD, FP is the prepayment factor and Lifetime effect is determined through the use of PD LT.

- Bucket 3: Deteriorated financial assets currently in default status.

$$ECL = Prov_{saldo}$$

¹ The prepayment factor is one minus the prepayment percentage according to the segment, determined by the entity.

where:

$$Prov_{Saldo} = Prov_{Saldo} * LGD * FP$$

In this case, PD is equal to 1.

The expected default does not use the discount rate since its modeled with amounts without interests.

6.17 Portfolio's sample number

The portfolio's size was evaluated and depending on this the right tool was selected. The results for the model size according to each segment are provided below:

Segmentos	N°Observaciones	Provisiones	% Provisión Total
Consumo	141.254	\$ 25.053.031.712	29,5%
Renegociado	60.152	\$ 26.748.254.270	31,5%
TRXL	146.594	\$ 1.312.884.034	1,5%
Normal	1.991.529	\$ 31.757.399.709	37,4%
TOTAL	2.339.529	\$ 84.871.569.725	100,0%

Based on the size of the portfolios, SPSS Modeler was used.

6.18 PD recalculation

The probability default was replicated for each client and segment, considering "logit" variables already defines on the database:

$$PD = \frac{1}{1 + e^{logit}}$$

This is done using SPSS Modeler corresponding to the following calculation:

Derivar campo:

PD_EY

Derivar como: Fórmula

Tipo de campo: ⚡ <Valor predeterminado>

Fórmula:

```
1 1/(1+exp(logit))
```

Additionally, restrictions must be considered for clients already on default and therefore their PD is already 1. The restriction is for clients in arrears for more than 90 days in a row or renegotiated clients upon December 2017 or before.

To contrast the results of the replication with estimated PDs by Walmart, is made the sum of resulting PD and the sum of PD from default clients.

Rellenar campos:

PD_EY

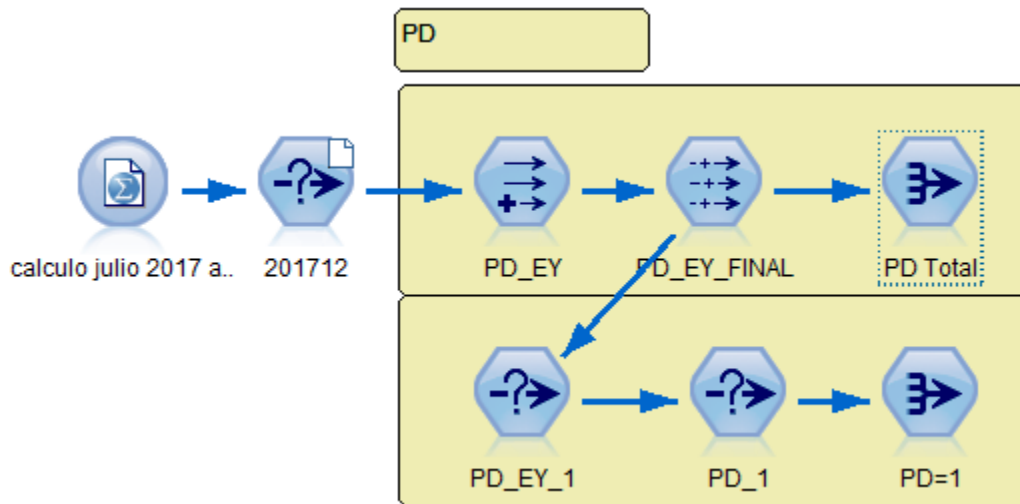
Reemplazar: En función de una condición

Condición:

```
1 DIAS_MORA >= 90 or
2 (MARCA_CONVENIO=1 and SEGMENTO="RENE" and fec_teradata <= codperiodo)
```

Reemplazar por:

```
1 1
```



The following results were obtained:

a) PD sum:

PD_Sum	PD_EY_Sum	N°Observaciones
242.633	242.641	2.339.529

The differences are based on the decimal considered in the PD replication and are not significant at all.

b) PD sum=1:

PD_Sum	PD_EY_Sum	N°Observaciones
71.846	71.846	71.846

6.19 Recalculation of probability default for lifetime

Walmart made lifetime curve for PD reflecting the expected movements in no-payment risk towards the lifetime in exposition. This probability is estimated throughout the life of the transaction by considering all the transactions that have experienced an increasing credit risk.

The PD are used for the calculation of provisions for clients in Bucket 2 (those with days of arrears between 30 and 90). The sample space was 37006 observations corresponding to the 1,6% of the portfolio by December 2017. Following details of the sample space might be founded below:

Días de Mora	N°Observaciones	Porcentaje
30	2.264.465	96,8%
31-89	37.006	1,6%
>90	38.058	1,6%
TOTAL	2.339.529	100,0%

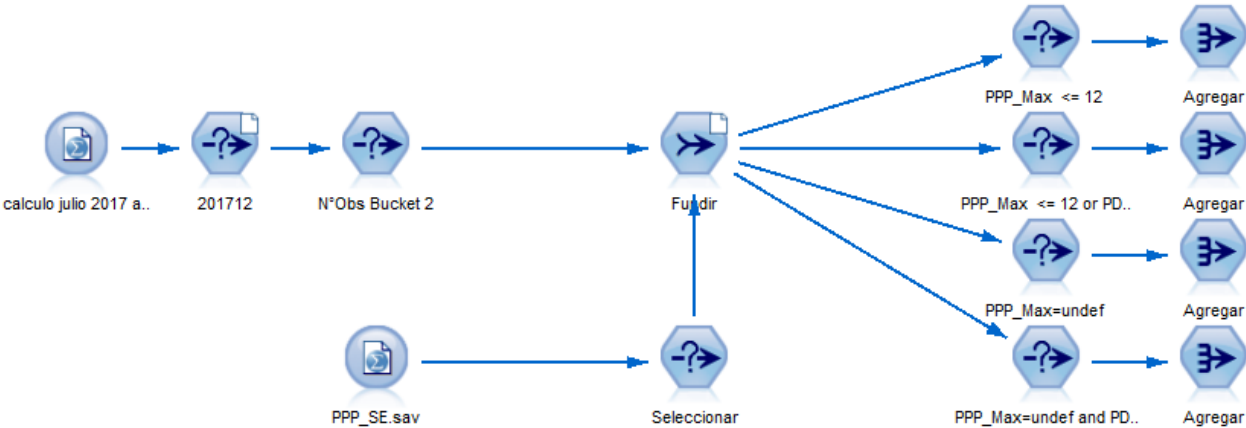
For those 37.006 clients, in order to accurately calculate the PD Lifetime it won't be considered clients with the following features:

- Clients with term coupon date less or equal to 12, will be assigned with the PD of the 12-months model.
- Renegotiated clients (those with days in arrears greater than 60) with convention agreement mark 1 (the date on which the agreement was made is superior to the observed period of December 2017).
- Clients with PPP equal to "NULL", since those correspond to clients with no current transactions at the end of the month.

The calculation of the PD Lifetime is presented as followed:

Días de Mora (31-89)	N°Observaciones
PD Lifetime	\$ 5.567
PPP<12 or PD=1	\$ 18.468
PPP = Undef	\$ 13.221
PPP = Undef and PD=1	\$ 250
TOTAL	\$ 37.006

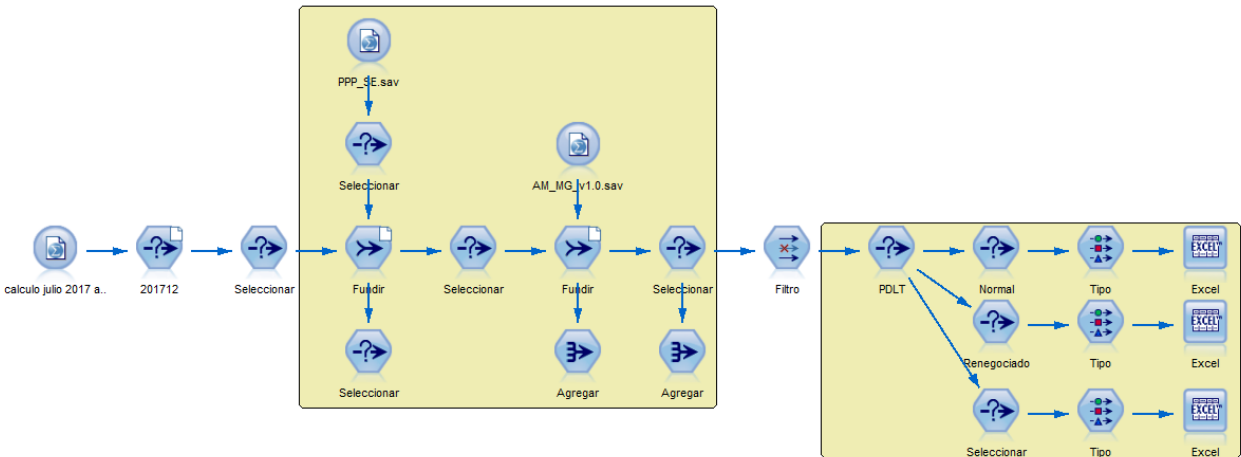
The following routine considering the procedures above is presented as following:



Walmart considers the “Lifetime effect” as the sum by client of PD by their corresponding exposition, as will be explained later towards this document. The lifetime effect by segmented portfolio is presented below:

Segmentos	N°Observaciones	Efecto LT
Consumo	1.956	\$ 239.236.301
Normal	2.560	\$ 110.627.373
Renegociado	1.051	\$ 27.910.511
TOTAL	5.567	\$ 377.774.185

Using SPSS modeler, the portion of clients satisfying the constrains described for the calculation of PDF Lifetime is determined with the routine presented below:



To calculate the recalculation it was decided to work with random samples based on the great number of observations and extensive methodology. Therefore, the tool EY Random was used. This software generate a list of random numbers, providing 25 samples by each portfolio to be reviewed. (Annex 9.2 “PD Lifetime: EY Random Tool”)

The replication was made for each of the selected client. At the beginning, the exposure to long-time (considering debt and PPP) to afterwards, multiply the marginal PD of each month, to eventually determine the sum of each period. Below is attached an example of the procedure by client:

Fig. 07 Recalculation of probability default for lifetime

DEUDA	\$ 728.407
PPP	15
PD	88,8%
SEGMENTO	NORM
TRAMO_MORA	3

PERIODO	A1	A2	A3	...	A11	A12	A13	A14	A15
PD Marginal	0,93	0,00	0,00		0,00	0,00	0,00	0,00	0,00
Devoluciones	\$ 48.560	\$ 48.560	\$ 48.560		\$ 48.560	\$ 48.560	\$ 48.560	\$ 48.560	\$ 48.560
Exposición	\$ 728.407	\$ 679.847	\$ 631.286		\$ 242.802	\$ 194.242	\$ 145.681	\$ 97.121	\$ 48.560
PD Marginal * Exposición	\$ 674.214	\$ -	\$ -		\$ -	\$ -	\$ 189	\$ 204	\$ 49

Réplica	Walmart	EY
$\sum PD Marginal * Exposición$	\$ 674.655	\$ 674.655
		YES

The example is developed for 25 cases on each portfolio (a total of 75 cases). The results of the reprocess are detailed as following:

a. Consumption:

CONSUMO			
N° Observación	Walmart	EY	Diferencias
34	\$ 942.205	\$ 942.205	0
72	\$ 1.263.680	\$ 1.263.680	0
132	\$ 1.585.807	\$ 1.585.807	0
185	\$ 432.148	\$ 432.148	0
241	\$ 1.438.607	\$ 1.438.607	0
306	\$ 1.106.891	\$ 1.106.891	0
358	\$ 4.188.901	\$ 4.188.901	0
448	\$ 656.341	\$ 656.341	0
533	\$ 2.873.778	\$ 2.873.778	0
641	\$ 838.432	\$ 838.432	0
775	\$ 818.923	\$ 818.923	0
934	\$ 465.557	\$ 465.557	0
1.165	\$ 3.657.692	\$ 3.657.692	0
1.242	\$ 989.825	\$ 989.825	0
1.330	\$ 734.912	\$ 734.912	0
1.622	\$ 562.831	\$ 562.831	0
1.661	\$ 3.406.536	\$ 3.406.536	0
1.683	\$ 4.585.392	\$ 4.585.392	0
1.712	\$ 729.658	\$ 729.658	0
1.734	\$ 1.290.571	\$ 1.290.571	0
1.755	\$ 7.030.596	\$ 7.030.596	0
1.767	\$ 497.801	\$ 497.801	0
1.771	\$ 3.876.493	\$ 3.876.493	0
1.807	\$ 4.873.114	\$ 4.873.114	0
1.853	\$ 1.216.762	\$ 1.216.762	0

b. Normal:

NORMAL			
N° Observación	Walmart	EY	Diferencias
28	\$ 579.451	\$ 579.451	0
270	\$ 257.852	\$ 257.852	0
284	\$ 3.889.926	\$ 3.889.926	0
305	\$ 405.852	\$ 405.852	0
650	\$ 1.860.970	\$ 1.860.970	0
942	\$ 985.361	\$ 985.361	0
957	\$ 1.651.525	\$ 1.651.525	0
1.052	\$ 711.410	\$ 711.410	0
1.097	\$ 1.551.597	\$ 1.551.597	0
1.124	\$ 435.853	\$ 435.853	0
1.248	\$ 279.282	\$ 279.282	0
1.397	\$ 823.822	\$ 823.822	0
1.410	\$ 648.355	\$ 648.355	0
1.442	\$ 480.674	\$ 480.674	0
1.543	\$ 1.316.807	\$ 1.316.807	0
1.551	\$ 2.341.564	\$ 2.341.564	0
1.624	\$ 1.605.671	\$ 1.605.671	0
1.713	\$ 506.791	\$ 506.791	0
2.084	\$ 821.664	\$ 821.664	0
2.183	\$ 596.255	\$ 596.255	0
2.209	\$ 877.665	\$ 877.665	0
2.255	\$ 2.746.691	\$ 2.746.691	0
2.343	\$ 1.893.189	\$ 1.893.189	0
2.435	\$ 674.655	\$ 674.655	0
2.505	\$ 2.848.468	\$ 2.848.468	0

c. Renegotiated:

RENEGOCIADO			
N° Observación	Walmart	EY	Diferencias
6	\$ 898.640	\$ 898.640	0
45	\$ 469.263	\$ 469.263	0
98	\$ 425.981	\$ 425.981	0
106	\$ 628.118	\$ 628.118	0
133	\$ 130.174	\$ 130.174	0
206	\$ 432.739	\$ 432.739	0
238	\$ 1.071.111	\$ 1.071.111	0
263	\$ 520.981	\$ 520.981	0
309	\$ 1.432.141	\$ 1.432.141	0
399	\$ 595.376	\$ 595.104	272
433	\$ 502.646	\$ 502.646	0
486	\$ 1.014.784	\$ 1.014.784	0
514	\$ 2.626.175	\$ 2.626.175	0
523	\$ 2.600.221	\$ 2.600.221	0
550	\$ 1.292.062	\$ 1.292.062	0
647	\$ 807.528	\$ 807.528	0
652	\$ 329.346	\$ 329.346	0
666	\$ 960.979	\$ 960.979	0
674	\$ 691.870	\$ 691.870	0
811	\$ 789.712	\$ 789.712	0
865	\$ 2.174.106	\$ 2.174.106	0
919	\$ 371.057	\$ 371.057	0
990	\$ 1.994.973	\$ 1.994.973	0
1.019	\$ 3.702.066	\$ 3.702.066	0
1.020	\$ 311.163	\$ 311.163	0

In conclusion it is observed that there is no significant difference by comparing the replicated values and those of Walmart.

6.20 Provision Balance Recalculation

The amount of provision is obtained multiplying the total amount of collocations of the selected segment by the estimated percentage of default and loss given default and additionally considering the prepayment factor.

$$Prov_{saldo} = EAD_{saldo} * PD * LGD * FP$$

Derivar campo:

Prov Saldo

Derivar como: **Fórmula**

Tipo de campo: ⚡ <Valor predeterminado>

Fórmula:

```
1 'EAD Saldo'*PD_EY*LGD*FP
```

In the case of Prov_saldo it will be considered the provision to non-contingent exposure, without Lifetime effect. For the calculation of the non-contingent exposure, it will be considered as first step to replace the negative balances of the debt by zero and afterwards proceed the calculation of the corresponding provision. The results are as following:

Resultado	Walmart	EY	Diferencias	NºObservaciones
EAD	\$ 532.551.253.918	\$ 532.551.253.918	0	2.339.529
Prov_Saldo	\$ 80.544.389.446	\$ 80.544.497.911	\$ 108.465	2.339.529

The differences are non-significant, because the estimation of the variation on the results showed before by the PD_EY.

6.21 Contingent Provision Recalculation in Chilean Pesos

Derivar campo:

EAD Saldo

Derivar como: **Fórmula**

Tipo de campo: 📏 Continuo

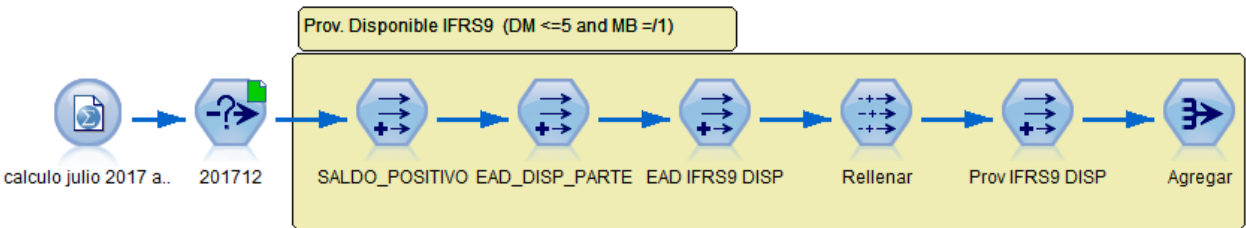
Fórmula:

```
1 if CTAOUP >= 0 then CTAOUP
2 else
3 0
4 endif
```

The amount of provision is obtained multiplying the total amount of collocations of the respective segment by the estimated probability of default and the loss given default adding the prepayment factor:

$$Prov_{IFRS_{DISP}} = EAD_{IFRS_{DISP}} * PD * LGD * FP$$

In the case of Prov_IFRS9_DISP the provision to contingent exposure is considered with no lifetime effect. The following routine is used:



For the calculation of the contingent exposition in chilean pesos, once more the negative balances are replaced by zero and afterwards the calculation is made.

Derivar campo:

Derivar como:

Tipo de campo:

Fórmula:

```

1 if
2 (CTACUP-(CTAUP-SALDO_L12)) < 0
3 then
4 0
5 else
6 CTACUP-(CTAUP-SALDO_L12)
7 endif
    
```

For the available amount considering the “Superavance” and if the difference of the debt of this later two is greater than the initial amount, the available amount will be considered as 0.

Derivar campo: SALDO_POSITIVO

Derivar como: Fórmula

Tipo de campo: <Valor predeterminado>

Fórmula:

```
1 if CIAOUP <= 0 then 0
2 else CIAOUP
3 endif
```

Disponibile = Cupo inicial – (Saldo – Saldo Super Avance)

For the calculation of the exposure at default, operations with more than 5 days of arrears or presenting lock will not be considered and therefore will be estimated with zero. The remaining will be adjusted to the CCF corresponding value.

CCF: 0,2727

$$EAD_{IFRS_{DISP}} = Disponible \times CCF$$

Derivar campo:

EAD IFRS9 DISP

Derivar como: **Fórmula**

Tipo de campo: Continuo

Fórmula:

```

1 if
2 DIAS_MORA > 5 or MARCA_BLOQUEO = 1
3 then
4 0
5 else
6 ( UTIL1 * EAD_DISP PARTE)
7 endif

```

Derivar campo:

Prov IFRS9 DISP

Derivar como: **Fórmula**

Tipo de campo: <Valor predeterminado>

Fórmula:

```

1 PD_EY*LGD*FP*'EAD IFRS9 DISP'

```

The results of the replication are:

Resultado	Walmart	EY	Diferencias	NºObservaciones
EAD_disp_IFRS9	\$ 97.469.735.420	\$ 97.469.724.591	\$ 10.829	2.339.529
Prov_ifrs_disp	\$ 2.056.519.161	\$ 2.056.558.419	\$ 39.258	2.339.529

The differences are no significant based on the results showed before in the PD_EY.

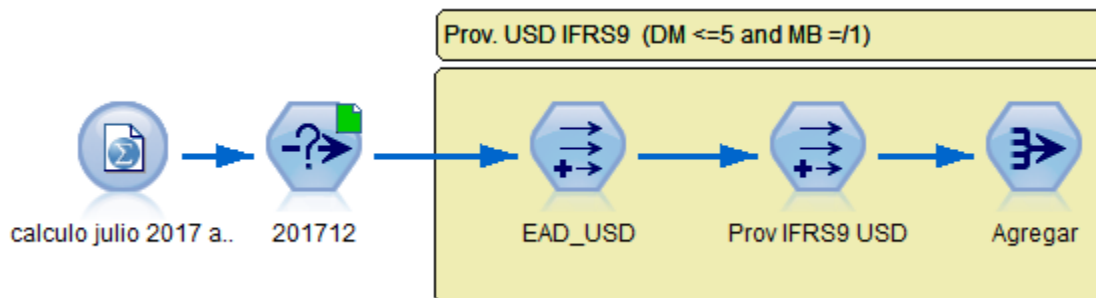
6.22 Contingent Provision Recalculation in USD

The amount of provisions is obtained by multiplying the amount of total collocations of the corresponding group segment by the estimated percentage of default and loss given default, adding the prepayment factor.

$$Prov_{IFRSUSD} = EAD_{IFRSUSD} * PD * LGD * FP$$

In the case of Prov_IFRS9_USD the contingent exposition provision is considered with no lifetime effect of the available dollar amount.

The following routine is used for the above purposes:



For the calculation of exposition contingent in dollars, operations with more than 5 days of arrears or presenting lock will not be considered and their value will be replaced by zero. As before, the remaining operations will be adjusted to the corresponding CFF

CCF: 0,2727

$$EAD_{IFRS_{DISP}} = Disponible \times CCF$$

Derivar campo:

EAD_USD

Derivar como: Fórmula

Tipo de campo: ⚡ <Valor predeterminado>

Fórmula:

```

1 if
2 DIAS_MORA > 5 or MARCA_BLOQUEO = 1
3 then
4 0
5 else
6 ( UTIL1 * cupo_dolar)
7 endif

```

The provision correspond to:

Derivar campo:

Prov IFRS9 USD

Derivar como: Fórmula

Tipo de campo: ✏ Continuo

Fórmula:

```

1 LGD*FP*PD_EY*EAD_USD

```

The results of the replication are presented below:

Resultado	Walmart	EY	Diferencias	N°Observaciones
EAD_usd_IFRS9	\$ 66.601.636.622	\$ 66.601.631.695	\$ 4.927	2.339.529
Prov_ifrs_usd	\$ 1.892.886.932	\$ 1.892.922.620	\$ 35.689	2.339.529

The differences, are no significant values based on the variation of the results showed previously in PD_EY.

6.23 Final Provision Recalculation

The results for the final provision is detailed as following:

201712	Provisión Saldo	Prov Disponible \$	Prov Disponible US\$	Efecto Life Time	Provisión Total
Walmart	\$ 80.544.389.446	\$ 2.056.519.161	\$ 1.892.886.932	\$ 377.774.185	\$ 84.871.569.725
EY	\$ 80.544.497.911	\$ 2.056.558.419	\$ 1.892.922.620	\$ 377.774.185	\$ 84.871.753.137
				DIFERENCIA	\$ 183.412

The results provide a difference of \$183.412 based on the difference of the PD replication and is not a significant difference considering the total amounts.

7. CONCLUSION

The implementation of IFRS 9 replacing IAS 39 presents a great change in finances and accountability for bank industry. The transition from an incurred loss model towards an expected losses requires an especial effort from financial entities. The complexity of the matter is due a convergence of strategic, organizational, technical and technological factors, consequently there is a still a large way to go towards a full implementation.

Regarding the results for the implementations validation of the entity, a positive verification was obtained. A review of both the methodological and implementation on each parameter were made to check whether they were aligned with IFRS 9 normatives.

It was established that in general the entity is considering the most relevant requirements in the new model, namely, consider prospective information for different risk scenarios subject to the calculation of probability default, changes in risk affecting financial instruments and expected losses based on lifetime operations.

In general, from a methodological perspective the proposed approach in the documentation is aligned with the requirements under IFRS9, which is based on the estimations of annual losses according to the residual life of the financial operation and according to the classification of instruments.

In this context, it is important to mention that adjustment in terms of the probability default point time are needed, the normative suggest to construct 12-months PD PIT-type, and therefore when a 12-months PD is constructed must be transformed into a PD Point-in-Time rising further differences in the results. Also there are points to evaluate as utilization of marginal cumulative probabilities for debt exposition, metrics for significant increasing of risk reevaluation and final calculation for lifetime of revolving-type products.

On the other hand, the recalculations considering Walmart methodology is constrained to methodological outstanding points which are not yet included in the model implementation, and therefore their results are subject to the future changes.

Even though, for segments was obtained the recalculation of expected losses and was compared with the implementation, providing a \$399.536 MM in provision for expected losses under IFRS 9.

The revision was made based on the work of developing analysts due to the lack of documentation in the model.

The entity is capable of measuring credit risk in a more precise way, so they are in a better position to determine their capital requirements from both an aggregated point of view and from a business perspective. Additionally the entity has been able to incorporate in their models many of the essential requirements that earlier were ignored.

To obtain a better and more precise way to measure credit risk there is still plenty to do but all so far done constitute important and consistent steps to improve the entity's risk management.

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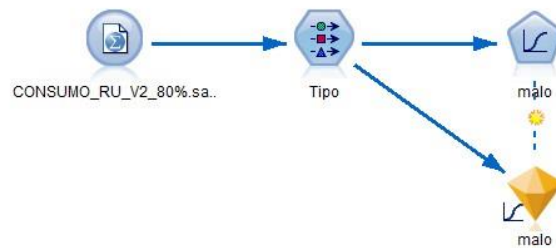
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9. APPENDICES

9.1 PD Calibration:

Below, the routine used to calculate the PD is provided with their results for each one of the models:

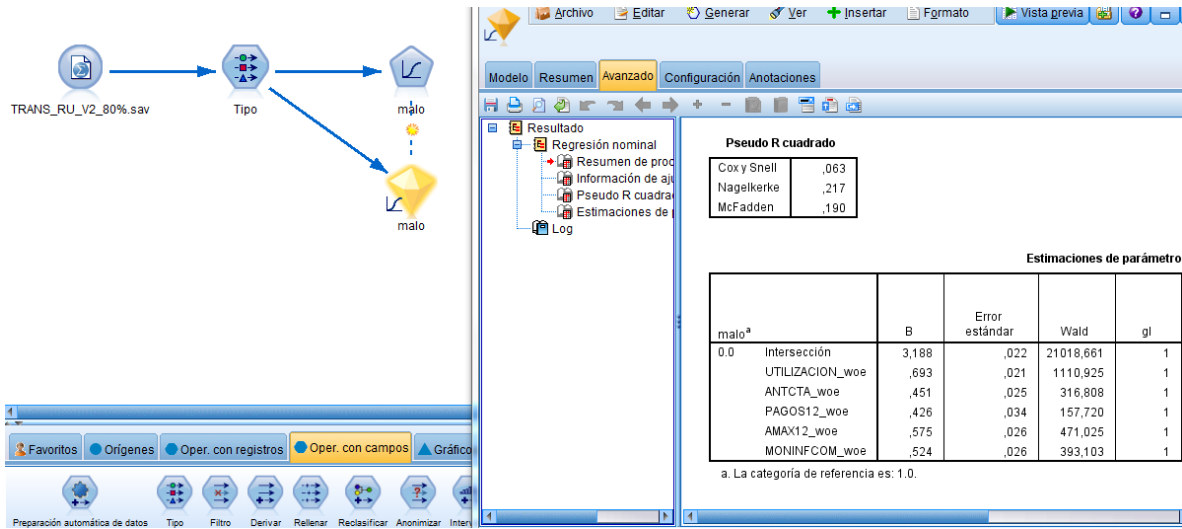
1. Consumo:



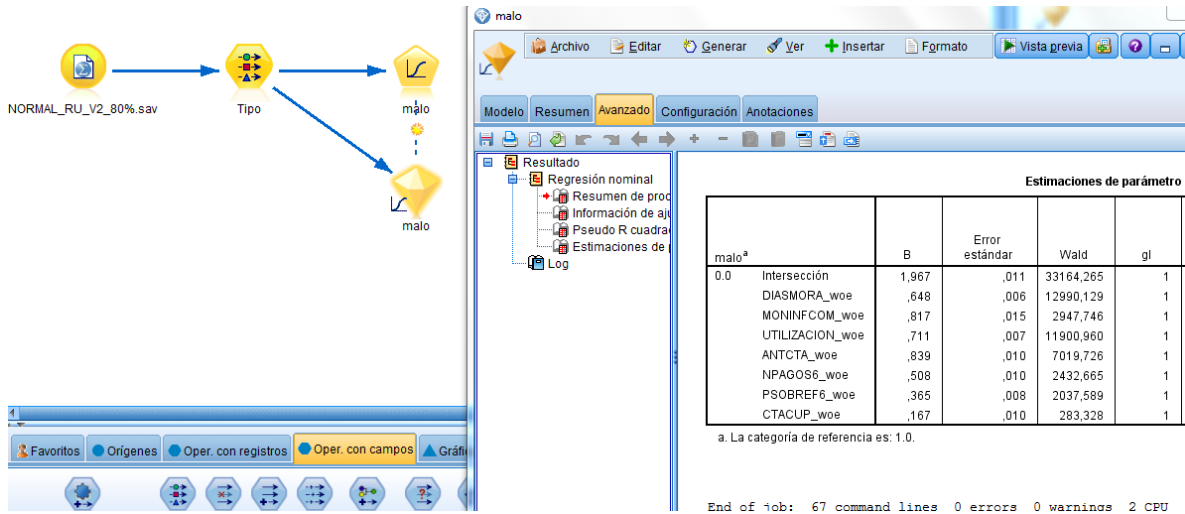
malo ^a	B	Error estándar	Wald	gl	Sig.	Exp(B)	95% de intervalo de confianza para Exp(B)	
							Límite inferior	Límite superior
0.0 Intersección	1,954	,012	24598,516	1	,000			
AMAX3_woe	,563	,015	1460,600	1	,000	1,756	1,706	1,808
PSOBREF3_woe	,483	,015	1073,790	1	,000	1,620	1,574	1,668
NPAGOS3_woe	,248	,018	195,795	1	,000	1,282	1,238	1,327
MONINFCOM_woe	,344	,017	399,549	1	,000	1,410	1,364	1,459
UTILIZACION_woe	,665	,022	932,732	1	,000	1,945	1,863	2,029
ANTCTA_woe	,823	,023	1228,234	1	,000	2,278	2,176	2,386

a. La categoría de referencia es: 1.0.

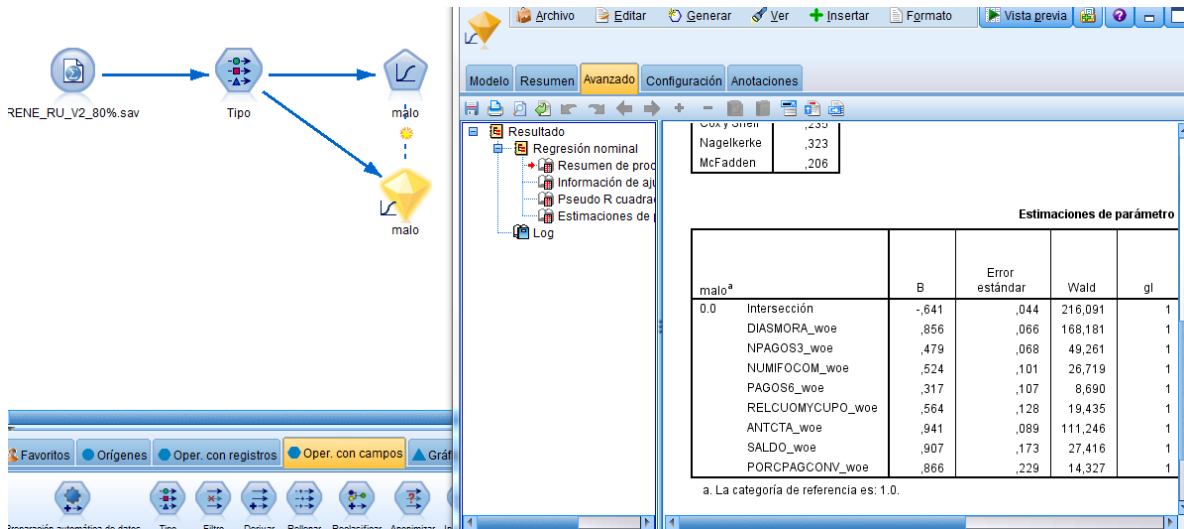
2. Transaccional:



3. Normal:



4. Renegociados:



Afterward, SPSS Statistics is used in order to calculate the final results for the PD. A code first assigning the corresponding weight of evidence is constructed for each interval of the considered variable in order to continue with the multivariate analysis.

On the analysis lineal regression for the logit calculation is used in order to determine the contribution of each one of the parameter on the regression.

Additionally marks as complement of the calculation are created in order to identify: defaulting clients on the initial period, clients with more than 60 days of arrear in renegotiated quality and clients with more than 90 days of arrear.

By counting with the logit and marks result, it is possible to calculate the PD which is estimated by each one of the clients.

9.2 PD Lifetime: Herrramienta Random

a) Normal

Ernst & Young
Page 1
Random Numbers
Company: Walmart SSFF

The random number generator seed used to produce this list was 1.439.186.201.
To generate the next continuous series use 1.209.067.896.

The system selected 25 Numbers from the following sequence(s):
1: Normal From 1 To 2.560

Read down the columns from left to right for generation order.

Generation Order

Number	Number	Number	Number	Number
1.543	1.397	2.505	2.343	1.410
1.551	1.248	650	957	2.183
270	2.209	1.624	942	284
2.435	1.713	1.052	2.084	305
1.097	28	1.124	2.255	1.442

Ascending Order

28	942	1.248	1.551	2.209
270	957	1.397	1.624	2.255
284	1.052	1.410	1.713	2.343
305	1.097	1.442	2.084	2.435
650	1.124	1.543	2.183	2.505

b) Consumo

The random number generator seed used to produce this list was 922.135.061.
To generate the next continuous series use 992.305.413.

The system selected 25 Numbers from the following sequence(s):
1: Renegociado From 1 To 1.051

Read down the columns from left to right for generation order.

Generation Order

Number	Number	Number	Number	Number
1.019	674	652	238	6
309	45	990	433	514
919	106	133	523	865
399	666	263	811	206
1.020	647	98	550	486

Ascending Order

6	206	433	647	865
45	238	486	652	919
98	263	514	666	990
106	309	523	674	1.019
133	399	550	811	1.020

c) Renegociado

The random number generator seed used to produce this list was 978.084.311.
To generate the next continuous series use 202.056.840.

The system selected 25 Numbers from the following sequence(s):
1: Consumo From 1 To 1.956

Read down the columns from left to right for generation order.

Generation Order

Number	Number	Number	Number	Number
1.661	1.755	448	1.242	1.330
1.734	72	775	1.767	358
1.853	1.683	34	306	1.807
533	132	1.771	1.165	1.712
641	241	934	1.622	185

Ascending Order

34	306	775	1.622	1.755
72	358	934	1.661	1.767
132	448	1.165	1.683	1.771
185	533	1.242	1.712	1.807
241	641	1.330	1.734	1.853

