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"A DETAILED ANALYSIS ON THE OVERALL CHANGES DUE TO THE INTRODUCTION OF IFRS 9"

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__ Pulin Alberto __

Summary

Introduction

This paper aims to discuss and analyse the various changes that have been made, following the introduction of IFRS 9 on July 2014. Even if its principles became applicable only on 2018, substituting the precedent mandatory regulation, constituted by the IAS 39, that has demonstrated its weakness after the financial crisis of 2008. In our analysis we will focus mainly on the important changes bring by the new regulation at the level of impairment, given that this is the most influencing factor on banking balance sheets. Obviously the banks businesses are highly influenced by the more stringent requirements introduced at the level of provisions and allowances following the ECL model and from the changing of the impairment procedures, in particular because their core business is mainly articulated over the credit activities (loans and borrowing both subjected to the regime of Amortised Cost). As if this was not enough, the financial institutions in the process of abide by IFRS 9 requirements, they have to respect in any case also the International supervisory regulation, reinforced by the recently introduced Basel III. The latter, in fact, it has established new capital requirements to be respected, increasing the more secure part of capital (CET 1) needed to cover the various exposures, in a way that banks became more solvable and liquid. Therefore, we will analyse two perspectives, from one point of view, how the banks have the intention to deal with IFRS standards in the redaction of accounting information for the drafting of their Balance Sheets, and from the other, how they will comply with supervisory regulation. However still remain some doubts and a not clear view on how the two disciplines wedge in each other, in particular for the different systems of expected credit losses calculation, established from them. Concluding the final objective is to understand the variations in terms of balance sheet captions, analysing the effects linked with the introduction of the new ECL model, following the more stringent requirements that from it comes. We will observe in details the effects of IFRS 9 first time adoption, examining the most important variations over banking balance sheets and ratios.

What has just been explained it will be articulated in five chapters during this paper

Starting with the first chapter we will understand the motivations that brought to the creation of the IFRS 9 principle, in substitution to the in-force law of IAS 39. Therefore, we will have an explanation of all the phases until their promulgation, starting from the first exposure draft dated back in 2009, till the effectively entering into force later in 2014. Moreover, we will treat the various changes in terms of balance sheet captions that occurred with the newly issued regulation, searching to compare the classifications before established by the IAS regulation

and the now less numerous available categories expressed by the IFRS one's. In particular we will deal with the new allocation system based on two requisites: the Business model of the assets to be assigned and the SPPI test concept, which is the objective requisite, decisive for establishing their allocation. Concluding, we will also highlight the changes that have taken place as regards the discipline on hedge accounting, which it is now more flexible and adequate for banks.

In the second chapter we will linger to analyse in detail the new impairment model expressed by the IFRS discipline, which has changed following the introduction of the ECL model. We are going to discuss the various impairment models available for all the exposures valued at amortized cost or at fair value through other comprehensive income, which are: the general model, the simplified model and the credit adjusted one's. In specific, we will explain well the three bucket approach of the general model, given that is the most utilized among the others, justifying why this model is more forward looking in respect of the precedent impairment procedure, since introduced for the first time the concept of the probability of default (PD), in the computation of the Expected credit losses. Then we are going to deal with concept underlying the PD, presenting the available and more used methods for its computation, between which the Migration matrix and the Merton's model.

Continuing our discussion in the third chapter, we are going to analysing the international supervisory regulation, established by the BCBS with the Basel treaties. For doing this from our point of view was important to remember a bit of history, explaining how we are arrived at the final edition of Basel III, presented with the Seoul summit on 2010, but effectively converted in law with the Regulation (CRR) 575/2013. Moreover, in this chapter we would like to present the requisites established in terms of capital adequacy, for the main risks that the banks are facing during their activities, starting from the most important one's that is the credit risk, then the operational and the market risk. In the closing of the chapter we desire to arise the problems and difficulties that the financial institutions have in dealing with the supervisory regulation, in particular following the introduction of IFRS 9. In fact, the two regulations have a different view in terms of PD calculation method (Basel III request the Trough the cycle (TTC) method instead of IFRS 9 which established the Point in time (PIT) approach), of staging ECL's time horizons, for provisions computation and for a non-well define measure/allocation of excesses or shortfalls in applying the accounting regulation.

The fourth chapter, instead, it is a very important part of this thesis but of transition, given that bring relevant examples of literature, in propensity to the analysis that we will carry out in the following chapter. The most significative article consists in "First observations on the impact and implementation of IFRS 9 by EU institutions", drafted by EBA, that before all other institutions, being the supervisory authority of the banking institutions analysed the impact of IFRS 9 on their balance sheets.

The fifth and last chapter presents, mainly based on the study of the EBA just mentioned, our analysis on the impact of the IFRS 9 at the first-time adoption. Analysis that is articulated taking in consideration about forty banks of different European countries, examining the quantitative impacts of the new regulation over them, at the level of influence over: Core Equity Tier 1 (CET1), Total Capital Ratio, Return on Tangible Capital (ROTC), Return on Risk Weighted Assets (RORWA), Earning Per Share (EPS) an on loans to deposit ratio.

Chapter 1: Differences among IAS 39 and IFRs 9

1.1 Introduction of IFRS

A bit of history is useful for understand how we have arrived at the creation and application of the IFRS 9. Since 1989 the IASC (International Standard Accounting Committee) has started a project in order to create an accounting principle, adoptable at the international level for the classification and measurement of financial instruments. This project beside the creation of IAS 32, which is focused mainly on the presentation and disclosure of the financial instruments on Balance Sheet, have bring, on December 1998 to the emission of previous regulation in force namely IAS 39. This principle that entered into force on 1st January 2001 has affected all the companies on the market, defining the criteria for measurement and valuation of financial assets and liabilities, integrating also the IAS 32 with what dispose by the Directive CE n. 65/2001 regarding the criteria of the fair value. One important change caused by this principle was the application of it over all types of company, regardless the dimension and sector of activities. Given the fact that the financial innovation has eased the divergencies among financial instruments which are more and more tradable on the market, but also it has permitted at banks to diversifying their activities with more services offered to customers from financial to insurance ones, which brought them closer to all the commercial/industrial companies.

From 2002 onwards the principles emanated by the IASB (Internal Accounting Standard Board, which is an internal body of the IASC, appointed to the emission of financial principle), that took the denomination of IFRS, became mandatory in the European Union.

Initially the IAS 39 seems functioning well, bringing also some important changes over the national principles, with the introduction of the rule that prescribe the predominance of the substance over the form. However, with the recent financial crisis of 2008, which took over in all the countries, it has brought important negative consequences on companies' balance sheets, putting into light all the limits of IAS 39. One important limit was linked with the classification of captions under the category measured at the FVTP (fair value through profit and loss), because with this methodology of classification, the banks found themselves with values of instruments on balance sheets that did not resemble the real value of them.

From this point onwards a period of revision for this regulation started, beginning with the Exposure Draft (ED) made by the IASB on July 2009, which revised the classification and measurement of financial instruments, after this the IASB started the creation of other two documents for improving the impairment of assets and for the hedge accounting procedures,

that needed to be realized within the closing of 2010. The decision of revise the IAS 39 in more phases was due by the limited time assigned by the G20 in a way to review the accounting regulation. Nevertheless, this methodology was criticized, because a diluted revision over a period of time is not useful, damaging the comparability among different years' financial reports. The first change bring by the ED regards the classification of instruments over the two main captions, the assets valued at amortised cost, and those at fair value. The assignment at those categories needed to be made at the recognition of financial instruments base on the type of underlying business, at the first category went assigned the assets detained over long periods, from which there were positive cashflow and the repayment of capital, instead at the second, those assets that were detained for short periods and that were traded frequently over the market. The ED eliminated also the fair value option (FO) that was present on the IAS 39 initial version but with the permission for some instruments to remain valued at FV, because otherwise they needed to be inserted among assets measured at amortised cost. For avoid also the problem of comparability among different years results, the ED prescribed a retroactive application of changes. Being the ED a document free to be modified, it welcomed the judgment of the principal controlling organizations, in particular of the ABI (Associazione Bancaria Italiana), which sustained positively the:

- Necessity of reduction in the number of classification captions both for the restriction in the usage of previous categories and for some rigidity presented on the Available for Sale (i.e. the prohibition to insert in *loans and receivables,* assets that are quoted on financial markets and the fact that the value to took in consideration for made the impairment was the fair value of assets also if the market was very volatile);
- Maintenance of the "mixed measure model" for the valuation of instruments and avoiding the indiscriminate usage of the fair value approach.

Nonetheless the measures adopted by the IASB in the ED have presented some criticality on:
- the choice to assigned at the planned categories the instruments base firstly on the characteristics of the instruments itself, instead to looking over the business model of them;
- the choice to obliged to value all equity instruments with the Fair Value approach;
- the removal of the obligation to split off for the implicit derivatives form the contracts.

All this to arrive at the revision of the 7th Exposure Draft which coincide with the publication on 24th July 2014 of the IFRS 9 principle.

1.2 Classification of captions under IAS39

The IAS 39 principle prescribed the classification of assets over 4 main categories that we are going to focus on in the hereinafter of this thesis, which are: loans and receivables, held to maturity, available for sales and financial assets at fair value through profit and loss.

1.2.1 Loans and receivables

The IAS 39 define the category of loans and receivables as: "*... non-derivative financial assets with fixed or determinable payments that are not quoted in an active market.*" [1]

Therefore, in loans and receivables we have to assign all the loans due to banks or from customers, commercial loans and repurchase agreements with the obligation to resell them at a later date, so instruments which entail fixed and determinable payment, detained by the banks till maturity and not included in the available for sales.

The principle for this category does not permit a following reclassification of these instruments in other categories. Indeed, after the initial recognition these assets are measured at amortised cost, and their value will be adjusted, decreasing it at every principal repayment date and in case in which we have recoveries and amortisation. Recoveries and amortisation need to be calculated utilizing the effective interest rate, that is the rate used for discount the loans' future cashflow repayment (principal and interests) in a way to have an amount equal to the cost of acquisition plus any increments due by costs and revenues directly attributable.

This method does not went apply to loans, which short maturities makes the application of the amortised cost insignificant for amounts and variations, so these loans are valued at the historical cost.

Regarding loans, the banks have to reassess them at the end of every fiscal year in a way to identify which, due by extraordinary events after the initial recognition, have shown the evidence of deterioration in credits and need to be subject to impairment procedures. We refer to the classification of bad loans in accordance to what express by the Bank of Italy, which prescribe some categories of risk: doubtful loans, substandard loans, restructured or past due.

For loans restructured we have three different situations: proper restructuring, renegotiation and the discharge of debt acting through a suretyship.

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[1] IASC, 2010, *International Accounting Standard 39 Financial Instruments: Recognition and Measurement,* Regulation of July 2009, par.9

The restructuring of loans figures out as banks' concession that bring a reduction in the loans' values equal to the difference among the new value calculated and the carrying amount of it, while the restructured loans become non-performing loans. Instead the value could be reinstated in the cases in which the causes that request to made impairment ceases to exist, this by providing the proof that the event is subsequent to the impairment. The recovery will influence positively the income statement, but it is important to highlight that the carrying amount of loans cannot overcame the value of loans considering the various amortisement, but excluding the impairment had.

1.2.2 Held to maturity (HTM)

The IAS 39 define the HTM financial instruments as: "*... non-derivative financial assets with fixed or determinable payments and fixed maturity that an entity has the positive intention and ability to hold to maturity.*" [2]

They are therefore quoted financial instruments, that the banks have the intention to detain till maturity in a way to collect the cashflows from them generated.

The standards in this case permit the possibility to made a reclassification for these type of instruments only in the available for sales, this need to be considered in any case an eventuality because if a majority of financial assets detained in a portfolio till maturity are sold before the expiration for a significant amount, all the assets in this portfolio will be transfer in the available for sales, and this type of portfolio could not be used for a minimum period of two years unless:

- The assets designated in the Held to Maturity are close to the expiration date, only in the case in which the possible interest rate fluctuation does not cause significant effect in the assets values;
- The banks were able to collect the major part of the principal through the scheduled payments;
- It is attributable to an isolated and non-recurring event that is beyond the banks' control.

After the initial recognition these assets are valued at the amortised cost too, and as loans and receivables they are subject to impairment with effects in the income statement.

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[2] IASC, 2010, *International Accounting Standard 39 Financial Instruments: Recognition and Measurement,* Regulation of July 2009, par.9

These financial assets could be derecognized solely in the case in which we have the transfer of all risks and rewards associated to them. Conversely in the case in which a relevant part of risks and rewards remain held by the bank, they continue to be recorded in in the bank's assets as if they are not be sold. In the extreme case in which is not possible to ascertain if the transfer of claim is happen, they could be derecognize when the bank does not present control over them.

For concluding in the situation in which the bank continues to receive the cashflows linked with the assets sold but contemporary signs an obligation to transfer those cashflow to a third party, in this case the assets could be derecognize too.

1.2.3 Financial assets at fair value through profit and loss (FTVPL)

The IAS 39 defines the financial assets designated at fair value as: "*… a financial asset or financial liability that meets either of the following conditions (a) it is classified as held for trading, (b).... Any financial asset […] within the scope of this Standard may be designated when initially recognised as a financial asset […] at fair value through profit or loss except for investments in equity instruments that do not have a quoted market price in an active market, and whose fair value cannot be reliably measured.*" [3]

Therefore, the assets that can be identify at fair value are those insert in the category held for trading which includes: debt securities, equities instruments and the positive value of derivatives contracts held for trading. Conversely to the other categories seen until now, these assets are recognized at fair value without considering all the costs and revenues that could be directly attributable. After the initial recognition any variation in the value of these instruments is recorded in the income statement. In a way to identify the value of this instruments we need to consider the price of them in an active market if it is available (Effective market quotes: first level of fair value application), otherwise if the instruments are not quoted in an active market it is possible to use some valuation techniques considering all the risks factors correlated with the instruments based on market elements, so utilizing them for the calculation of: the value of recent comparable transactions, option pricing model or the discount cashflow approach (Comparable method: second level of fair value application). Moreover, for these assets the reclassification after the initial recognition is not allowed in any other category unless an unusual and non-recurring event occurs. If this extreme situation

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[3] IASC, 2010, *International Accounting Standard 39 Financial Instruments: Recognition and Measurement,* Regulation of July 2009, par.9

arises these instruments could be assigned in the other categories provided by IAS 39 in base also of the type of the instruments considered (HTM, financial assets available for sale and loans). At the time of reclassification, the value at which they are register is the fair value owned by the instruments.

Finally, the financial assets at FVTPL could be derecognize as what happen for the other categories of assets in the case in which there is the effective transfer of all risks and rewards linked with them.

1.2.4 Available for sale (AFS)

The last category prescribed following the IAS 39 are the available for sale, that are defined from it as: "*... those non-derivative financial assets that are designated as available for sale or are not classified as (a) loans and receivables, (b) held-to-maturity investments or (c) financial assets at fair value through profit or loss.*" [4]

Therefore, this category includes all those assets that are not recognizable in the other categories established by IAS 39, which are:

- All the bonds and debt instruments acquired and not included in assets valued at fair value through profit and loss, loans and receivables, held for trading or till maturity;
- Equity investments avoiding considering all those in subsidiaries and associated entities and those instruments that need to be classified as held for trading;
- The part of syndicated loans that from the origination are inserted among available for sale.

For this category of instruments, the assets are initially recognized for an amount equal their fair value including all costs and revenues directly associated. The only exception regards the equity instruments not quoted on an active market which require the measurement at the cost. The reclassification is only permitted in the category of investment held till maturity if the intention in the future is to hold them thill the expiration date. These assets are valued at fair value even if all the variation won't be recorded on the income statement but in a specific not disposable reserve until a permanent loss figure out or the assets will be derecognized. Only in this situation the loss or the gain in valuation are transferred on income statement.

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[4] IASC, 2010, *International Accounting Standard 39 Financial Instruments: Recognition and Measurement,* Regulation of July 2009, par.9

Therefore, it is possible to impair the value of those assets in the case in which there is an objective evidence of impairment. Finally, as for the other asset's types, it is possible to derecognize them after the selling, only if the right over the CFs are transferred.

1.2.5 Hedging derivatives

The hedging derivatives are defined by IAS 39, from paragraph 71 to 102, which represents them generally as derivatives instruments with the scope of neutralising possible losses in value of assets, negative possible cashflow generated or acquired and in a way to prevent future variation in the exchange with foreign currency.
Then we divide them among three possible hedging categories:

- Fair value hedge: in this category we find hedging instruments suitable for cover the possible losses that could happen in the value of certain assets. It is important to highlight that the financial revaluations on this category of hedging instruments need to be considered on the income statement, rectifying the accounting value of the covered assets. The bank is obliged to cease the recording of the hedging asset if the instrument went sold, if the coverage does not satisfy the requirements for the recording or if the bank has suspended the designation of them as hedging assets;
- Cashflow hedge: in this category we find hedging instruments suitable for cover the risk coming from the uncertainty of cashflow linked with certain assets. As just seen with the fair value hedge the coverage need to be recorded on the income statement, and the causes linked with the derecognition of the hedging are the same;
- Hedging investment in foreign currencies: in this category we find the instrument for the coverage of investments made in foreign currency. For these instruments we divide the effective coverage part that need to be reordered on the other comprehensive income and the non-effective part in the income statement. Instead for the derecognition we have the same treatment seen in the previous categories.

For the recognition of these instruments in the hedging derivative voice, on the financial statement, we need to have a clear hedging relationship documentation between the hedging instruments and the relative assets. The effectiveness of the hedge obviously depends by the level of protection against the various risks above mentioned. This is a relevant parameter that have not to be undervalued, because another requirement for identify financial assets in this

financial statement voice is the requirement of the guarantee that these instruments neutralise the possible sources of risks in the range of 80 to 125%.

The level of effectiveness needs to be evaluated every year utilizing:

- A prospective test, which needs to provide the expected effectiveness of the hedge;
- A retrospective test which asses the variance of the results achieved every year in respect of the perfecting hedge, giving so the coverage percentage. In the case that this test shows a percentage of hedging out of the range prescribed, it requests that the hedging is discontinued, and that the derivative have to be insert among the instruments held for trading given its nature.

This limitation of coverage range seems to be very stringent for the banking institutions, obliging them to cover nearly all their exposures, in a way to have an instrument that could be identify as a hedging one.

1.3 Classification of captions under IFRs 9

The IFRS 9 was created with the intention of simplifying and reduce the wide range of identification categories prescribed by IAS 39 in a way to provide also substantial representation of captions to the possible investors or clients interested on banks' balance sheet. In fact, the new standards bring some important revolution over classification and measurement of financial instruments, a new impairment model and a revision of the stringent regulation over the hedging instruments. For what regard the categories prescribed by this regulation we could identify: assets at amortised cost, asset at fair value through profit and loss, assets at fair value through other comprehensive income and hedging instruments.

1.3.1 Business model and the SPPI test

For assigning the assets in the categories prescribed by the IFRS 9, we have to introduce the concepts of Business model and of the SPPI test.

The banks so for classify the assets in the new categories created by the IFRS standards, they need to look at the business model underlying the portfolios of similar assets, that could be grouped together, in a way to check the intention and the objective that the management team has for them, preferring a higher level of aggregation in the analysis in respects to an instrument

by instrument approach. This Business model test prescribes four main steps that need to be followed:

- Grouping of assets in different portfolios according to the way as they are manged;
- Analysis of the underlying objective of the entity in managing them;
- Determination of the nature for the various portfolio in base of their contractual cashflow that are able to be generated;
- For assets classified as held to collect ones it is useful to back-testing the appropriateness of classification.

After having do this the financial institutions must assign the groups of financial assets over the three main types of business models available, based on the management decision over them, which are:

- HTC (Held to collect): The objective under this group of assets figure out by the management, it is to collect their future cashflows. So, in this case the valuation of the timing and amount of expected sales and the relative frequency is a significant condition for the classification of assets in this category. Obviously, the collection of contractual cashflows is considered essential to achieving this business model identification. In particular there are regulated cases in which it is possible to have some sales, for example if the sales are due for an increase in credit risk of a financial assets, if the sales are infrequent or the sales are close to the maturity of the instruments. Concluding the probability of detain those assets till the maturity need to be bigger than the probability of having a sale, then generally in this category we have loans and receivables.

- HTCS (Held to collect and sale): In this case the objective of the management over these assets consist both in the possibility to collect the future cashflows form them, but also the possibility of liquidating the investment made. Generally, this business model is chosen for a portfolio of assets from which the management team desire to have a certain annual yield.

- Other business models: This marginal category grouped all the assets that have a business model that do not match with the two above mentioned. In this category the sales are frequent, instead the willingness to maintain the assets till maturity consist in

a residual part of them. In fact, the principal goal is to maximize cashflows coming from the differences in fair values of assets, buying and selling them continuously on the markets, including also all derivatives instruments that for their nature are leveraged.

After the business model is identify the banks need also to execute the so called SPPI test, which principal objective is to verify that the outstanding cashflow generated by a certain asset, that have to be analysed, consists only in the repayment of the principal and to the maturation of interests. The principal of a certain asset consists in its fair value at the time of recognition, while the interest is the cost of money for the time that remain invested in the asset. The underlying thought is thus to uniquely identify that a given activity produces only a simple cashflow in line with a lending instrument, avoiding considering instruments that are very articulated and which mature complex types of cashflows.

For what regard the execution, this test is only mandatory at the time of recognition, without the necessity of propose it again during the lifetime of the assets. The only exception to this general rule regards those assets who have: a contractual term in their contracts which can modify the timing or the amount of cashflows, and for those who own regulated rates.

For the assets that have contractual terms which may influence both the timing and the amount of contractual cashflows, it is requested at the financial institutions who own them to repeat the SPPI test in a way to assess if the new contractual terms remain consistent with the requirements prescribed by this framework. A typical example could refers to those assets who have the option to be repaid before the maturity, in this case they will continue to be valued at amortised cost, if this have a de minimis effect over their cashflows, looking at the effects on their cumulative life. The same situation happens for the assets that presents regulated rates, so rates of interests established by governments or regulated authorities, which represent no more the time value of money, generally in this case the assets will continue to respect the SPPI test until it went introduced risk or volatility inconsistent with the general lending arrangement. Concluding it is important to consider that the SPPI test as we could understand from what we have said is never met for the:

- Assets which contractual terms could bring for the financial institution an increase in the level of risks linked generally with the intrinsic volatility;
- Financial activities that presents a different denomination among the principal and interests received because based in two non-equal currencies;

- Equity investments because have contractual terms who can give to a rise in the level of risk, obviously this is in contrast with the SPPI test that requires determinable payment at determinable dates, with constant volatility;

- All the types of derivatives because they are leveraged for nature;

- Bonds, which interests payments are linked with financial measures of a business sold for example to revenues or EBITDA, because expose the financial institution to risk similar to equity's assets.

1.3.2 Initial recognition and derecognition of financial instruments

The IFRS 9 plan as a general rule that the assets need to be recognized and then classify under the provided categories, only when the bank or the entity becomes part of a contractual position for a certain instrument.[5] At this time the assets are valued at their fair value, which normally consists in their transaction prices including all the costs and revenues directly attributable to them. The only exception regards those assets that went measured at the FVTPL that require to avoid the consideration of all costs and revenues linked with them, considering in this case the only net amount, separating so the possible cost and revenues that will be recognized in the profit and loss statement. It is possible to have a situation in which the price differs significantly from the fair value of the instruments, in this case the transaction value needs to be estimated with other valuation methods.

For the cancellation, the IASB prescribes that the valuation over the transfer of control must be postponed, with respect to the assessment of the transfer of all the risks and benefits associated with the cashflows of the assets.[6] Moreover, with respects to the IAS 39 regulation, the IFRS 9 establish an objective framework for understand if effectively all risks and rewards linked with a certain asset that have to be derecognize, are transferred. In particular this happen looking at the exposures before and after of the selling transaction, obviously in the case in which the level of exposures have not significantly change, the rights over the cashflows linked with the assets are maintained.[7] In this case the IASB prescribes that the financial institutions have to maintain the assets recorded on the financial statements.

In addition, the IFRS 9 establish the rules regarding the possibility given to the financial institutions for derecognize part of a financial instruments. The IASB in particular give the possibility to apply a partial derecognition for a certain part of an asset if it does not bring risk

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[5] IFRS 9 Financial Instruments, par. 9.3.1.1
[6] IFRS 9 Financial Instruments, par. BCZ3.8
[7] IFRS 9 Financial Instruments, par. BCZ3.11

or rewards which is linked with the does not derecognized part. The same paragraph provides other conditions that must be respected to allow that a part of a financial asset can be derecognised from the financial statements and following what expressed by the paragraph BCZ3.13 this can happens only if it comprised:

"(a) only specifically identified cash flows from a financial asset (or a group of similar financial assets);

(b) only a fully proportionate (pro rata) share of the cash flows from a financial asset (or a group of similar financial assets); or

(c) only a fully proportionate (pro rata) share of specifically identified cash flows from a financial asset (or a group of similar financial assets)." [8]

It is the only exception that this article allowed; in all the other cases we need to apply the derecognition principle to the assets in their entirety.

The new standards in any case let the possibility as the previous regulation, to derecognize an asset also if the bank maintain the control over its cashflows, but only if at the same time the bank has a contractual obligation to pay them to another entity.[9] This principle need to be respected also in the case in which a financial institutions creates a securitization of asset, in a way to obtain liquidity, selling an instruments which is guaranteed from the cashflows of the underlying assets put in this operation. Indeed, it does not matter the fact that the instrument went sold through a SPE or directly to interested investors
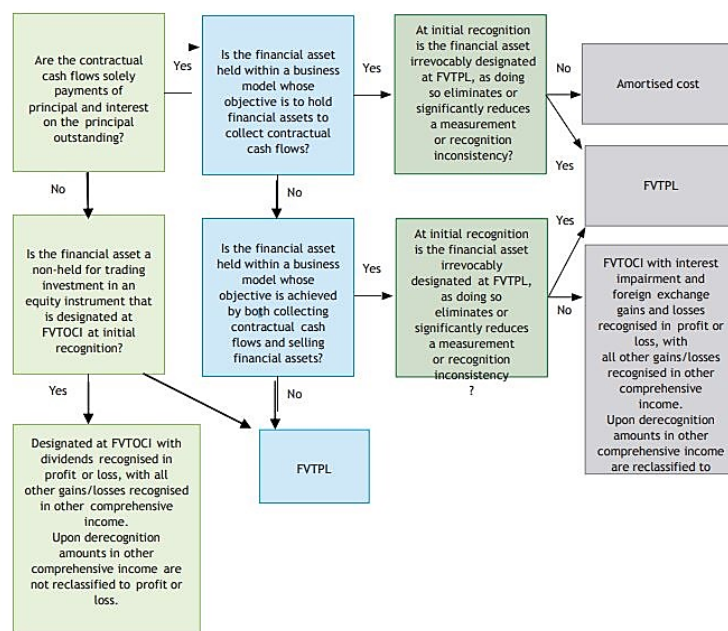
Figure 1: Assets classification following IFRS 9 principles

Reference: Deloitte, 2013 IFRS 9: Financial Instruments– high level summary

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[8] IFRS 9 Financial Instruments, par. BCZ3.13
[9] IFRS 9 Financial Instruments, par. BCZ3.14

1.3.3 Assets valued at amortized costs

Following the IFRS9 regulation, the assets could be recorded at amortised cost if:

"(a) the financial asset has only basic loan features; (b) the financial asset is managed on a contractual yield basis"[10]

Then as we can understand from the requirements expressed by this article and from *Figure 1* above, in this category we have to include all the assets that passes the SPPI test, meaning that their payments are represented only by the repayments of the principal plus the interests generated. This for IFRS 9 is not enough, in fact, for respect the standards it is necessary beyond passing of the SPPI test that the business model identified for the assets is the HTC model, which includes all the assets whose objective is the maintenance until maturity, in order that a financial institution can earn through the cash flows generated by them. What we have just said is valid if for the assets at the initial recognition the bank hasn't opted for the valuation at FVTPL, otherwise they must be inserted in this last category.

Generally, in this category we could find all the loans and receivables, the bonds which objective is to not trade them and all the liabilities although we have some restriction in the cases in which:

- The financial liabilities are valued at FVTPL, this happen in the case in which we have an accounting mismatch or in the case in which the management has chosen this option;
- They are financial guarantee contracts;
- They are financial liabilities that arise for a not happen derecognition after a selling of assets;
- The financial liabilities include embedded derivatives;
- They are constituted by commitments to provide certain loans at a rate of interest lower than the market one's.

1.3.4 Assets valued at Fair value through other comprehensive income

The standards establish that for consider an asset in the category measured at FVTOCI it is necessary that: *" (a) has contractual cash flow characteristics that give rise on specified dates to cash flows that are solely payments of principal and interest on the principal amount*

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[10] IFRS 9 Financial Instruments, par. BC4.12

outstanding; and (b) is held within a business model in which assets are managed both in order to collect contractual cash flows and for sale (a 'hold to collect and sell' business model)." [11]

As we can understand from this article it is necessary that the assets pass the SPPI test and that they are considered within the model of HTCS. Then in this assets' category we have to consider all those from which the management team have objective to collect cashflows and realize the fair values through the trading on financial markets.

It is important to highlight that there is the possibility to consider in this category also equity instruments that are not insert in a business model oriented to trading, with an irrevocable election at the initial recognition in this category. When this exception happens, we need to record the changes in fair values in the other comprehensive income instead the dividends maturated need to be insert among the items in the income statement.

1.3.5 Assets valued at Fair value through profit and loss

The FVTPL category include all those assets that meet at least one of the three conditions expressed by IFRS 9 which are:

- If the asset or the liability consists in a trading instrument;

- If the asset or the liability at the first recognition is valued choosing the fair value option, making its irrevocably recorded at FVTPL, only if with this assignment it is possible to reduce significantly the mismatch in the valuation of them eliminating possible inconsistencies.

- If an asset or a liability contains at least one embedded derivative and the entity elects to account it as a hybrid contracts for the entirety;

- On a residual basis, it is possible to include in this category all those assets that are excluded by those who are valued at amortized cost or at FVTOCI.[12]

Differently form IAS 39, the IFRS 9 request also that the assets for be classified following the FVTPL method have not to meet the SPPI test or to passing it if they present a business model which lie outside both the HTC and HTCS.

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[11] IFRS 9 Financial Instruments, par. BC4.149
[12] IFRS 9 Financial Instruments, par. BC4.77

1.3.6 Reclassification

The IASB agreed on the fact that giving the possibility at financial institutions to reclassify assets or liabilities in other categories can forbid a linear comparability of results among two years in a row. This is also justifiable because in general it is very difficult that the business model identify at the initial recognition of the assets can change, which is why the competent authority has decided to introduce more stringent parameters to be respected in order to grant a reclassification.[13] Indeed, the only circumstance in which it is possible to reclassify the assets is when the entity's business model for the specific assets is change and so the previously utilized model for the assessments is no more applicable. In such eventuality, the reclassification date has to be set the day of the first reporting period following the change happen in the business model, but in any case the entity has not to restate any previously recognized interests, gains or losses.[14] Anyhow the changes in the business model have to be significant and objective, in fact the management has to determine this variation by internal and external parameters, which need to be relevant for the entity operation and at the same time demonstrable to external parties. [15]

There are some assets for which a reclassification is not allowed:

- For equity instruments for which the financial institution has made the irrevocable decision to consider them through the FVTOCI; or
- For financial assets and liabilities for which the fair value option was chosen. [16]

1.3.7 Hedging derivatives

The IASB as we have anticipated, it has brought important reforms for this category of assets in respect to what established by IAS 39.

The only thing that remain unaltered from the two different regulations is the definition of this instruments caption, which includes all the assets or group of assets with the characteristic to protecting the entity against possible risks linked with: the change in fair value of an asset, the variability in cashflows and the hedging of investment in foreign currencies.

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[13] IFRS 9 Financial Instruments, par. BC4.111
[14] IFRS 9 Financial Instruments, par. BC4.119
[15] IFRS 9 Financial Instruments, par. BC4.116
[16] IFRS 9 Financial Instruments, par. BC4.152

Important differences instead can be find looking at the possibility granted by IFRS 9 to: hedging only the net position over certain transactions, the possibility to have an aggregate hedging instrument and the elimination of the hedging interval.

It seems useful to understand more in detail the changes that the new standards bring.

In particular for the first time is possible to hedging only the net position that arise from two opposite transaction that a financial institution could have on balance sheet, covering with a derivative only the part that is not offset. This type of hedging remains in any case possible purely for the risk linked with investment in foreign currency, requesting furthermore a specific documentation about at least the valid reporting period, its nature and the relative volume.

For what regard the possibility to create an aggregate hedging instrument the IFRS 9 revise what established by the IAS 39, which not allowed the possibility that a derivative could be a hedging instrument and that it was not possible to have any combination of a derivative with other types of exposures, in a way to form a hedging item. [17] Additionally, it is prescribed that those hedging derivatives, which are used by financial institutions to cover the credit risk, they need to be evaluated at FVTPL, while the credit exposures are generally measured at amortised cost.

Ending, the last but not for importance change that the new standards have made, it is linked with the elimination of the constraint that the IAS 39 request in a way to have an effectively hedge, so the range of 80% to 125% requested for grant the possibility to identify a certain asset in this regime. [18] This effectiveness range has been substituted by an objective method, by which every entity has to look at the relevant characteristics of a hedging relationship and to the all possible causes of its ineffectiveness. There are only three cases in which the hedging accounting can be discontinued: when the asset ceases to meet the risk management objective, when the hedging relationship does not respect the qualifying criteria and if the hedging asset is sold or it is expired.

All these positive changes are followed obviously from an extension in the disclosure requirements, this hasn't any restriction for the organizations, that remain free to make their judgment for the classification of an asset in this category, however respecting the requirements of the IFRS discipline. Indeed, now it is request from the hedging disclosure to providing information about:

- The management strategy for facing the risk and the relative application for manage it;

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[17] IFRS 9 Financial Instruments, par. BC6.158
[18] IFRS 9 Financial Instruments, par. BCE.199

- The explanation in what ways a certain asset, or group of assets can reduce the uncertainty over times and maturation of future cashflows;

- The effect that the hedge accounting could bring over the bank's financial statement;

- The indication if the financial entity is applying or not the fair value option for the hedging asset, so if the management want to value it at FVTPL.

In any case the information that a financial entity should provide are very detailed, so it is suggested to them to start gathering all the information as soon as possible.[19]

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[19] PWC, 2016, *Practical guide General hedge accounting* p.24

Chapter 2: Valuation of assets captions subject to impairment under IFRS 9

Before starting the explanation of the argument that we will treat in this chapter, it seems important to highlight until now the main differences among the two legislation in the valuation of assets subject to impairment, which are in general the most important in amounts and relevance for the core business of commercial banks. In summary IFRS 9 have introduced a different approach in the impairment procedure, imposing at financial institutions to made impairment in a situation in which they expect losses in value, contrary to the previous regulation that imposed to impair a financial asset or group of assets only when the losses were realized. Moreover, the IFRS 9 introduces a new model which granted three possible approaches of impairment, that are: a general (also called three bucket approach), a simplified and a credit adjusted approach. Given these changes, it is prescribed, for the financial institutions that will adopt for the first-time those principles, the obligation to make a disclosure of the reconciliation among the two different regulations in the explanatory note.[20]

2.1   Impairment under IAS 39

The outdated regulation of IAS 39 had established, for the category of assets valued at amortized cost and for those assets classified in the categories measured as AFS or at FVTOCI, the necessity to be subject at the impairment test.

Indeed, financial institutions that was following the IAS regulation, had to verify at the end of each reporting period if there was an evidence, for an asset or a group of financial assets, of impairment. [21] The evidence of impairment linked with a loss event was ascertained only in the case in which it had an impact on the estimated future cashflows of the analysed assets. Sometimes it was impossible to identify a unique cause of impairment, so a combination of more events could happen at the same time influencing negatively the value of assets.

The paragraph 59 of the IAS 39 had pinpointed some typical conditions in which was evident the loss in value of assets, which were:

- A financial situation of difficulty for the obligor, that has to repay the obligation;

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[20] IFRS 9 Financial Instruments, par. BC7.24
[21] IAS 39, par. 58

- A cause that bring to a breach of contract, which could be linked with delay in the principal or interests' repayments;
- The high probability that the obligor is going into bankruptcy;
- A situation in which for difficulties in the financial market a certain instrument will find itself without an active market;
- When there is an observable and measurable evidence of future reduction in value generation, linked with a single or a group of assets, since their initial recognition. This situation could be due by a deterioration of the contract, which can be connected to a counterparty cause or to macroeconomic events. [22]

Aside to these conditions that are generally useful for evaluating a cause of impairment, for the AFS, which are constituted of tradable assets, we have a more detailed discipline, looking at the internal factors relative to the company that have to been evaluated or to external quantitative indicators:

- Within internal indicators we have to consider as a significant cause of impairment the generation of negative economic results, an underperforming of the company in respected to the budget estimates and the downgrade in bonds rating by more than two categories.
- With respect to external qualitative indicators, an asset has to be impaired when the fair value of the instrument is for a prolonged period significantly under the recognition value. For a prolonged period, we mean at least 24 months instead, for a significant reduction in value it is request a reduction under the recognition value for at least 30%.

Then in the case in which there was an objective evidence of impairment for certain assets or group of assets, following the guidelines expressed before the application of IFRS 9, a financial institution had to carry out the impairment of the same. The impairment amount depended by the difference among the carrying value of the assets minus the present value of the discounted cashflows coming from this asset or group of assets, discounted at the present value using the effective interest rate. [23]

If in a following period after the impairment realized, the circumstances that had caused it ceases to exist or went reduced in amount, then it was possible to have a revision in value until the carrying amount of it.[24]

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[22] IAS 39, par. 59
[23] IAS 39, par. 63
[24] IAS 39, par. 65

The only category which was clearly excluded to impairment procedures consisted in assets evaluated at FVTPL, given that this valuation at the market price has permitted also to recognize the expected losses in value, that was going recorded by financial institutions directly in a designated reserve, reducing the value of Equity in the financial statement. Uniquely in the case in which there was an objective evidence of the loss in value for the asset or group of assets, then the loss was being transferred from the financial statement to the income statement as a cost.

2.2   Impairment under IFRS 9

The IFRS 9 as we have just analysed in summary on the preamble of this chapter introduce a new impairment model, requiring a retrospective application under what establish by IAS 8, in a way to have comparable information among the various periods.[25] This because applying a new impairment, that consider also the ECL (expected losses) in a forward looking approach, avoiding the "too little, too late" impairment in particular for those assets valued at amortized cost, this can lead to significant deviations in values, that would compromise the comparability of results. Then from what said until now, we have understood that this new impairment method is gather on the concept of ECL, or rather on the estimation using probabilistic criteria over the possible future cash shortfalls along all the useful life of an instrument, which originate from the difference among the present value of future cashflow due in accordance to the contractual terms and the present value of future cashflow that the entity expect to receive.[26]

The rate of interest that have to be applied in the discounting the future cashflow is always the effective rate of interest.

In order to measure the ECL the IFRS 9 distinguish among:

- 12 month expected credit losses: they are represented by the present value of cash shortfall in case of default of the counterparty on the 12 months following the date of financial statements;
- Lifetime expected credit losses: they are represented by the present value of cash shortfall in case of default of the counterparty over the whole life of a financial instrument;

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[25] IFRS 9 Financial Instruments, par. BC7.26
[26] IFRS 9 Financial Instruments, par. BC5.242

- Defaulted instruments: the standards do not explain the term of default, in any case for proxy the IASB has establish that an instrument can be consider defaulted if there is a delay in payment over 90 days. This extreme could be overpass if the entity has reasonable reasons supported by evident information and report, that can sustain a time extension.[27]

Basically, this technique is based over probabilistic criteria, reflecting the temporal value of money and it is founded over rational future expectations disposable without additional costs or efforts. It is important to highlight that this model base itself over probabilistic criteria because the calculation has not to be merely a mathematical discount of value, but rather the financial institutions have to analyse at least two scenarios, one of non-default and the other of default.

Ending for what regard the applicability of this article, as also the previous IAS 39, it is limited to the following categories of assets:

- Assets measured at amortised cost;
- Financial assets (debt instruments) measured at FVTOCI;
- Loans and financial guarantees which are not measured at FVTPL;
- Commitments to disbursement of loans not assessed at FVTPL;
- Credits generated by leasing contracts. [28]

Indeed, it remains not applicable to the subsequent asset categories:

- Equity participations in other entities;
- Purchased or originated credit-impaired financial assets (POCI), recognizing only the cumulative changes due by lifetime expected credit losses;
- Commitments to disbursement of loans assessed at FVTPL;
- All the financial instruments valued at amortised cost.

Now in the following chapters we will analyse in detail the three available models established by the regulation for the impairment procedure.

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[27] IFRS 9 Financial Instruments, par. BC5.102
[28] IFRS 9 Financial Instruments, par. BC5.118

2.3   The general model

The general model is usually defined as three bucket approach, inasmuch it is the deterioration in the creditworthiness that entail the passage of an asset among one stage to another, as it is visible form the imagine below (*Figure 2*).
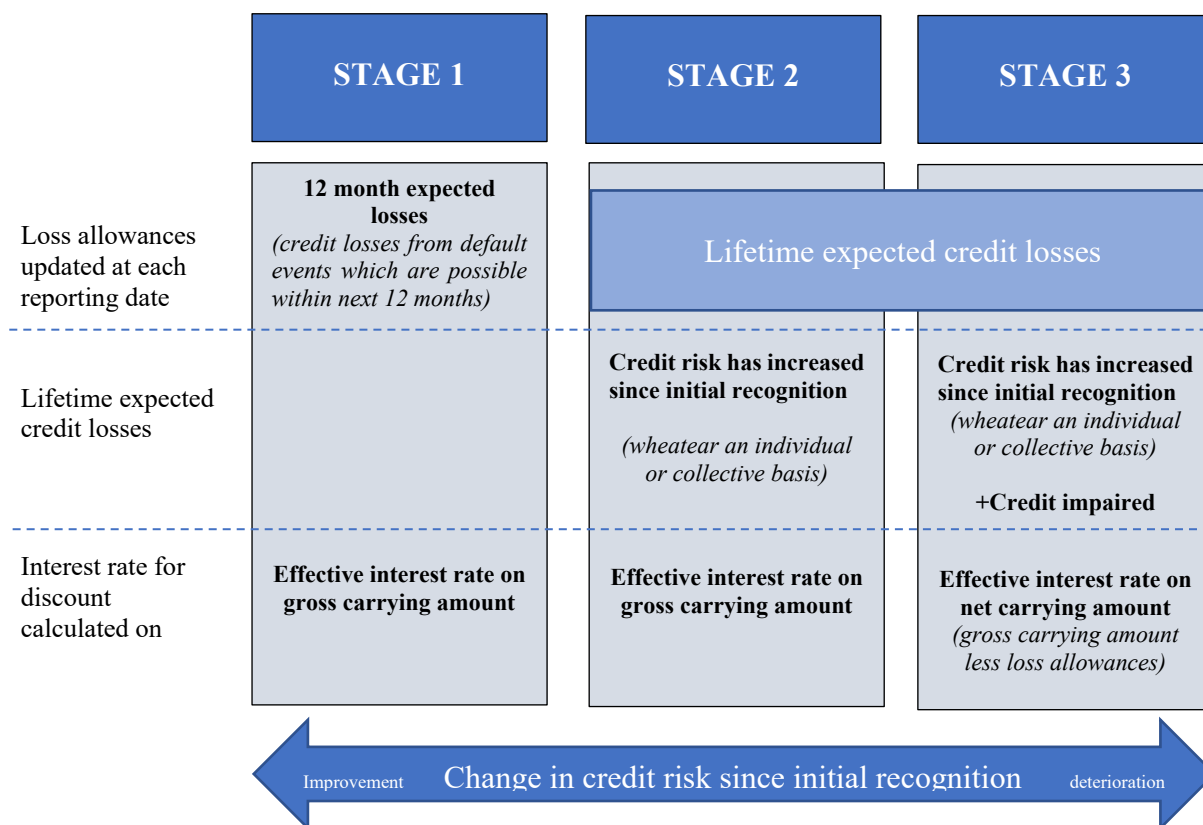
Figure 2: Three bucket approach for impairment evaluation
Reference: Own elaboration

The IFRS 9 describe this approach at the paragraph BC5.135 [29] prescribing, also if not explicitly the three stages of asset allocation, that are:

- Stage 1: This category includes all assets whose are in good conditions, performing in a regular manner and being in line with the contracts stipulated. So, they have not any factor which suggest a deterioration in the credit quality or to an increase in the credit risk. For these assets the regulation requests a recognition of 12-month ECL (represented by losses which are plausible in the future 12 months after the date of financial statements), calculated from the gross carrying amount discounted at the

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[29] IFRS 9 Financial Instruments, par. BC5.135

effective interest rate, after deducting the sum of the contractually expected cash flows.[30]

- Stage 2: This category contains all the assets whose credit risk is significantly increase since the last financial statement recognition (note that there is no clear definition of what the regulatory authority means by a significant increase in credit risk), in general we refer to 30 days of past due and a downgrade from an investment grade to a speculative one's.[31]

- Stage 3: This category involves all the credit impaired financial assets, which are those who have suffered a detrimental impact over the future cashflows. There are some typical situations from which it is possible to detect a cause of impairment:
    - A financial situation of difficulty for the borrower or issuer;
    - A breach of contract coming from a past due event (30-60 days of payment delays) or from a default event (more than 90 days of delay);
    - When the lender in a contractual difficulty of the issuer or borrower, granted to him a concession;
    - A situation in which the probability of bankruptcy or other form of reorganization for the obligor appear clear;
    - When an active market disappears, but this disappearance needs to be linked to financial difficulties;
    - When we have a Purchase of Originated impaired financial assets (POCI), that are assets generally acquired at discount which reflects the incurred credit losses.

    This asset stage 3 classification requests to calculate lifetime expected credit losses over the net carrying amount of asset (gross carrying amount minus the loss allowances linked with the same).

The general approach being symmetric it is aimed at assessing both the worsening and improvement in creditworthiness. Hence, when there is an improvement leading a reduction of risk, bringing an asset first assessed on stage 2 or 3 to the stage 1 and so passing from lifetime expected losses to 12 months ECL, it is necessary to recognize a reversal impairment in the

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[30] IASB, Exposure Draft ED/2013/3, Financial Instruments: Expected Credit Losses, par.4
[31] IASB, Exposure Draft ED/2013/3, Financial Instruments: Expected Credit Losses, par. 5

profit and loss statement.[32] This type of evaluation needs to be done at each reporting date, assessing if there was an increase or a decrease in the credit risk linked with the various assets.

2.3.1 Significant increase in credit risk with the Migration Matrix model

It is important to define better the concept of significant increase in credit risk, which require the passage for an asset or group of assets from the Stage 1 to the Stage 2, requesting more allowances. To do this we retain important the introduction of the probability of default (PD) concept, which is the probability that an asset goes in default before the maturity, so it can be considered a measure of credit risk. In particular we would like to underline referring to what we have just said, that shorter it is the life of a financial assets, lower its PD will be and therefore the better its credit quality.[33] For identify the increase in the credit risk, the theorists have elaborated some statistical models, focused on the evaluation of significant changes in the PD. The IFRS 9 does not specify the allowed statistical methods that the financial institutions have to apply, saying in fact: *".. that an entity may use various techniques to measure expected credit losses"* [34]. Anyway, the most used methods are: the Merton's model, the Weibull model, the migration matrix, the logistic regression and the regression analysis of least squares.

In the hereinafter of our treatise, we will analyse the migration matrix, the most intuitive and easy to apply model based on historical time series, in the next sub-chapters we go through the Merton's model and the other non-statistical models, based on the concept of "low risk exemption" .

Then the first model that we analyse is the migration matrix, that as expressed by the AIFIRM[35] consists in a statistical model articulated in three important steps, represented through various re-elaborated migration matrix, in order to judge when an exposure should be transferred to a riskier stage. The important concept under this method is the determination by the bank of a certain quantile based on the risk appetite of the different portfolios of assets. In fact, the transfer from Stage 1 to Stage 2 happen when the cumulative transition probability exceeds the threshold expressed by the quantile. This migration matrix model is articulated in three steps, starting from the creation of a matrix for all the cumulated migration probabilities, which it will display seven classes of rating from "AAA" to "CCC" grades, for a defined year *i* transition (Table 1).

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[32] IFRS 9 Financial Instruments, par. BC5.210
[33] IASB, Exposure Draft ED/2013/3, Financial Instruments: Expected Credit Losses, par. BC71
[34] IASB, Exposure Draft ED/2013/3, Financial Instruments: Expected Credit Losses, par. BC91
[35] AIFIRM, *Position Paper n.8, Il principio contabile IFRS 9 in banca: la prospettiva del Risk Manager*, p.17

From/to	AAA	AA	A	BBB	BB	B	CCC	D
AAA	**83,90%**	14,16%	1,83%	0,06%	0,04%	0,00%	0,00%	0,00%
AA	1,58%	**83,86%**	13,43%	0,90%	0,16%	0,05%	0,00%	0,02%
A	0,14%	4,85%	**84,15%**	9,30%	1,19%	0,26%	0,05%	0,06%
t BBB	0,10%	0,54%	9,34%	**79,23%**	7,98%	1,82%	0,48%	0,51%
BB	0,02%	0,15%	1,25%	10,66%	**69,86%**	13,71%	1,45%	2,89%
B	0,02%	0,10%	0,39%	1,11%	10,40%	**67,81%**	9,01%	11,16%
CCC	0,00%	0,07%	0,10%	0,49%	1,88%	15,97%	**49,51%**	31,97%
D	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	**100,00%**

Table 1: Two Years Transition Matrix (2018)

Reference: from Standard & Poor's

To that point, the next step consists in the elaboration of another matrix for calculating the migration probabilities without default (the so-called conditional probabilities). To do this, we have to compute the ratio between the unconditional probability of default and the complement to one of its default probabilities.

For better explain how it should be reworked, we make some examples:

$$P(M_{AA,AA}|no\ default) = \frac{P(M_{AA,AA})}{[1 - P(M_{AA,D})]} = 83.86\%/(1 - 0.02\%) = 83.88\%$$

$$P(M_A|no\ default) = 84.15\%/(1 - 0.06\%) = 84.2\%$$

$$P(M_{BBB}|no\ default) = 79.23\%/(1 - 0.51\%) = 79.64\%$$

… and so on until finding the matrix elaborated in the *Table 2* below.

From/to	AAA	AA	A	BBB	BB	B	CCC
AAA	**83,90%**	14,16%	1,83%	0,06%	0,04%	0,00%	0,00%
AA	1,58%	**83,88%**	13,43%	0,90%	0,16%	0,05%	0,00%
A	0,14%	4,85%	**84,20%**	9,31%	1,19%	0,26%	0,05%
t BBB	0,10%	0,54%	9,39%	**79,64%**	8,02%	1,83%	0,48%
BB	0,02%	0,15%	1,29%	10,98%	**71,94%**	14,12%	1,50%
B	0,02%	0,11%	0,44%	1,24%	11,71%	**76,33%**	10,14%
CCC	0,00%	0,10%	0,15%	0,73%	2,76%	23,47%	**72,78%**

Table 2: Average Conditional probability of default over Two Years Transition Matrix (2018)

Reference: Own elaboration

Now that we are at the second step of the procedure, we have to calculating the probability that an asset remains in the same class of origination, or that it moves in a better or worst rating class k. For analyse the movement from one class to another, we elaborate another matrix including the cumulated conditional probabilities to default. As made before we present also the underlying computation in an example:

$$P(M_{AAA,AA}|no\ default) = P(M_{AAA,AAA}|no\ default) + P(M_{AA,AA}|no\ default) =$$
$$= 83.90\% + 14.16\% = 98.06\%$$

$$P(M_{AA,A}|no\ default) = P(M_{AA,AA}|no\ default) + P(M_{A,A}|no\ default) =$$
$$= 98.06\% + 1.83\% = 99.89\%$$

$$P(M_{A,BBB}|no\ default) = P(M_{A,A}|no\ default) + P(M_{BBB,BBB}|no\ default) =$$
$$= 99.89\% + 0.064\% = 99.95\%$$

$$P(M_{BBB,BB}|no\ default) = P(M_{BBB,BBB}|no\ default) + P(M_{BB,BB}|no\ default) =$$
$$= 99.95\% + 0.044\% = 100.00\%$$

$$P(M_{BB,B}|no\ default) = P(M_{BB,BB}|no\ default) + P(M_{B,B}|no\ default) =$$
$$= 100.00\% + 0.00\% = 100.00\%$$

$$P(M_{B,CCC}|no\ default) = P(M_{B,B}|no\ default) + P(M_{CCC,CCC}|no\ default) =$$
$$= 100.00\% + 0.00\% = 100.00\%$$

… and so on, also starting from other rating grades, until finding the matrix elaborated in the *Table 3* below.

	From/to	AAA	AA	A	BBB	BB	B	CCC
	AAA	**83,90%**	98,06%	99,89%	99,95%	100,00%	100,00%	100,00%
	AA	1,58%	**85,45%**	98,88%	99,79%	99,95%	100,00%	100,00%
	A	0,14%	4,98%	**89,19%**	98,49%	99,68%	99,95%	100,00%
t	BBB	0,10%	0,64%	10,03%	**89,66%**	97,69%	99,52%	100,00%
	BB	0,02%	0,18%	1,47%	12,45%	**84,39%**	98,50%	100,00%
	B	0,02%	0,13%	0,57%	1,82%	13,52%	**89,85%**	100,00%
	CCC	0,00%	0,11%	0,26%	0,98%	3,74%	27,21%	**100,00%**

Table 3: Cumulated Conditional probability of default over Two Years Transition Matrix (2018)

Reference: Own elaboration

Arrived at the third and last step of this method, we have to analyse with the help of the last matrix (*Figure 5*) if an exposure has to be transferred or not into Stage 2. Supposing to have a portfolio of assets evaluated with an "AAA" grade that at the year i downgrade to an "AA" grade, in this case its needs to be transferred to Stage 2. This because the threshold establishes by the quantile of 10% went overcame, in fact the 98.06% cumulative conditional probability is bigger than the 90% fixed by the quantile. Instead, supposing that another portfolio of assets was being valued with an "AA" grade and that after one year the grade remain stable, in this case the 85.45% of cumulative conditional probability remains lower than the 90% threshold expressed by the quantile, so the assets must remain evaluated in Stage 1.

There is also the possibility to assign different quantiles for the different ratings grades, obviously assigning lower quantiles such as the 0% for the best grades (from "AAA" to "A") and increasing it for the lower ones designating for example a 10% from the "BBB" to "B" grades, and so on. This model besides its simplicity and immediacy in application that are valuable, it presents some limitations given the fact that uses for estimating the probabilities some historical measures referred to the real universe. Hence this approach has a limited applicability especially in large corporations, also if it is efficient in the scenario analysis and for the calculation of value at risk (VAR).

2.3.2 Merton's model

Another famous statistical model, that differently from the above analysed one's, it is utilize mainly for evaluating the credit risk of the company's debt, it is the Merton's model. This statistical approach derived directly from the Black-Sholes (BS) formula, it is used in a way to identify the solvability of banks against their contractual obligation, looking at the probability of their default. The BS formula express the price of an European option (put or call) over another financial instruments, generally a share, without the distribution of dividends which movement follow the so called random walk (that generally is more visible when the price of the share is close to its FV, because it is more susceptible from rumours).

For explain the Merton's model it is useful to understand before the underlying BS formula, which it has to see some requisite respected:

- The options taken in consideration need to be only in the form of European one's, this mean that the right implied by them can be exercise only at the maturity;

- The markets have to be efficient, this means that the price of the instrument is close to its fair value, so the movements are unpredictable;
- The share taken in consideration has not to distribute dividends;
- There is not any friction in the market, so the market is free from taxes and the assets are perfectly divisible;
- The returns of the underlying stock are normally distributed.

Now it is important clarify the variables that we are going to use in the following formula which are:

- c= call premium;
- p= put premium;
- S=current stock price;
- K=strike price for the option;
- T=time to maturity;

- σ= the volatility (standard deviation) of the stock;
- N= cumulative normal distribution;
- r= risk free rate;
- e=exponential term.

Therefore, the BS formula, depending by what option we want to evaluate it will be :

$$c = S_0 * N(d_1) - K * e^{-rt} * N(d_2) \text{ , for the call}$$
$$p = K * e^{-rt} * N(-d_2) - S_0 * N(-d_1) \text{, for the put}$$

with: $$d_1 = \frac{Ln(S_0/K)+\left(r+\frac{\sigma^2}{2}\right)*T}{\sigma*\sqrt{T}} \quad and \quad d_2 = \frac{Ln(S_0/K)+\left(r-\frac{\sigma^2}{2}\right)*T}{\sigma*\sqrt{T}} = d_1 - \sigma*\sqrt{T}$$

The BS equations expressed above have the function to establish the prices of a call or of a put option using the risk adjusted probabilities and opportunities cost of paying a premium for the option. In particular looking at the call option, $S_0 * N(d_1)$ measures the probability that the option will be exercise at maturity[36], the opposite situation in the case of a put option (second formula).[37] Instead, $K * e^{-rt} * N(d_2)$ express the inverse probability, so that an investor will not exercise the option at maturity, because it will be out of the money[38].

Having said that, we could represent d_2 as the risk neutral probability of default for the call option, being the probability that the call option will be out of money.

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[36] This occur when the market price is equal or greater than the strike price $S_t >= K_t$ (call option)
[37] This occur when the strike price is equal or greater than the market price $S_t =< K_t$ (put option)
[38] An option, obviously it depends by the type, it will be out of the money in the case of the put when the selling strike price is lower than the market price and vice versa a call option, it will be out of the money when the acquiring strike price will be higher than the market price

The Merton's model exploits the Black-Sholes formula and concepts, utilizing them in the valuation of credit risk of a company's debt. Therefore, thanks to this model the analysts and investors have the ability to understand in what degree the company is able to meet their debt obligation, so its ability of debt servicing and the relative risk of default.

For assessing the credit risk of an entity, this model utilizes the expedient of considering the equity's instruments like call option in the BS model, in which the value of the company is considered equal to the price, that it will be higher when the Enterprise value (EV) increase, so when the assets are bigger than liabilities.

We explicit now the main variables utilized by this model, which are:

- V_t= Value of assets at the time t;
- E_t= Value of the company's equity at the time t;
- D= Book value of company liabilities ~ market value of them;
- t= Current time period;
- T= Maturity;

- r= Risk-free interest rate;
- N=Cumulative standard normal distribution;
- e= Exponential term;
- σ= Standard deviation of stock returns;
- Δ_t= T-t.

It is important also to highlight that the value of E_t conceptually if $V_t < D$ goes to 0 and the company will be on default, vice versa in the case in which $V_t > D$ then the company it will be solvent, having the ability to reimburse the debt at the time T[39]. After this clarification we can explain Merton's formula which is the following:

$$E_t = V_t * N(d_1) - D * e^{-r\Delta t} * N(d_2)$$

where: $d_1 = \dfrac{Ln(V_t/K) + \left(r + \frac{\sigma^2}{2}\right) * \Delta T}{\sigma * \sqrt{\Delta T}}$ and $d_2 = \dfrac{Ln(V_t/K) + \left(r - \frac{\sigma^2}{2}\right) * \Delta T}{\sigma * \sqrt{\Delta T}} = d_1 - \sigma * \sqrt{\Delta T}$

Therefore, as in the BS model we have the identification of the probability to default in the parameter $N(-d_2)$. In this case we have a negative parameter d_2, that comes out from the following computation: $P(V_t < D) = 1 - N(d_2) = N(-d_2)$. Also, this model being a statistical one's presents some limitations, because we assume that the debt repayments happen at a single date, but in reality they are spread over time and because the Value of assets is

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[39] $E_t = max(V_t - D; 0)$

difficult to be estimated at market value. Anyway, the Merton's model is one of the most utilized statistical approaches.

2.3.3 Non statistical approaches

In addition to the statistical models that allocate the assets among the various stages in an automatic way, after having calculated the PD, we have also some qualitative instruments. These instruments with the statistical models have the function to determine the staging allocation.

We refer in particular to two approaches:

- "Trends" evaluation of additional internal information to the banking system, that could indicate the occurrence of an increase in the credit risk;
- Manual "override" of results by an appointed IFRS 9 Desk

The trends evaluation base the staging allocation at the verification of some trigger events, that are:

- Managerial classification: This is based on internal information generated by the bank and based on the counterparty's risk, on instruments that were transferred in a special "watching list";
- 30 days past due criteria: The IASB prescribe the 30 days past due rebuttable presumption, meaning that after 30 days there is an automatic shift of the asset in a riskier stage, because the trigger event happen, but it is let the possibility to the financial institutions to avoid this, producing reasonable and supportable information to support the evidence of the contrary; [40]
- Forbearance: In line with what establish by the Basel Committee (BCBS 2015, Annex E) the forbearance exposures presently inserted in the forborne one's, in the case it occurs a significant increase in credit risk are automatically transferred on stage 2. In fact, the forbearance discipline predisposes the possibility to have a probation period during which the exposures are considered forborne, until payments became regular. [41]
- Absolute threshold on PD: If it has not established yet in the "management classification", it could be set an absolute value of PD (example PD greater than 5%).

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[40] IFRS 9 Financial Instruments, par. BC5.194
[41] IFRS 9 Financial Instruments, par. BCE.121

This threshold then become the parameter for transferring the exposure from Stage 1 to Stage 2.

A financial institution, after having completed the statistical evaluation over the probability of default and judge about the appropriateness of results with the qualitative trends evaluation, it can provide the creation of an "IFRS Desk". The creation of this desk, that it is part of the manual override technique, it is need for the purpose of judge over some well define casuistries, in a way to allocate correctly the various exposures owned by the bank.

In any case, the IFRS 9 establish the so define "low risk exemption", in which a test for analyse the creditworthiness of those exposures it is not requested, because they are owned at a low credit risk. [42] The financial instruments are valued to have a lower credit risk if:

- The financial instrument has a low credit risk;
- The obligor has a strong capacity to meet their debt obligations in terms of cash outflows, in the short term.

The Basel Committee intervene on this prescription, allowing this "low risk exemption" only to International active banks (BCBS 2015).

For now, we have not said anything about the transferring of assets among Stage 2 and Stage 3, but also for these stages the IFRS 9 regulation intervened, pinpointing some causes in which there can be a significant increase in credit risk such as to require the transfer, at the following conditions[43]:

- Adverse changes in the macroeconomic environment (regulatory modification or innovation in the economic sector);
- Significant changes in the prices for the access to credit risk indicators such as on the rating realised by third parties or calculated internally;
- Significant changes expected or realized on the operating result (at the level of revenues, liquidity or quality of assets on balance sheet);
- Significant increment in the credit risk detained against a specific counterparty, this refer to a rebuttable presumption of 30-day past due[44];

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[42] IFRS 9 Financial Instruments, par. BC5.181
[43] IFRS 9 Financial Instruments, par. B5.5.17
[44] IFRS 9 Financial Instruments, par. B5.5.19

- Significant reduction of a financial guarantee at protection of credit risk (due for example to a reduction in the real estate prices, that could give the incentive to the counterparty to not observe his/her contractual obligation)
- Significant changes in contractual terms with the counterparty.

Moreover, far all the NPL exposures it is request directly to be recorded under the Stage 3 as what requested by EBA.[45]

2.3.4 Loss allowances determination

After the valuation of staging allocation for the various portfolios of instruments owned by the bank, we have to calculate the relative loss allowances against the future ECLs.

For the IFRS 9 the measurement of cash shortfalls has to follow some criteria[46]:

- It has to be unbiased and probably weighted, taking in consideration different possible scenarios;
- It has to consider the time value of money;
- It has to be based over reasonable and supportable information, regarding past events and future forecast of economic conditions, that it does not request undue costs or efforts for collecting them at the reporting date.

The first requisite, it is considered respected when the institutions taken in consideration multiple information and sources, realizing different scenarios. In fact, the regulation prescribes to consider at least two scenarios and not all the possible outcomes, letting the possibility at the financial institution to utilize a representative sample. This representative sample has to present in any case one scenario in which the possibility of loss occurrence happens, even if the possibility is remote or very low, and another considering the situation in which there is not credit default risk. [47] Instead, for the second requisite we have just outline the meaning before, and it refers to the application of the effective interest rate. While the last one as prescribed by the principles[48], it is linked with the first given the fact that regard the collection of reasonable and supportable information to use in the ECL model. Such information has to consider present

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[45] EBA, *Final draft Implementing Technical Standard*, Report of March 2013, p. 13
[46] IFRS 9 Financial Instruments, par. BCE.106
[47] IFRS 9 Financial Instruments, par. BC5.265
[48] IFRS 9 Financial Instruments, par. B5.5.50

events, past events and future forecasts on the possible economic conditions. Therefore these information must include specific factors linked with the obligors subject of the banks, general economic conditions which have the power to influence the cash inflows of the considered assets and the forecast direction of them at the reporting date. Obviously in part this is a subjective judgment, in particular when the forecast horizon increase, given that entails lower availability of detailed information.

Then once having explain the guidelines that have to be followed by financial institutions on the gathering useful information, we can represent the ECL model in function of three parameters of risk that we are going to illustrate in the hereinafter: PD, LGD, EAD.[49]

$$ECL = PD * LGD * EAD$$

- PD (Probability of default)[50] = The probability of default it can be define as the probability that the counterparty goes in default during one-year period (12 moth probability of default), if the instrument is on Stage 1. While, the probability of default will be computed till maturity of the instrument in the case in which it is on the second or third stage. As already said so far, this probability could be calculated with various statistical model between which the two explained above: the migration matrix and the Merton's model;

- LGD (Loss given default)[51] = The loss given default is calculated as the ratio between the losses over an exposure due by the counterparty default and the amount of the total outstanding default position. The calculation of losses is not simple and depends by the quality of the contracts that the financial institutions stipulate, but also from the collaterals given as pledge by the borrowers. Therefore, for calculating the loss given default we have to introduce the concept of "Loan to value" (LTV) that represents which part of loans is certain to be cashed in through financial guarantees, doing so we will compute the possible losses only for the uncovered part of the exposure at risk;

$$LTV = \frac{Loans\ Value}{Collaterals\ Value} = \frac{1}{RR(recovery\ rate)}$$

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[49] Global Public Policy Committee, 2016, par. 2.1.2.2
[50] https://www.investopedia.com/terms/d/defaultprobability.asp
[51] https://www.investopedia.com/terms/l/lossgivendefault.asp

- EAD (Exposures at default)[52] = It measures the amount of losses that a bank has to bear in the case of some credit exposures default at time *t*. Generally, Banks has their own internal risk management models to estimate the EAD.

Then having understand the variables, we can rewrite the model considering the time value of money and the relative interval of calculation, obtaining so:

$$ECL_{12month} = MPD_1 * LGD_1 * \frac{EAD_1}{(1 + EIR)^1}$$

$$ECL_{lifetime} = \sum_{t=1}^{T} MPD_t * LGD_t * \frac{EAD_t}{(1 + EIR)^t}$$

2.4 The simplified and the credit adjusted approaches

Beside the general approach, the IFRS 9 provide for the creation of two marginal model: the simplified and the credit adjusted approaches.

The Simplified method as defined by the paragraphs 5.5.15 and 5.5.16 of IFRS 9, it can be used for qualifying trade and receivables, contract assets within the scope of IFRS 15[53] and leasing receivables. This approach, differently from the general one's, it presents only one stage of classification which request, in spite of everything, the calculation of ECLs on a lifetime basis. Even if, for the calculation of ECLs in the simplified approach, the financial institutions are allowed to predispose a so called "provision matrix".[54] This matrix has to be constructed by the financial institutions with the utilization of historical data and past experiences, in a way to estimate the various rates of default, for the different interval of payment delay, adjusting also them with forward looking information. After having predispose its, the process for the calculation of lifetime ECLs can be executed easily, proceeding with the following steps:

- Receivables are segmented based on different credit losses patterns, for the different categories at which they can be assigned (product, customer, geographic region..);

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[52] https://www.investopedia.com/terms/e/exposure_at_default.asp
[53] The principle is applied to all the contractual assets that cannot be classified as: leasing contracts falling within the scope of IFRS 16, Insurance contract defined by IFRS 4, financial instruments determined by IFRS (9-10-11) and to the non-monetary exchanges in order to facilitate the selling to clients or potential one's.
[54] IFRS 9 Financial Instruments, par. B5.5.35

- Different default rates are predisposed for different delays and categories of receivables (current, 1-30 days past due, 31-60 days past due and 90 days or more past due);
- Historical data are used for the estimation of the different probabilities of default assigned at the different delays in payment for the different categories of assets, adjusting them also to future economic forecast;
- At this point that the matrix will be ultimate, for calculating the lifetime ECLs, we will multiply the gross carrying amount of receivables, assigned at each category, for the different default rates based on their delays in payments.

The following representation (*Table 4*) can be useful for figuring out how the provision matrix work:

	Current	1-30 days past due	31-60 days past due	61-90 days past due	90 days past due or more
Default rate (A)	0.3%	1.6%	3.6%	6.6%	10.6%
Gross carrying amount ($ 000's) (B)	15,000	7,500	4,000	2,500	1,000
Lifetime expected credit loss (A x B)	45	120	144	165	106

Table 4: Example of provision matrix

Reference: PWC, 2017, IFRS 9 Financial Instruments: Understanding the basics, p.34

I would like to stress the point that the application of the simplified approach at the contracts allowed it is not mandatory, except in the case in which those assets are accounted with the one-year time expedient at the transaction price under IFRS 15[55] or that the contracts do not contain a significant financing component.[56]

We will now explain the credit adjusted approach; the last method of valuation allowed by the standards. It is a specific method that is applied only when financial institutions acquire credit impaired assets (that since the date of acquisition are deteriorated and they are recognizable because generally acquired at discount)[57]. The only peculiarities of this method reside in the calculation of the interest income, because unlike the other two, they are calculated after having deduct form the carrying value of assets the allowances for ECLs and because in this method it is used the credit adjust effective interest rate for discount the EAD. [58]

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[55] IFRS 15 Revenues from contracts, par. 63
[56] IFRS 9 Financial Instruments, par. 5.5.16
[57] IFRS 9 Financial Instruments, par. 5.5.13
[58] The credit adjust interest rate takes in consideration the estimate of future cashflows as the effective interest rate, but differ from it because it includes adjustment for expected credit losses.

CHAPTER 3: Influence of IFRS 9 application on financial Institutions' capital requirements, defined by BASEL regulation

3.1.1 Introduction to BASEL III regulation: Basel I

The Basel accords are sets of rules established by the Basel Committee, which is the responsible for the matter of the supervision of credit institutions, within the organizational context of BIS (Bank for International Settlements).

The first regulation on capital requirements dates back to 1988 with "The accord over minimum capital requirements", also known as Base I, but for the European banks this regulation became mandatory only with the Directive 647/1989. It was the first regulation to establish a capital requirements against the risks that the banks were facing in their normal activities and from that moment forward, for every lending operation made by the banks, they had to detain a certain amount as precautionary capital, in a way to be solvents and liquids.

In this first edition it went established the condition for which the supervisory capital had to be at least the 8% of the total amount of banking book, for only the part of exposures subject at credit risk.[59] For better understand this meaning, we have to explain further the concepts of supervisory capital and risk weighted assets (RWAs). The first is an aggregated composed by two Tier (Tier 1 and Tier 2), which contain the most secure capital owned by the financial institutions, that is composed by: Equity capital, hybrid instruments, all the reserves net of net of the reserves designated for own shares and the material immobilizations. Also if, it is not impossible to have near the supervisory capital, also some supplementary capital, which it contains all the bonds instruments with elevated maturities, the payment of which can be interrupted in case of difficulty by banks, this peculiarity makes them similar to equity assets.[60] The second concept, instead, it refers to the sum of all the activities subject to credit risk, which were weighed using their credit risk, calculated in base of the borrower type and the state within which it operated, without considering too much the financial guarantees associated with them. Within years, however this principle has begun to show all its limits, whose resided in: the lack of sensibility in considering the different levels of risks within a certain typology of assets, the excessive rigidity in respect to the fast revolution of financial instruments and for the only

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[59] *Supervisory capital = Supervisory capital/Exposure to credit risk = 8%*

[60] Resti, A., Sironi, A.,2008," *Rischio e valore nelle banche. Milano"* p.665-667

concentration of this model to facing the credit risk, omitting to consider all the possible risk that threatened the banks.

3.1.2 Introduction to BASEL III regulation: Basel II

As results of gaps showed by Basel I, the Basel Committee approved on 2004 "The new Basel capital accord", after denominated Basel II. The new regulation has made important changes, so substantial that they are articulated in three Pillars.

The "First Pillar"[61] is the most significant one, revising a lot of concepts of the previous regulation in force. In particular it has modified the concepts of supervisory capital adding another Tier, the Tier 3 including short terms subordinated loans and the way in which the risk weighted assets are calculated, predisposing that banks in the weighting their exposures have to take in consideration the credit rating of assets, the higher the credit rating was, the lower was be their risk weight. Secondly, it has expanded the possible sources of risk for the banking business, introducing besides the credit risk (RC), the market risk (RM) and the operational risk (RO) within which the banks have to face in. The only thing that this model has let unchanged it was the limit for the minimum capital requirements, that remained fixed at 8%, albeit on higher exposure amounts, as banks have to consider more risks.. In addition, for the first time two different systems were introduced for the calculation of capital adequacy, the standardised approach that has been present yet on Basel I and the IRB approach, models that we are going to treat in the hereinafter.

Instead, the aim of "Second Pillar"[62] was to enhance the importance of risk management and risk mitigations system, as well as the relevance of the efficiency in capital planning, in a way to mitigate the risk profile of banks, as expressed by the BIS. Contextually indeed, it was introduced the Supervisory Review Process (SRP) with the mission as expressed by paragraph 720 of the Basel II to : *"… ensure that banks have adequate capital to support all the risks in their business, but also to encourage banks to develop and use better risk management techniques in monitoring and managing their risks"*.[63] Such process is very important because for the first time management is being blamed for negligence, in the case in which he/her does

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[61] BIS, 2006, "*International Convergence of Capital Measurement and Capital Standards",* p. 12-202
[62] BIS, 2006, "*International Convergence of Capital Measurement and Capital Standards",* p. 204-225
[63] BIS, 2006, "*International Convergence of Capital Measurement and Capital Standards",* p. 204, par. 720

not ensuring the that the bank dispose of the right supervisory capital[64], and because it is still applied today.

We retain useful to analyse further in detail this process that is articulated in two phases:

- In the first phase the banks must commit to analyse internally their capital adequacy, using the framework of processes and techniques foreseen in the Internal Capital Adequacy Assessment Process (ICAAP), in a way to assessing the relationship between their capital and their risk profile, in order to maintaining a certain capital level.[65]

  After the valuation on coherency among the supervisory capital and their risk profile, the banks have to execute also an internal review control, which consists in:

    - Looking at the appropriateness of the ICAAP in respect to the nature, scope and complexity of their activities;

    - Identifying largest exposures at risk in their portfolios, or the higher risk concentration items;

    - Checking for the inputs utilized in terms of accuracy and completeness;

    - Verifying that the conditions used on the scenarios' creation was reasonable;

    - Analysing whether the assumptions and inputs used are reasonable, stress testing the assessments made.[66]

- In the second phase make appearance with active role the supervisory authorities, that at least annually and for every bank, they must to execute the so-called Supervisory Review and Evaluation Process (SREP). This evaluation focus on four different areas verifying that: the business model is sustainable, the administration bodies are adequate to manage the risks, the bank have sufficient capital and reserves for covering possible losses and that the bank own enough liquidity for covering short terms obligations.

  Among all the various controls, being supervisory bodies, their principal focus will be the capital adequacy of banks in respect of Basel II regulation, that will be verified through: on and off-site examinations, the periodic reporting information, the revision of the work done by external auditors and the meeting organized with the management.[67]

  It is important to notice that every bank have to respect the minimum capital requirement (first pillar), but the SREP in its decision, could oblige in base of the relative profile of each bank to detain a supplementary capital buffer, and /or it can fix some qualitative requisites.[68] In any case, the responsible persons for vigilance delegated by the BCE,

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[64] BIS, 2006, *"International Convergence of Capital Measurement and Capital Standards"*, par.721

[65] BIS, 2006, *"International Convergence of Capital Measurement and Capital Standards"*, par.726

[66] BIS, 2006, *"International Convergence of Capital Measurement and Capital Standards"*, par.745

[67] BIS, 2006, *"International Convergence of Capital Measurement and Capital Standards"*, par.746.

[68] BIS, 2006, *"International Convergence of Capital Measurement and Capital Standards"*, par.757

brought together in supervisory groups (GVG), they have to take in consideration the specificity of each banks, calibrating the scope, intensity and frequency of the review process carried. Undoubtedly, the revision process will be deeper for those banks belonging to Global Systemically Important Institutions (G-SIIs), given the more impact that those banks could have in case of difficulty on the entire financial system.

Concluding, the "Third Pillar" [69] was created for enhancing the level of disclosures over banking activities to the market participants letting them to have important information about risk exposures, risk assessment processes, capital and hence on the capital adequacy of the institutions.[70]

3.1.3 Introduction to BASEL III regulation: Basel III

With the financial crisis started on 2007, the Basel II regulation has shown important limits, therefore the G20 leaders has started to discuss on its inadequacy, leading to a new reform called Basel III, which was presented then, in November 2010 at the summit of Seoul. [71] Though, it has become operative only in 2013 in the European Union with the Capital Requirements Directive (CDR) 2013/36/EU, then turned into law with the Capital Requirements Regulation (CRR) 575/2013. The new reform was focused on important changes, that were retained needed, or rather on the: improving the quality and level of regulatory capital, adjusting the miscalibration in valuing the risks, introducing some additional prudential regulatory frameworks, specifying a maximum leverage ratio of which the banks can dispose, limiting the excessive liquidity risk with two important ratios (liquidity coverage and net stable funding), enhancing the robustness and sensitivity of SA approach and to limiting the use of certain inputs used under the IRB approach. [72] Among all, the most challenging modification without any doubt consist in the stricter requirements imposed, in terms of supervisory capital. This change obviously has some pros and cons, form one point of view it has a positive effect in the financial system, because better is the quality of the supervisory capital, higher are the guarantees offered from financial institutions, from the other it has a negative effect, because

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[69] BIS, 2006, "*International Convergence of Capital Measurement and Capital Standards*", p. 226-242
[70] BIS, 2006, "*International Convergence of Capital Measurement and Capital Standards*", par. 809
[71] KPMG, 2011, *Basel III issues and implications*, p. 1
[72] BCBS, 2017, "*High-level summary of Basel III reforms.*", p.1

obviously more prudential capital it is requested, the less capital the banks will have available to invest, reducing the competitivity of this economic sector.

The Basel III regulation has not change the minimum level of capital requested that still at 8%, but its composition, prescribing that[73]:

- The Common Equity Tier 1 capital need to be at least 4.5% of RWAs;
- The Tier 1 capital need to be at least 6% of RWAs;
- The Total capital must be at least 8% of RWAs, this because to banks is requested to hold a capital conservation buffer of 2.5% in addition to Common Equity Tier 1. It is important to highlight that for the G-SIIs, it is also mandatory an additional countercyclical buffer from 0% to 2.5% calibrated in multiple steps of 0.25% each, following the judgment of a national designated public authority.[74]

From what we have said yet, we can understand immediately in what ways the regulation has determine a higher quality of capital. In fact, it has brought to an increase in percentage for the Tier 1 Capital on the Total Capital ratio, increasing for 2.5% the CET1 capital (with Basel I was requested only the 2%), which correspond to the most secure part of capital composed by: Equity, stock surpluses resulting from common share issuance, reserves and retained earnings, as long as they follow the conditions expressed by article 28 of CRR. Moreover, an additional form of security consists in the capital conservation buffer of 2.5%, for having a liquidity cushion in financial turbulence phases. Instead, the remaining part for achieving the Total capital ratio is composed by the Additional Tier 1 capital (AT1)[75], formed by convertibles and hybrid securities and by the Tier 2 capital[76] composed by revaluation reserves and subordinated debts. Therefore we can explain the minimum capital requirement with the following inequality:

$$MCR(Minimum\ capital\ requirements) = \frac{SC\ (Supervisory\ capital)}{TRWAS\ (Total\ risk\ weighted\ assets)} \geq 8\%$$

That can be rewrite keeping in consideration the components of total risk that banks are facing in their activities (credit risk, market risk and operational risk) as:

$$SC \geq 8\% \times [(mcr_{mr} + mcr_{or}) \times 12.5 + rwa_{cr}]^{77}.$$

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[73] BCBS, 2019, *"Risk-based capital requirements"*, RBC20, par. 20.1
[74] BCBS, 2019, *"Risk-based capital requirements"*, RBC30, par. 30.6
[75] Regulation (EU)575/2013, art. 61
[76] Regulation (EU)575/2013, art. 62
[77] TRWA= the minimum capital requirements for market and operational risk, multiplied for 12.5 plus the 8% of the credit risk-weighted assets

Beyond this important reform, Basel III has introduce a relevant constraint over the maximum leverage ratio that banks can dispose, in a way to reducing the possibility to have a chain effect in case of banking default. Basically, it was set a cap over the leverage ratio[78] at 3%, but the peculiarity consists in the fact that for G-SIIs we have a buffer in this ratio too, that it is fixed at 50% of the risk-based capital buffer. Hence for example, if a bank has a capital buffer set at 2%, we have a leverage buffer of 1%, implying that the bank after all has to maintain a leverage ratio of 4%, that can be achieved reducing the on-off balance sheet exposures or increasing the Tier 1 capital. [79]

Concluding looking at the problem of liquidity, the treaty has established the creation of two main ratios which are the Liquidity Coverage ratio (LCR) and the Net Stable Funding ratio (NSFR).[80] The LCR ratio was created with the intent to request at banks the maintenance of a sufficient level of liquidity, in a way to cover their short terms exposures for at least for 30 days in case of stress in the economy. The NSFR instead, it has the purpose to encourage banks to better matching the duration of their assets and liabilities, avoiding the coverage of long-term assets with short terms liabilities, because they cannot be refunded with the CF matured by them. These ratios are calculated as:

$$LCR = \frac{Stok\ of\ hig - quality\ liquid\ assets\ (HQLAs)}{Net\ cash\ outflows\ over\ a\ 30 - day\ time\ period} \geq 100\%$$

$$NSFR = \frac{Available\ amount\ of\ stable\ funding}{Required\ amount\ of\ stable\ funding} \geq 100\%$$

We would like to point out that Basel III has provided a window within which banks must adapt, that generally arrives until 2022. [81]

3.2   Change to Point In Time PD (PIT) with IFRS 9 introduction

Before analysing the measurement techniques for understanding the different risks linked with the exposures of banks, and consequently establishing their capital requirements in the context of Basel III, it is useful to understand how the PD calculation is changed with the introduction

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[78] $Leverage\ ratio\ = \frac{Tier\ 1\ capital}{On\ and\ off-balance\ sheet\ exposures\ (including\ derivatives, repos\ and\ other\ securities\ financing\ transactions)}$

[79] BCBS, 2017, "*High-level summary of Basel III reforms.*", p.9

[80] BCBS, 2017, "*High-level summary of Basel III reforms.*", p.1

[81] BCBS, 2017, "*Finalising Basel III In brief.*", p.9

of IFRS 9. As a matter of fact, under both the IAS accounting and Basel supervisory regulation, the calculation of the PD was carried out with a Through The Cycle (TTC) methodology.[82] This method, differently from the Point In Time (PIT) one's, it did not use in the calculation of the PD any parameter for the obligor, which was sensitive to short-term macroeconomic events. We refer to a parameter that reacts promptly at variation in creditworthiness of the counterparty, generally decreasing in expansion market phases, because less risk of default is applicable and the opposite in the declining market phases. The absence of this cyclical factor in the TTC permits to have more stable valuations over the credit risks, reducing the volatility on estimates, but in any case without diminish the relevance of this technique on evaluating the creditworthiness of obligor for the medium long term. Thereby the rating assignment over TTC, it is usually less adequate to making estimations in short terms periods in fact, during the financial crisis of 2007, in which things changed drastically with high frequency, the model AIRB strongly calibrated in TTC was not able to judge the evolution in credit risk. Therefore, although the PIT methodology risk to increase the prociclality in the risk estimations, it responds better to the present and prospective conditions as requested by IFRS 9.[83]
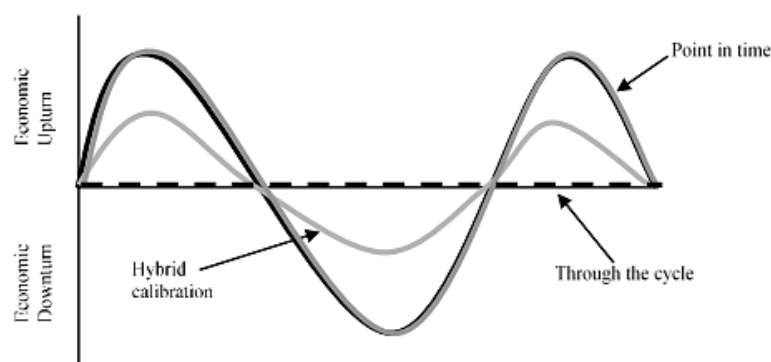
Figure 3: Probability of default PIT, TTC and Hybrid

Reference: AIFIRM, December 2016, "Il principio contabile IFRS 9 in banca: la prospettiva del Risk Manager", p.30

What we have said until now remain useful also if the actual system used by banks is hybrid, in the between of a PIT and a TTC one's.[84] It is a method guided by objective information linked with the capacity of debt repayments and nourished by "early warning" signal referred to the economic lifecycle and not to qualitative expert judgments. Therefore, we have understood the different approaches for the computation of the PD chosen by regulators on

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[82] IFRS 9 Financial Instruments, par. BC5.285
[83] IFRS 9 Financial Instruments, par. BC5.286
[84] AIFIRM, December 2016, *"Il principio contabile IFRS 9 in banca: la prospettiva del Risk Manager",* p.30

IFRS 9 for accounting purposes, in respect to the supervisory regulation of BCBS. In the continuum we will analyse the different approaches prescribed for the valuation of Expected losses linked to credit risk both under the supervisory regulation and for the accounting one's.

3.3.1 Basel supervisory regulation: Standardize approach

Basel III regulation permits the usage of two different models for the calculation of RWAs linked with credit risk, the Standardize (SA) and the Internal Rating Based (IRB) approaches. The SA valuation system was introduced with the Regulation (EU) 575/2013[85] and nowadays remain usable for smaller credit institutions. This model estimates the RWAs for credit risk (RWA_{cr}) by multiplying the risk-weight assigned by each type of exposures' portfolios, in the relation of their quality. To do this in SA the exposures are divided in 17 classes[86] and their assignment is based: on the nature of the counterparty, on the technical characteristics of the transactions or by the manner in which the transactions are carried on. For each credit rating classes, the risk weight is established in relation to the rating assigned at the exposures, in base of the different scores elaborated by export credit rating agencies (ECAs) or by specialized external credit assessment institutions (ECAIs), recognized for this purpose by Supervisory authorities. The rating attributed at each exposure depends on several factors connected at example with: the maturity of assets, their credit rating, the level of diversification in the same portfolio and by the type of collateral covering them. When instead, the banks haven't intention to use ECAs/ECAIs rating assessments, because without their usage they can benefit from more credit risk mitigation in valuation techniques, at least they are obliged to attributing at their relative exposures the maximum level of risk weight equal to 100%.[87] Rating agencies in elaborating the various quality step for each type of exposures, they attribute to them different probabilities of repayment, following a TTC system, considering a possible recession situation. Therefore, with a SA approach financial institution are able to cover ECLs with provisions, instead for unexpected credit losses they have to use as guarantee their own capital. It is important to highlight that part of exposures is generally covered by financial guarantees, and that this model consider in the form of Credit Risk Mitigation techniques (CRM), in a way to reducing the credit risk for capital requirements purposes, applicable in both methods (SA-

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[85] Regulation (EU)575/2013, 26th July 2013, art. 111
[86] Regulation (EU)575/2013, 26th July 2013, art. 112
[87] Regulation (EU)575/2013, 26th July 2013, art. 113

IRB). These techniques can be divided in two categories one with founded and one with unfounded protection. The funded credit protection guarantees include:

- Financial collateral in the form of liquid instruments given through pledge agreements, the transfer of a title as guarantee and securities lending and borrowing transactions;
- Master netting agreements covering repurchase transactions, securities lending and borrowing and margin lending transactions;
- Real estate mortgages and lease transactions involving real estate with the characteristics specified by CRR regulation;
- other type of collateral usable only by IRB banks, relating to assignment of receivables and other physical assets in addition to those used as financial collateral and encumbered by mortgages.

Unfounded guarantees are composed instead of personal guarantees and credit derivatives. All these guarantees for be effectiveness need to have a binding nature of legal commitment among parties, they need to be enforceable and documented.[88]

After having described the peculiarities of the standardize approach framework, we can analyse how practically the RWA$_{cr}$ is calculated[89]:

- E= Exposures;
- EV$_{SA}$= Exposures under the SA;
- RW$_{SA}$= Risk weight assigned through ECAS/ECAIS;
- H$_E$= Haircut that represent the volatility of the assets in a way to adjusting them[90];

- H$_C$= Haircut that represent the volatility of collaterals in a way to adjusting them;
- H$_{FX}$=Foreign exchange haircut, in a way to eliminate the volatility of exchange rates.

$$RWA_{cr} = EV_{SA} \times RW_{SA}$$

$$EV_{SA} = max\{0; [E \times (1 + H_E) - C \times (1 - H_C - H_{FX})]\}$$

This means that the value of RWAcr will increase when the level of exposures increases, but could also happen that the increase of exposures is due by a reduction in value of collaterals for their high volatility linked with market or exchange rate fluctuations.

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[88] Regulation (EU)575/2013, 26th July 2013, art. 183
[89] Måssebäck S., 2014, p.4
[90] The exposures value will be higher in the case of high volatility, this haircut it is apply to all the exposures except for cash instruments.

3.3.2 Basel supervisory regulation: IRB approach

The IRB approach was introduced with the same regulation of the standardised one's [91], reviewing the pre-existing A-IRB model, defined no longer allowed by Basel III.[92] Generally this method can be used by G-SIIs, hence by the most important and well capitalized financial institutions. In any case the application of this model is not automatic, in fact, the banks have to request the authorization at the supervisory institutions. This authorization will be granted if there is the respect of certain conditions from banks, established in the Regulatory Technical Standards (RTS) and regarding: the rating system applied, the internal estimations of default, the assignment of exposures in their relative classes, the correct disclosure of estimations made, the management of changes to rating system, the stress test used for capital adequacy and the availability of specifics bodies for measuring the credit risk and for collecting and storing data.[93] Once having obtained the authorization, the financial entities can apply the IRB approach, which measure the credit risk in a totally different way from the SA approach because it is articulated over four main variables:

- PD: It represents the probability that a counterparty default in a time horizon of one year;
- LGD: It represents the percentage of exposures defaulted among the total exposures, and it is calculated as the ratio between the loss due to default and the amount of exposure at the time of default;
- EAD: it represents the value of on- and off- balance sheet exposures, also if, for the off-balance sheet ones', the relative amount is calculated applying a conversion factor (CFC). This factor is obtained as the ratio between the undrawn amount of exposures that will be withdrawn from the counterparty soon, so outstanding and at default, and the undrawn amount;
- Maturity (M): It represents the average of residual contractual maturities of payments due, each weighted by its amount.

By exploiting these variables in a stochastic credit portfolio model according to the IRB approach, we are able to resolve or better to mitigate the insolvency problem linked with banking activity. In fact, with this approach financial entities hold enough capital, so that the

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[91] Regulation (EU)575/2013, 26th July 2013, art. 142
[92] BCBS, 2017, "*High-level summary of Basel III reforms.*", p.5
[93] Regulation (EU)575/2013, 26th July 2013, art. 144,173 and 180(3)

probability of losses to exceeds the level of provision is very small. This probability in fact is set by the supervisor in the calculation of the Value At Risk (VAR) equal to $1 - \alpha$ (α = confidence value), generally assigning a very high value to the confidence interval or rather of 99%. Such model in respect to the SA approach consider also the Unexpected Losses (UL) calculated as:

$$UL = VAR_\alpha - EL$$

Hence the RW_{IRB} as expressed in the CRR regulation incorporate also the UL, in the calculation of RWA_{cr}[94] :

$$\text{RW}_{\text{IRB}} = [\underbrace{LGD \times \Phi(\frac{\Phi^{-1}(PD) + \sqrt{R\Phi^{-1}} \times (0.999)}{\sqrt{1-R}}}_{VAR_\alpha}) \underbrace{- LGD \times PD}_{EL}] \times \frac{1 + (M - 2.5) \times b}{1 - 1.5 \times b} \times 12.5 \times 1.06$$

$$\underbrace{\phantom{LGD \times \Phi(\frac{\Phi^{-1}(PD) + \sqrt{R\Phi^{-1}} \times (0.999)}{\sqrt{1-R}}) - LGD \times PD}}_{UL}$$

- $\Phi(x)$ = Cumulative distribution function for a normal random variable, representing the probability that σ^2 is in between of 0 and 1 in this case;
- $\Phi^{-1}(Z)$ = Inverse cumulative distribution function of a normal casual variable (i.e. the value of x such that $\Phi(x)=Z$);
- R= It represents the correlation factor, which varies for every type of assets, i.e. for retail exposures is equal to: $R = 0.03 \times \frac{1 - e^{-35 \times PD}}{1 - e^{-35}} + 0.16 \times (1 - \frac{1 - e^{-35 \times PD}}{1 - e^{-35}})$;
- b= Maturity adjustment factor, calculated as follow: $b = [0.11852 - 0.05478 \times \ln(PD)]^2$;
- The parameter 12.5 is the reciprocal of 8% factor, which is used to derive the RW from the calculated capital requirements;
- PD = It states the average probability of default during normal business conditions. The formula uses the PD together with the LGD to calculate the EL: $EL = PD \times LGD$.

From this model we understand clearly that the EL couldn't be eliminated through the diversification (Systematic risk), instead the UL will be lower as the correlation among assets decrease, being reduceable with diversification (specific risk).

In the specific case in which the exposures are defaulted, we find our self with a PD= 1 and a RW calculated as:

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[94] Regulation (EU)575/2013, 26th July 2013, art. 154

$$RW_{IRB} = max\{0; 12.5 \times (LGD - EL_{BE}{}^{95})$$

As in the standardize approach in the case in which we have ELs higher than the provisions made, obviously we have a shortfall to be deduct from CET1. [96] Conversely if we would have provisions higher than the EL, we have an excess to be considered like Tier 2 capital until the 0.6 % of the risk-weighted exposures amounts.[97]

3.3.3 IFRS 9 accounting regulation: ECL model

With the introduction of IFRS 9 there was a change for accounting purposes in terms of the valuation of assets, due to an increase in the required level of impairment as we have been able to understand until now. In fact, the introduction of the new principles bring to the creation of the ECL model, in which assets are divided in different stages, each one requesting specific impairment provisions (12 month or lifetime one's), unlike IAS 39 that evaluated possible losses only through a discounted method applying the EIR. This new method, hence, obliges the financial institutions to maintain provisions also for performing loans, considering until 12-months for ECLs, albeit the higher impact in provision level derive by exposures inserted in stage two, that aren't defaulted but that are considered as it, given the lifetime expected losses.[98] Therefore, the level of provisions for the new regulation into force are calculated as follow:

$$ECL_{12month} = MPD_1 * LGD_1 * \frac{EAD_1}{(1 + EIR)^1}$$

$$ECL_{lifetime} = \sum_{t=1}^{T} MPD_t * LGD_t * \frac{EAD_t}{(1 + EIR)^t}$$

The wording of this model, it is even stricter than the supervisory criteria established according to the Basel regulation. Obviously the requirements are different and distinct, IFRS9 is important for accounting purposes on the preparation of financial statements instead, Basel III is important for the supervision and solvency of banks in terms of minimum capital requirements, in this case against credit risk. These differences on measurement are visible

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[95] EL_BE represents the expected losses best estimate for defaulted exposures, Regulation (EU)575/2013, 26th July 2013, art. 181

[96] Regulation (EU)575/2013, 26th July 2013, art. 36

[97] Regulation (EU)575/2013, 26th July 2013, art. 62

[98] Levy, A., Protsyk, A., Xu, P., Zhang, J., 2016, *Managing earnings volatility and uncertainty in the supply and demand for regulatory capital: the impact of IFRS 9*, p.4

firstly on the calculation of certain variables such as the PD that is the most relevant factor used in both methodologies and secondly in the period of expected losses maturation. For what regards the calculation of the probability of default, as we have already seen, in the IASB regulation at financial institutions is requested to calculate it in a forward looking way and measuring it under the PIT system, instead for the Basel regulation financial institutions have to measure it with the TTC methodology. The divergence in the two systems is visible also for the expected credit losses, that under the Basel regulation and IRB approach are calculated only over a period of time, fixated in one year, both for stage 1 and 2 as we have understood until now. The following table is useful for understanding the important differences among the two principles, helping us to realize better, the problem that implicate to banks:

Iasb vs Bcbs			
		Iasb (Ifrs 9)	**Bcbs**
Pd	• Periodo di misurazione • Sensibilità al ciclo econo-mico	• 12 mesi (stage 1) • Lifetime (stage 2 e 3) • Point- in-time (Pd Pit),forward looking e deve tener conto dei fattori macroeconomici	• 12 mesi • Through the cycle (PdTtc)
Lgd	• Misurazione	• Neutrale, forward looking in grado di contem-plare i fattori macroeconomici • Nessun vincolo sulla profondità delle serie sto-riche predefinita • Costi da escludere per evitare il double coun-ting • Tasso di attualizzazione inteso come (effective interest rate), tasso contrattuale annuo (tasso annuo composto in caso di capitalizzazione infra-annuale, se consentita)	• Downturn, serie storiche lunghe almeno 5 anni per retail, 7 anni per corporate, sovereign, ban-che • Definito dalla normativa l'impatto delle garan-zie reali elegibile • Costi diretti e indiretti del processo del cre-dito da incorporare nella stima • Tasso di attualizzazione lasciato alla discrezio-nalità della banca

Table 5: Important parameters under IRB approach in respect to those under IFRS 9

Reference: Letizia A., Porretta P., Impacts of Ifrs 9 and Basel 3 on Credit Risk Management framework in bank p.61

As a result of these important changes the banks could have the risk of *"double counting"* their exposures, influencing negatively the value of capital, and in particularly they could have a remarkable impact over the CET1. Thus, in absence of changes to the actual regulation into force, we expect a negative variation over the capital amount detained by financial institutions, even without any intervention happen in credit risk on their portfolios.[99]

Given these premises on January 2017 the Basel Committee have published a discussion over the regulatory framework, despite the fact that it concerns only the standardize approach.[100] Notwithstanding the Committee has not predispose any variation for the IRB approach, it

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[99] Regulation (EU)575/2013, 26th July 2013, art. 80(3), which requires to the EBA to provide technical advice to the Commission "on any significant change deemed necessary to define own funds as a result of any of the following factors: a) developments affecting standards or market practices; b) changes (c) significant developments in the EBA's methodology for testing of stress on the solvency of institutions.

[100] BCBS, 2017, "*Discussion Paper: Regulatory treatment of accounting provisions*"

remains some criticises to be resolve, to which we try to give an answer with the creation of some possible scenarios in the next chapter.

3.3.4 Possible evolution in supervisory regulation after IFRS 9 introduction

In this paragraph we will examine some possible solutions to the problem presented in the previous sub-chapter, in a way to improve the coherency and the coexistence between the accounting regulation (IFRS 9) and the supervisory one's (Basel III). In this context we have two hypothetical solutions[101]:

- The first possibility consists in the formulation of a symmetrical model for excesses and shortfalls, that it could permit to averaging out the impact of IFRS 9 in term of capital. This could be justifiable because the higher level of provisions introduced do not corresponds to any increase in the risk of instruments, but only to a different system of valuation. Applying this method, we could avoid the problem of double counting, because the differences that could arise among accounting provisions for ELs, compared to the supervisory one's, they would be just recognized as Unexpected Losses on the IRB approach for the computation of capital requirements. Therefore, the symmetric model could directly affect the CET1 in coherence of the prudential regulation, doing so it could also incentivize banks to increase their allowances in the expansion phases of the economic cycle. In fact, if we would insert excesses and shortfalls in the Tier 2 capital, this would be inconsistent with the treatment of other components of banks' Capital.

- The second option, that it is imaginable consists in the possibility to deducting directly the eventual shortfalls from CET1. Instead for what regards possible excesses, that we could have in the case in which Basel provisions are higher than IFRS 9 one's, we have two alternative options. The first option consists in insert them in the Tier 2 capital, incrementing the actual allowed cap of 0,6%, that will be removable, justifying that the actual limitation are right for dealing only with incurred losses. Instead, the second option could permit the deduction directly on the RWAs, less probable route given that this would means influencing the patrimonial ratios. Such influence could incentivize the financial institutions to reduce their attention on the credit coverage

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[101] AIFIRM, December 2016, *"Il principio contabile IFRS 9 in banca: la prospettiva del Risk Manager",* p.92

Therefore, the first alternative is the best viable as the following image shown:
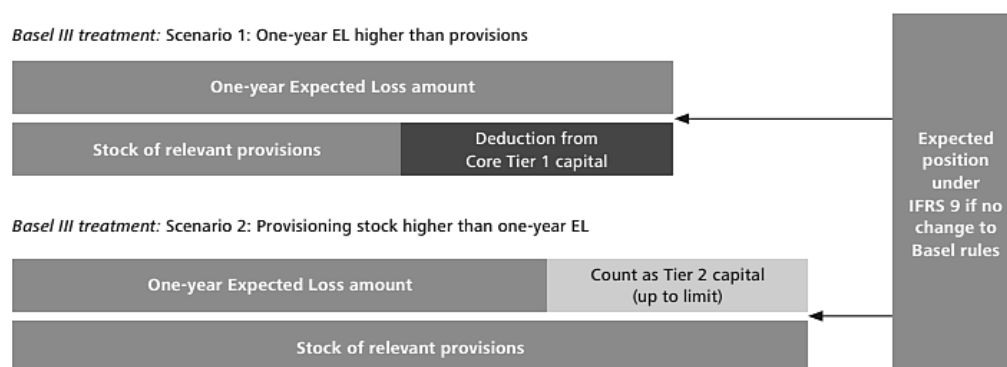

Figure 4: Provisions under the IRB approach in respect to those under IFRS 9

Reference: Deloitte, 2013, Going up? The impact of impairment proposal on regulatory capital, p.4

3.3.5 Mitigation of IFRS 9 effects applying a transactional regime

The first application of IFRS 9 will bring, most likely, relevant negative effects in banks' CET1 ratio, which represents probably the most important indicator of banking business solidity.

The regulators knowing that this possible negative effect could damage the European banking system in respect to the world one's, they have decided to insert some important mitigation factors. Considering also the fact that the Financial Accounting Standard Board (FASB) will introduce, only with two years of delays, similar principles in the United States GAAPS.

The Basel Committee in fact has prescribed a transitional arrangement for the shock absorption of CET1, allowing banks to dilute the total variation in units of amount and not in percentage terms, over the next five years, since the period in which, the financial institutions will start to apply the ECL model[102]. It is necessary to empathise that the paragraph 96 of Basel III doesn't prescribe the transitional arrangement as a mandatory rule for the European banks, but it must be a task of every state to judge about the appropriateness of this regime and to decide eventually to promulgate a national law. Speaking of which the European Union with the *Regulation (EU) 2017/2395* prescribe that financial institutions are allowed to apply a sort of discounting factor, that will decrease over time, on the increase in provisions due, indicated as f (0.95 on 2018, 0.85 on 2019, 0.70 on 2020, 0.5 on 2021 and 0.25 on 2022)[103].

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[102] BCBS, 2017, "*Regulatory treatment of accounting provisions – interim approach and transitional arrangements",* par.3.2.3

[103] REGULATION (EU) 2017/2395, art. 6

This factor will be used in the calculation of capital to re-sum back on CET1, independently of which supervisory regime the banks are following as we can examine below:

- For exposures evaluated under the SA approach we have:

$$AB_{SA} = (A_{2,SA} + A_{4,SA} - t) \times f^{104}$$

where:

$A_{2,SA}$ = the difference between IFRS 9 provisions at Day 1 and IAS 39 provisions at the end of the previous reporting period;

$A_{4,SA}$ = is the difference between IFRS stage 1 and 2 provisions calculated at each reporting date and those calculated at Day 1;

f = the applicable factor laid down before;

t = the increase of Common Equity Tier 1 capital that is due to tax deductibility of the amounts $A_{2,SA}$ and $A_{4,SA}$.

- For exposures evaluated under the IRB approach we have:

$$AB_{IRB} = (A_{2,IRB} + A_{4,IRB} - t) \times f^{105}$$

$A_{2,IRB}$ = the difference between IFRS 9 provisions at Day 1 and IAS 39 provisions at the end of previous reporting period, both adjusted for the regulatory EL amount;

$A_{4,IRB}$ = is the difference between IFRS stage 1 and 2 provisions calculated at each reporting date, and those calculated at Day 1, both adjusted for the regulatory EL amount;

f and t are the same factor used in the SA approach.

3.4   Market risk on Basel III

The Market risk concept is the sum of three main risks that banks are facing during their activities, which are: the interest rate risk, the exchange rate risk and the pricing risk.

The interest rate risk concerned with the changes in the interest granted and bared on financial instruments, in particular from bonds and from lending/borrowing assets, which are the most relevant assets or debt classes on baking balance sheet. In fact, this risk concerns mainly instrument with a fixed interest rate, mainly for the downside risk at them associated. The

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[104] REGULATION (EU) 2017/2395, art. 6
[105] REGULATION (EU) 2017/2395, art. 6

exchange rate risk as the same word says, it is the risk that entities bears if they have investments in other currencies different from the accounting one's. Instead the pricing risk, it is the risk associated with the declining in value of securities or of an investment portfolio, excluding the case of market downturn, that hinges on a number of factors, including earnings volatility, poor management, industry risk, and price changes.

The methods for calculating the exposures in terms of RWA_{mkr}, that permit at the management team to establish also some hedging strategies, they are various[106]:

- Value At Risk (VAR): The VAR model permits at financial institutions to consider in their estimations a series of risk factors (interest, foreign currency rate, share of instruments in the portfolios, maturities…) adjusting the portfolio and reducing at the minimum level the risk associated with their capital. This is a static model and easy to be use among others available, that it has the underlying scope to identify the maximum expected losses that we could have, in the extreme and worst situation, in which in our probability curve, we could get the largest possible movement represented by the extreme of 99% . Therefore, we understand that the important parameters are the time frame decided for our estimations and the probability of possible losses outcomes, for obtaining the results of EL, utilizing the following formula:

$$EL = -[\sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{(n-1)}} \times \theta(99\%)]\% = -[\sqrt{\frac{\sum_{i=1}^{n}(x_i - \overline{x})^2}{(n-1)}} \times 2.33]\%$$

- Monte Carlo simulation: The Monte Carlo simulation in respect of VAR permits to consider different possible scenarios, randomly crated, using a large sample of historical experience-based probabilities. This method in respects of the previous one is more flexible, without requesting the necessity of establishing a normal probability function and, with a number of scenarios established in base to the different risk factors that the entity is facing. The Basel Committee for this method expresses clearly that the interval has to consider the 99% trust level, for a period of ownership of 10 trading days and a historical observation time span of minimum 1 year, if the recent volatility of prices was high.

- Stress test: The stress test process is particularly important for identify the major effects over the banking portfolios of certain exposures. This test has to be done keeping in

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[106] Treapăt L., Anghel L., 2016, "*Managing the Market Risk in Banks*", p. 4

consideration qualitative and quantitative indicators, in a way to identify the main important critics factors, under some possible future scenarios. This test is important because banks in reason of their expected losses, based on supposed extreme condition in the market, they can protect themselves and avoid that the most significant exposures remain uncovered. If a bank does not pass the stress test have to revise immediately its risk coverage policies, in order to reduce its vulnerability. In fact, the result of this assessment is revised periodically by the risk committee and by the management, reflecting if it would be the case to bring modification.

3.5   Operational risk on Basel III

The operational risk can be defined as the risk arising from the core activities of the banking business; thus, it could be linked with the possible losses resulting from the inadequate management, legal procedures and other administrative problems.

Following the last financial crisis, the Basel Committee has identified two possible shortcomings in the actual operational risk framework. The first problem arises for the availability of insufficient funds commensurate by the specific risk of each banks, instead the second connected with the first one, it is due by the incapacity of the management team, given also inadequate systems of control, to estimate the capital requirements for the operational risk. To overcome this problem, Basel III substitute the three previous systems allowed, with a single risk sensitive standardise approach that must be used by all banks.[107] The new standardize approach calculation is based on two important variables that are a measure of banks' income and a measure of their historical losses. Using these variables in the index conceptually indicates that banks which has experienced high losses in the past have more possibility to develop them in future, and also that banks with higher operating income could experienced more losses for the relative elevated risk taken.

The operational risk capital under the newly introduced standardize risk sensitive approach, it can be summarized as follows:

$$Operational\ risk\ capital = BIC \times ILM^{108}$$

Where:

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[107] BCBS, 2017, "*High-level summary of Basel III reforms*", p. 8
[108] BCBS, 2017, "*High-level summary of Basel III reforms*", p. 8

- Business indicator component (BIC)=$\sum(\alpha_i \times BI_i)$;

- Business Indicator (BI) represents the sum of three components that are: the service component, the financial component and the interests, leases and dividends component;

- α_i denote a marginal coefficient that will be multiply by BI_i based on three buckets (i=1,2,3 bucket) as *Figure5* below:

BI bucket	BI range	Marginal BI coefficients (α_i)
1	≤€1 bn	0.12
2	€1 bn < BI ≤ €30 bn	0.15
3	>€30 bn	0.18

Figure 5: BI_i and α_i over the three buckets

Reference: BCBS, 2017, "High-level summary of Basel III reforms", p. 8

- Internal Loss Multiplier (ILM): is a function of the Loss Component (LC) and BIC, in which the LC component is computed as 15 times the average banks historical losses, over the proceedings 10 years. Therefore, the ILM increases as the ratio (LC/BIC) rise, vice versa in the opposite situation will have a decreasing trend.[109]

Supervisory national regulators could decide to establish for all banks ILM equal to 1, indistinctly by the level of operational losses risk of each one. IN this case in order to help the comparability among banks would be required to all of them to disclose their historical operational losses.

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[109] Further in detail ILM= $\ln[e^1 - 1 + (\frac{LN}{BIC})^{0.8}]$

CHAPTER 4: Literature Analysis

4.1   Regulatory Authorities publication about the impact of IFRS 9

The most important analysis over the effects on banks' balance sheet due to the introduction of IFRS9 came from the exhaustive report made by the European Bank Authority (EBA).[110]
This report displays the analysis made over a sample of about 50banks among the most important banks in the European country, in fact the majority of them (94%) are identifies between the global systematic institutions (G-SIIs: 57%) and other systematic important institutions (O-SIIs: 37%), reporting assets in the range of EUR12 billion to EUR 2200 billion. From this examination are highlighted the following important effects over banks' balance sheet:

- CET1: As we could see also in the *Figure 6* below, EBA have found an average adjusted reduction of sample's CET1 of -48bps, but with a perceivable difference among banks, indeed the impact seemed to be smaller for banks applying an internal rating based approach (IRB) for credit risk rather than those applying a standardized approach (SA). It is assumed, that this impact might have been due to the fact, that in contrast to SA banks, regulatory expected losses of IRB banks had already been reflected in CET1.
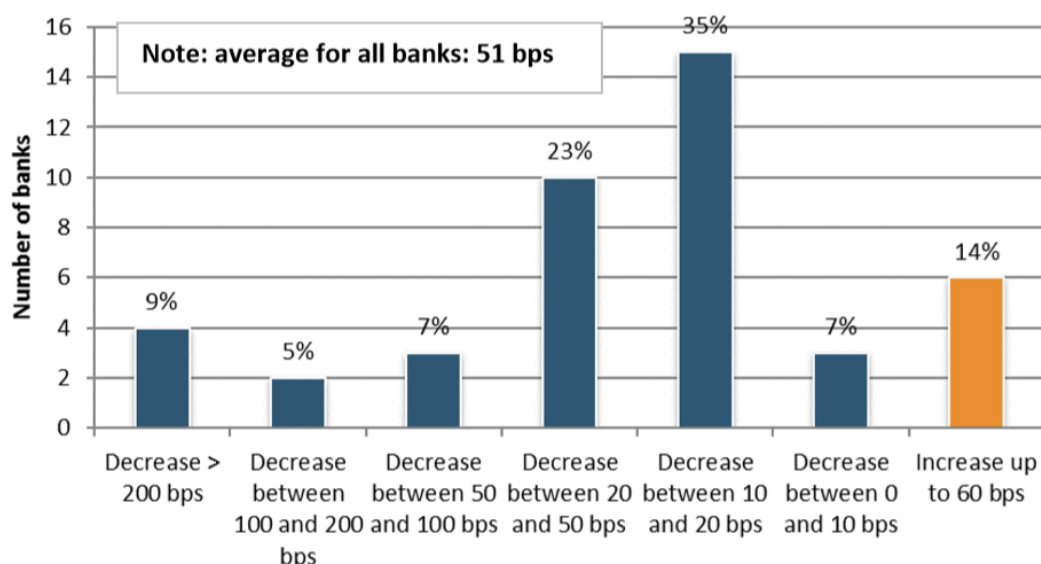

Figure 6: Impact on CET1 ratio without considering transitional arrangements

Reference: EBA, 2018, First observations on the impact and implementation of IFRS 9 by EU institutions

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[110] EBA, 2018, "*First observations on the impact and implementation of IFRS 9 by EU institutions*"

- Loan loss provisions: the application of IFRS9 has entailed sample's loan loss provisions increase of around 9% on simple average. In this case the impact for IRB banks is significantly higher rather than SA banks (*Figure 7*), given the fact that the first already forecast higher provision, coherently also with results find above, since expected losses are already absorbed in CET1.
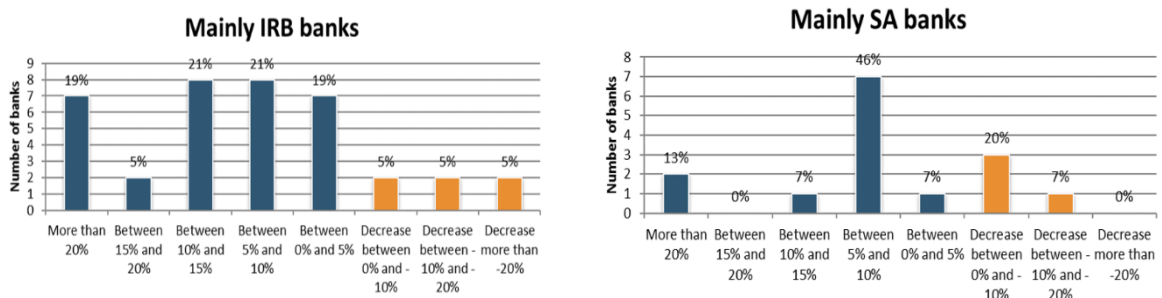
Figure 7: Impact of IFRS introduction over loan loss provisions

Reference: EBA, 2018, First observations on the impact and implementation of IFRS 9 by EU institutions

- Classification and measurement: Introduction of IFRS 9 has led to different categories of assets classification, but above all to a different measurement of them, carrying a new impairment method. The classification effect is negligible causing for the sample of banks an average increase of 4% in assets valued at amortised costs and a consequential decreased in assets valued at FVTPL. Instead the new impairment method based on stage model, has bring some problems linked to the not definitive indication of backstop transfer among stages based on days of delay in payments. (30days for consider assets of Stage 1 in Stage 2 and 90 days for consider assets of Stage 2 in Stage 3). Nevertheless, the banks consider in the sample acted well on average, in fact the coverage-ratio per stages highlighted an increase in ECL in particular for Stage 3 with a coverage of 45%, 3.9% for the Stage 2 and 0.1% for Stage 1.

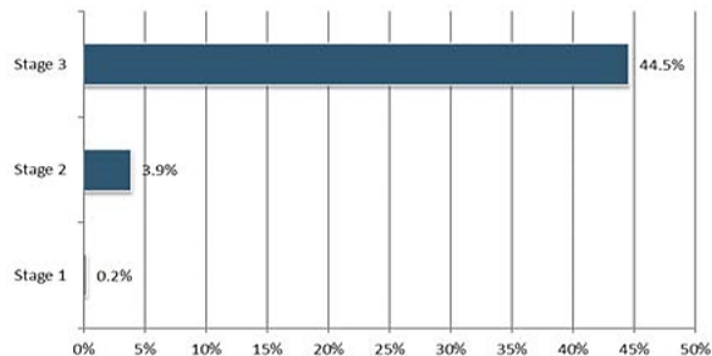*Figure 8:* Coverage ratio per stages of allocation

Reference: EBA, 2018, First observations on the impact and implementation of IFRS 9 by EU institutions

A similar study was conducted time ahead by ECB, in a way to examine the possible effects due to the complexity of the application of the new standards, within the framework of the Single Supervisory Mechanism (SSM). The review involved the main significant institutions (SIs) and less significant institutions (LSIs).The estimations are in line with EBA findings, since ECB report over 106 significant institutions and 77 less significant institutions an average decrease in CET1 of about -40bps for the firsts, and a higher decrease on average of -59bps for the latest.

The latest important institutional study came from EFRAG that analysed 11 G-SII finding that a majority of them expected to classify at amortized cost the following assets (because meeting the SPPI test), that under IAS 39 are stated in:

- Assets currently classified as loans and receivables (between 95% and 100%),
- Held to maturity (majority or 100%)
- Available for sale (between 80% and 100%)

The expectations about the reclassification impact include a reduction in the maturity of loans, especially for SMEs that have lower credit rating and so higher expected losses, with consequently a reduction in the willingness to support borrowers in distressed situations, and a higher pricing of long-term financing. From this study appear also that the majority of institutions foreseen an increase in loans loss allowances of a percentage range between 25% to 50%, relevant amount especially for important commercial banks and those that operate on the NPL market.

4.2   Auditors and consultant analysis

The BIG 4 in the auditors and consultant industry have made their guidelines and analysis in terms of the changing that the new IFRS bring on banks' financial statements.

In this case is useful to look at their opinion over the major important effects also highlighted by the regulatory authorities' publication:

- CET1: The impact over the banks' CET1varies a lot depending by the size, membership country and the risk profile of banks. Moreover, SA banks are expected to suffer twice the effect of the new impairment model and staging allocation of assets than IRB peers

(*Deloitte 2016*).For EY[111]the effect over CET1 varies form -100 bps and a positive effect of 25 bps but considering that the majority of institutions experienced a decrease of around 20 bps. The different impacts are due mainly to a miscellaneous finding over coverage ratios of bank banks owned before the application, indeed we could notice that banks in general with higher coverage ratio, having the same increase in allowances of other banks, have experienced a limited reduction in CET1. Another justification could arise from a re-classification effect that for some banks could be positive.

- Impairment effects: Obviously with IFRS 9 model of impairment, based on the anticipation of expected losses over assets valued at Amortised Cost, bring to a generalise increase in loans loss allowances among banks' financial statements.

  The major differences, given the fact that for assets subject to impairment also under IAS 39 is requested the calculation of ECL over these lifetime exposures, are due to Stage 2 assets by which according to IFRS 9 is mandatory to calculate their lifetime EL, increasing allowances (Deloitte 2014). For PWC[112]the new standards reflect more adequately the actual economic loss at any given time and the impact can be quite different depending on the specific institution and the economic environment.

  For concluding, it is relevant also to highlight the explanation given by *EY 2018*, by which the bank's size has a relevant implication on the increase in loans loss allowances, also if there are some other concurrent effects that could explain these changes. The first is due by portfolio mix, indeed banks with retail portfolios experienced large increase in allowances because deteriorated exposure could be long life and the second is linked with the discretion used on judgements and estimates made by banks (for stages allocation).

- Classification and measurement effects: For KPMG[113] the new standards that banks and in general financial institutions have to respects, cause a significant impact on the classification and measurement of assets. These effects consequently went translated in a volatility increase of profit and loss, that also indirectly influence the equity one's. Instead for PWC[3] there is no evidence of sensible changes in classification and measurement, in the sense that the majority of assets valued at amortised cost still also

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[111]EY, 2018, *"IFRS 9 Expected Credit Loss: Making sense of the transition impact"*

[112] PWC, 2017, *"IFRS 9 Financial Instruments: Understanding the basics"*
[113] KPMG,2014, *"First impression: IFRS 9 Financial Instruments"*

after the application of IFRS 9 measured with this method, the same is valid for assets previously valued at fair value.

The following *Figure 9* summarize well the effects previously analysed:
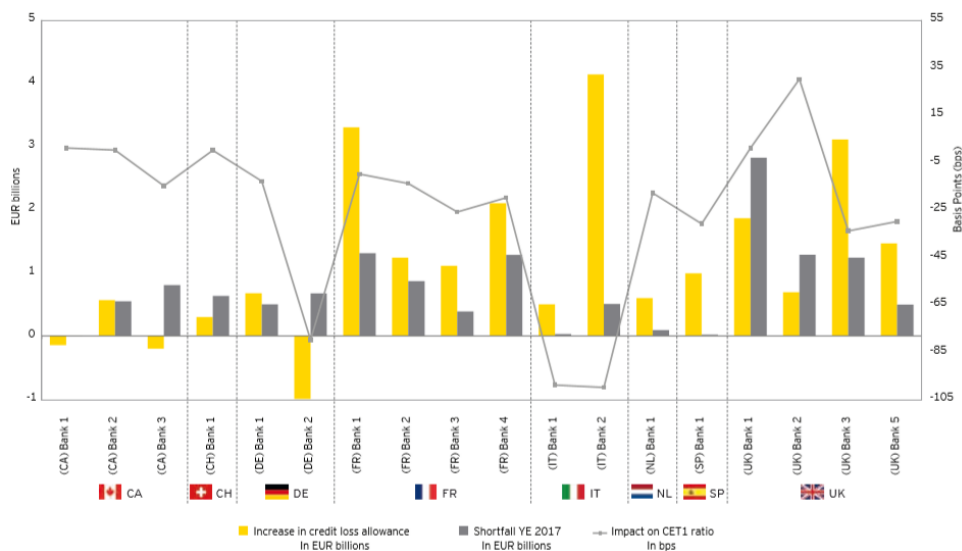
Figure 9: Main effects over banks' financial statements

Reference: EY, 2018, IFRS 9 Expected Credit Loss: Making sense of the transition impact

4.3 Short-term effects at the first implementation of new standards

A considerable quantitative study[114]about short-term effects, over 39 European banks' balance sheet, suppose two main hypothesis to be verified about the first application of standards: an increase of the amount of assets designed at FVTPL, due to failures in SPPI test and a reduction in earnings generated by the implementation of ECL provisioning.

This paper tries to answer at those question with a difference-in-differences test, using as benchmark US banks, finding that IFRS banks manage assets designed at FVTPL and LLP downward over four half year following the IFRS 9 publication. Coherently, the findings exhibit an upward trend especially in assets HTM, causing so an increase in assets valued at amortized cost. Further, in an additional analysis made with a multivariate regression there is a confirmation of a downward trend in assets at FVTPL but in respect to negative coefficients of Loans loss provision found with a DID analysis, are obtained positive and significant coefficients, that means an increase in the level of provision. This increase was overall expected

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[114]Christophe L., 2016, *"How do banks account for short-term effects of IFRS 9?"*

given the reduction in assets valued at FVTPL and so a consequential increase in assets valued at amortized cost, that under IFRS9 request timely reserves given the new impairment model based on ECL, so on anticipation of future losses.

4.4 Increase in the banks' cost of funding after the application of IFRS 9

An important study that came from the Bank of England analyses a different and interesting aspects link with the introduction of IFRS9: the effects on cost of funding for banks. We know that new standards bring to an increase in loans loss provision due to the new ECL model, which reduces the after-tax profits and so retained earnings that represents an important amount in CET1, ceteris paribus means to an increase in leverage or to a higher retention of Equity. This paper tries to analyse the previous explain effects through a relevant econometric study applied over a sample of 75 traded banks from six Europeans countries (UK 10, German 8, French 8, Spanish 9, Italian 17, and Swiss 23). First of all, went analyse the impact of IFRS 9 over banks' leverage, CET1 and Tier1 ratios, showing as in *Table 6* that the most leveraged banks are Italian's and German's once with an average risk weight of 61.29% and 70.89%, respectively.

	Leverage ratio					CET1 ratio					Tier 1 ratio				
	Obs.	Max	Min	Avg.	St.dev	Obs.	Max	Min	Avg.	St.dev	Obs.	Max	Min	Avg.	St.dev
UK	578	21.61%	1.61%	6.37%	3.35%	535	24.06%	5.03%	13.09%	4.39%	535	22.03%	6.89%	11.74%	3.40%
Germany	544	33.77%	1.40%	7.94%	8.15%	227	24.74%	4.02%	11.20%	5.35%	227	22.98%	5.83%	10.88%	3.82%
France	568	17.50%	2.16%	7.55%	4.61%	388	28.02%	6.45%	14.61%	5.29%	380	21.28%	5.50%	11.98%	4.16%
Italy	1,192	47.24%	1.25%	8.20%	5.21%	994	86.04%	4.13%	13.38%	8.14%	986	80.71%	5.13%	10.90%	6.47%
Spain	528	32.10%	-2.20%	6.91%	5.01%	404	18.86%	-5.76%	11.36%	3.77%	404	15.08%	5.00%	10.10%	2.34%
Switzerland	1,576	24.76%	-0.11%	6.51%	3.34%	956	50.55%	4.33%	16.13%	7.92%	872	39.57%	8.00%	16.44%	4.57%

Table 6: Summary of Statistics over: Leverage, CET1 and Tier 1 ratios

Reference: Mahmoud F., Robert B. and Jamal O. Impact of IFRS 9 on the cost of funding of banks in Europe

Then the study moves forward analysing the Equity betas by regressing the daily excess returns on equity on the excess returns of market indexes over the two years preceding the observation period. After that, they estimate assets betas regressing equity betas on the inverse of leverage ratios estimated using quarterly leverage ratios, which results are represented in *Table 7* and in line with the preceding observation about the riskiness of Italian and German banks.

Capital ratio	UK	Germany	France	Italy	Spain	Switzerland
Leverage ratio	0.06	0.10	0.10	0.09	0.06	0.08
CET1 ratio	0.13	0.12	0.15	0.14	0.11	0.18
Tier-1 Capital ratio	0.15	0.12	0.19	0.18	0.12	0.17

Table 7: Average estimates of assets betas

Reference: Mahmoud F., Robert B. and Jamal O. Impact of IFRS 9 on the cost of funding of banks in Europe

Then they estimate the Low-Risk Anomaly (γ) for different portfolio of banks: large banks (the largest 30% of the banks), small banks (the smallest 30%), and medium banks (remaining 40%) in a way to estimate the γ level of each country by plotting the resulting alphas and betas for each country. The values are those expressed in *Table 8* that clearly indicate, the low-risk anomaly exists for banks' equity in the six countries of the sample, except France, where γ value is positive.

	UK	Germany	France	Italy	Spain	Switzerland
Riskless Debt	-10.61bps	-14.68bps	4.04bps	-3.45bps	-10.14bps	-1.54bps
Risky Debt	-10.98bps	-15.02bps	4.13bps	-3.55bps	-10.41bps	-1.57bps

Table 8: Estimated annual magnitude of low-risk anomaly

Reference: Mahmoud F., Robert B. and Jamal O. Impact of IFRS 9 on the cost of funding of banks in Europe

This means that for every 1 percentage point increase of equity in the capital structure, the cost of funding could rise, for example for German's banks by about 0.15 percentage points.

After the estimations of the magnitude of the low-risk anomaly, is possible to assess the impact of the implementation of IFRS 9 on the cost of funding for banks. They do that by multiplying the annual magnitude of the low risk anomaly for each country (*Table 8*) by the average impacts of IFRS 9 on the levels of equity capital extracted from the EBA's report 9 and Mazars's study, the results are the following:

	Riskless Debt			Risky Debt, low sensitivity to leverage		
Sample	**EBA**	**Mazras**	**Mazras (country)**	**EBA**	**Mazras**	**Mazras (country)**
UK	4.77	2.55	1.22	4.94	2.63	1.26
Germany	6.61	3.52	6.09	6.76	3.61	6.23
France	-1.82	-0.97	-0.71	-1.86	-0.99	-0.72
Italy	1.55	0.83	2.45	1.60	0.85	2.52
Spain	4.56	2.43	3.70	4.69	2.50	3.80
Switzerland	0.69	0.37	0.32	0.71	0.38	0.32

Table 9: Estimated Average Impact of IFRS 9 on the cost of funding of banks

Reference: Mahmoud F., Robert B. and Jamal O. Impact of IFRS 9 on the cost of funding of banks in Europe

With this econometric analysis we can conclude that surely the new ECL model bring to a generalize increase in the loan loss allowances, creating the necessity for banks to increase their equity values but also the existence of a low-risk anomaly for bank equity (that means an increase in the cost of funding). However, the results could not provide a robust evidence only for the anomaly of French banks' equity, in which the cost of funding seems to fall.

4.5   IFRS 9 and financial stability

The IFRS9 bring some important changes in particular, as we just say before at the ground of the new impairment model for assets valued at amortised cost, trying to make banks more solid and financially stable, irrespective to macroeconomic events that can trigger their assets values. In this context is useful to analyse a study made by some professors at the University of Cologne[115], which intent is to verify two hypotheses linked with this topic:

- IFRS's solution at the "cliff-effect": with the introduction of staging approach could be possible to solve the "one shot" sharp increases in allowances, that under IAS 39 happen, given the fact that credit losses are recognized only once verified.
- Front loading impairment: effect due to the new ECL model and obviously linked with the preceding one's.

They investigated if the combination of the two effects could enhance the whole financial sector, employing the European bank stress test (period 2014-2018).

The findings of the empirical research are in line with the hypothesis expectations, in particular they have found in general a higher level of provisions under IFRS9, especially in adverse periods, with an important "front-loading" effect at the beginning of the conversion period. Due to this important front-loading effect banks have seen a reduction also in the level of capitalization for the initial "bath", linked with the increase in provision on P&L statement, which reduce the profitability and retained earnings. These negative initial consequences permit to solve the "cliff-effect" that under IAS39 causes a lot of variability in the income statement, attributable at the not constant recognition of provisions, that instead occur in one solution at date of loss verification. Indeed IFRS 9 with the ECL model in respect to the incurred loss of IAS 39 help to reduce the procyclicality of impairment and the variability of banks return.

Instead a study made by Novotny-Farkas[116] for the European Parliament highlight that potentially the prociclality under IFRS 9 could be amplified, given the fact that the calculation of ECL are calculated PIT (Point in time) and not TTC (Through the cycle) PDs.

This means that ECLs oscillate as the business cycle, lowering during upswing and significantly increases during downsizing of the economy. To what extent the new ECL model will be procyclical depends on how it will be implemented, indeed the level of prociclality could be reduced if the banks are able to use forward-looking PDs in their estimations of credit risks.

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[115]Arndt-Gerrit K. and Daniel R., 2018, *"Does IFRS 9 increase Financial Stability?"*
[116]Novotny-Farkas, Z, 2015, *"The Significance of IFRS 9 for Financial Stability and Supervisory Rules"*

This could be challenging for many banks that run-out of systems and relevant information for estimate in a reliable way the PD. Relatedly, if the banks are not able to identify in a timely manner the increase in credit risks of their assets, could presents "cliff-effect" , in particular due to the transaction of assets from Stage 1 to Stage 2 , that imply a calculation of ECL on a lifetime basis.

The article highlights also another problem in the ECL model, that it is linked with the introduction of significant managerial discretion over the timing and measurement of expected losses. With regard to the timing, the IFRS give ample possibility for management's judgment, in particular over the increase in credit risk that trigger the transaction of assets from 12-month ECL (Stage 1) to lifetime ECL (Stage 2). This could cause an "impairment too little too late", considering also that an increase in the time horizon of the valuation for PDs, means more uncertainty and subjectivity in the valuations of provisions.

So for concluding if the new standards will be applied in a meticulous way , this could lead to an increase in the banks stability and in lowering of the prociclality, obviously from the management point of view there is the incentive to smooth earnings, managing the level of provisions and delaying as much as possible the time for losses recognition.

4.6   Hedging over IFRS 9

The last important consequence brought by the new standards and linked with the financial stability of banks institution, it is the new and easier regulations about hedging instruments that banks can establish against the main risks faced during their financial activity, in particular: market risk. Under IFRS 9 more instruments could be qualified in the hedging category, besides derivatives and financial instruments against currency risk, non-derivative instruments that are carried at FVTPL may also be designated as hedging instruments. Given also the fact that under IFRS 9 many more instruments could be carried at FVTPL, means an increase possibility of hedge accounting. The simplification consists in the valuation of the instruments that could be considered as hedging one's nowadays, based on the objective test that verifies the existence of an economic relationship among the hedged item and the hedging instrument and no more based on the range 80%-125% effectiveness of hedging requirement.

Remains instead unvaried in respect of IAS 39 the possible classification of hedging items also under IFRS 9, that are:

- Cash flow hedge;

- FV hedge;

- Hedge of net investments in foreign operations.

4.7 Summary of what we will expect looking at the literature

The introduction of the IFRS 9 has bring important changes on banks' balance sheet, mainly due by the new impairment method of assets valued at amortized costs (considering that for commercial banks the loans constitute a relevant voice among assets). In the initial phase we expect to find an increase in the level of loans loss provisions using the ECL model, which bring to an increase in loans loss allowances and an important reduction in the level of earnings, this indirectly causes a decrease in CET1(for low retained earnings, which effect overcame the positive influence of lower taxes). Instead we do not expect a significant change for what regard the allocation of assets in different categories, although a little increase in assets held till maturity and so valued at amortised cost, need to be signalled.

Given the afore mentioned problems, the European Parliament and the European Council have emanated the Regulation (EU) 2017/2395 in a way to mitigate these negative effects.

In details this regulation envisages the possibility given to banks in a way to have a transitional arrangement between 2017 and 2018 balance sheet, which give the option for them to record in CET1 a portion of the increased credit loss provisions for a transitional period. This transitional period it is deemed to be of a maximum 5 years starting from 2018, and obviously the portion of expected credit losses that could take part of CET1 capital decrease over the period till zero, in a way to arrive at the full implementation of IFRS 9.

This clearly with the intention to does not eliminate the whole effect due to standards changing in transitional period. Nevertheless, the IFRS 9 application could improve the financial stability of the banks and reduce also the prociclality effects over loans loss provisions. Indeed, the new ECL model if applied in a forward looking and meticulous way could eliminate the "cliff-effect", due to the old incurred loss provisioning system and its relative procyclical effect due to high losses recognition in downtrend in the economic cycle.

Then for conclude, in the following tables, we could analyse the expected effects on banks' balance sheets, which are then reflected in the main ratios for evaluating a bank activity.

Expected effects on banks' balance sheet	
Active	Passive
Assets ▪ Loans and receivables ⬇ ▪ Held to maturity financial instruments ⬇ ▪ Financial investments ⬇ ▪ Lease and receivables ⬇	Equity ▪ Shareholder capital ⬇ ▪ Loan loss allowances ⬆ ▪ Interest income ⬄ ▪ Other comprehensive income ⬆ ▪ Accumulated impairment amount ⬆ Liabilities ▪ Provision for loans commitment ⬆ ▪ Provision for financial guarantee ⬆
Total assets ⬇	**Total liabilities + equity** ⬇

Table 10: Own elaboration on the possible impact of IFRS 9 over banks' Balance Sheet, base on what expressed by the literature analysed

Analysis over important banks' ratios
ROTC ⬇
RORWA ⬄
Loans loss provision to loans ⬆
Loan loss reserves to gross loans ⬆
Loans to deposit ratio ⬇
Interbank ratio ⬄
EPS ⬇
DPS ⬇   Due to reducing in Earnings for more level in provision
P/E ⬆

Table 11: Own elaboration representing the hypothetical impact of IFRs on banks' ratios, based on what expressed by the literature analysed

Chapter 5: Effects of IFRs 9 over Banking Balance sheets

5.1   Quantitative analysis made over a bank's sample

For checking the validity of the assumptions made at the end of the chapter before, I have created a data sample with the main significant banks in the European environment.

The analysis consists in looking at the main effects linked with the first-time adoption of the new IFRS 9 standards, so obtaining a sort of broad sense of the most probable and incisive effects, given the differences mainly on measurement and reclassification among 2017-2018. These changes create a strongly variation in the year of first-time adoption, generating a higher level of volatility in contrast with the usual variation of values experienced from one year to another. Therefore, in my analysis I have taken in consideration 39 European Banks (15 of which having a registered office in the Italian country), analysing the effect that occurred following the application of the new regulation at the level of CET1 and consequently on Total capital ratio, on the profitability indexes such as ROTC and RORWA but also on the level of EPS and for concluding I have analyse the variation on impairment due to the application of the new ECL model.

I think it is important to highlight until now that all the banks in the sample, who less and who more, have experienced an increase on impairment of assets valued at amortised costs or valued through other comprehensive income due to the introduction of the ECL model, in fact this model as before saying imply the recognition of losses afore the time of realization, increasing the level of the provisions and afterward of the allowances on Balance Sheet, this imply so a reduction on assets at the carrying net value.

The afore mentioned effect obviously has an impact on CET 1 ratio, reducing it due to a seeming lower quality of loans, but in reality this is not the case, in fact, this is due to the reclassification and measurement changes that bring more assets classified in Stage 2 leading to an increase in the level of impairment and allowances linked with them. The higher level of impairment and allowances must not be look in a negative bad view, on the contrary this represents a higher level of stability guaranteed by the banks which must in any case respect the minimum required level of CET1 ratio prescribed by Basel III regulation.

Banks	State	Allowances increase due to IFRS 9	CET1 ratio			TC ratio		
			01/01/18- IFRS 9 (fully loaded)	31/12/17 - IAS 39 (fully loaded)	impact in bps	01/01/2018- IFRS 9 (fully loaded)	31/12/17 - IAS 39 (fully loaded)	impact in bps
Banco Santander	Spain	8,00%	11,30%	10,84%	46	14,98%	14,99%	-1
Intesa San Paolo	Italy	14,66%	15,20%	15,20%	0	17,70%	17,90%	-20
BBVA	Spain	14,70%	11,40%	11,34%	6	15,70%	15,50%	20
UniCredit	Italy	1,43%	12,80%	13,73%	-93	17,19%	18,10%	-91
ING group	Netherlands	17,18%	14,50%	14,70%	-20	17,22%	18,19%	-97
ABN AMRO	Netherlands	5,80%	18,40%	17,70%	70	22,20%	21,30%	90
Société Générale	France	8,35%	11,20%	11,40%	-20	16,70%	17,00%	-30
Crédit Agricole	France	11,96%	15,00%	14,90%	10	18,30%	18,20%	10
KBC	Belgium	23,36%	15,90%	16,20%	-30	18,40%	19,00%	-60
Deutsche Bank	Germany	17,39%	13,60%	14,00%	-40	17,50%	18,60%	-110
Erste bank	Austria	4,57%	13,50%	12,90%	60	18,10%	18,20%	-10
Bankia	Spain	11,32%	13,80%	14,15%	-35	17,58%	16,84%	74
BNP Paribas	France	13,23%	11,80%	11,90%	-10	15,00%	14,80%	20
National Bank of Greece	Greece	8,75%	16,40%	17,00%	-60	16,50%	17,00%	-50
Raiffeisen	Austria	6,93%	13,40%	12,70%	70	18,20%	17,80%	40
Banco Sabadell	Spain	14,28%	12,00%	13,40%	-140	15,50%	16,10%	-60
Barclays	United Kingdom	2,18%	13,20%	13,30%	-10	20,70%	21,50%	-80
Nordea	Sweden	3,81%	15,50%	19,50%	-400	19,90%	25,20%	-530
HSBC	United Kingdom	25,86%	14,00%	14,50%	-50	19,40%	18,30%	110
RBS	United Kingdom	16,08%	16,20%	15,90%	30	21,80%	21,30%	50
Danske	Denmark	12,39%	17,00%	17,60%	-60	21,30%	22,60%	-130
BPCE	France	14,07%	15,50%	15,40%	10	19,20%	19,20%	0
Rabobank	Netherlands	23,84%	16,00%	15,50%	50	26,60%	26,20%	40
Commerzbank	Germany	5,60%	12,90%	14,10%	-120	16,30%	18,30%	-200
Bank of Ireland	Ireland	-3,87%	13,40%	13,80%	-40	18,80%	20,20%	-140
Allied Irish	Ireland	9,24%	17,50%	17,50%	0	18,10%	18,00%	10
Mediolanum	Italy	25,70%	19,20%	21,90%	-270	19,30%	22,00%	-270
Carige	Italy	22,14%	10,00%	11,75%	-175	10,20%	11,93%	-173
Mediobanca	Italy	7,83%	14,20%	13,30%	90	18,10%	16,80%	130
Monte Paschi Siena	Italy	9,21%	13,70%	14,80%	-110	15,20%	15,00%	20
UBI	Italy	14,57%	11,70%	11,56%	14	13,80%	14,30%	-50
BPER	Italy	2,25%	11,95%	13,68%	-173	12,05%	13,78%	-173
Credem	Italy	7,40%	13,00%	13,70%	-70	14,90%	15,60%	-70
Creval	Italy	31,41%	18,86%	12,61%	625	20,81%	14,79%	602
Popolare di Sondrio	Italy	12,77%	12,07%	11,63%	44	13,61%	13,66%	-5
Banca Sella	Italy	6,60%	11,57%	12,47%	-90	13,16%	14,47%	-131
BPM	Italy	7,98%	12,26%	12,66%	-40	14,68%	15,21%	-53
Banca Annia	Italy	22,03%	12,18%	11,95%	23	13,50%	13,70%	-20
Banco di Desio e della Brianza	Italy	20,27%	11,10%	12,36%	-126	14,00%	15,21%	-121
Average		12%			-24			-35

Table 12: Own elaboration representing the first part of the data sample analysis

EPS			ROTC			RORWA			Loans to deposit ratio		
31/12/18 - IFRS 9	31/12/17 - IAS 39	impact in %	01/01/18- IFRS 9	31/12/17 - IAS 39	impact in bps	01/01/18- IFRS 9	31/12/17 - IAS 39	impact in bps	31/12/18 - IFRS 9	31/12/17 - IAS 39	impact in bps
0,45	0,40	11,1%	13,72%	12,45%	126	1,55%	1,35%	20	113,12%	109,28%	384
0,24	0,44	-45,5%	20,44%	31,80%	-1136	2,64%	3,79%	-114	125,72%	127,37%	-166
0,76	0,48	58,3%	30,36%	31,13%	-77	3,46%	3,53%	-7	102,73%	106,37%	-365
1,71	2,79	-38,7%	10,00%	10,87%	-87	1,28%	1,49%	-21	99,58%	97,52%	206
1,21	1,26	-4,0%	10,60%	10,97%	-37	1,54%	1,61%	-7	106,55%	106,43%	11
2,35	2,89	-18,7%	15,80%	20,07%	-427	2,91%	3,55%	-65	111,00%	112,00%	-100
4,24	2,92	45,2%	17,27%	15,19%	209	1,93%	1,73%	20	107,30%	103,55%	374
1,39	1,08	28,7%	11,89%	12,28%	-39	1,78%	1,83%	-5	108,21%	111,24%	-303
5,98	6,03	-0,8%	24,36%	27,23%	-288	3,87%	4,41%	-54	75,69%	72,79%	290
0,01	0,53	-98,1%	26,61%	24,61%	200	3,62%	3,45%	17	69,16%	69,51%	-36
4,02	2,94	36,7%	17,67%	17,68%	-1	2,39%	2,28%	10	91,81%	92,42%	-61
0,22	0,17	29,4%	6,52%	4,24%	228	0,90%	0,60%	30	93,65%	94,35%	-70
3,02	3,02	0,0%	12,01%	13,50%	-149	1,42%	1,61%	-19	96,15%	96,09%	6
0,02	-0,04	/	3,59%	-7,27%	1086	0,59%	-1,24%	182	94,86%	122,89%	-2803
3,68	3,34	10,2%	23,11%	22,85%	25	3,10%	2,90%	19	92,91%	91,49%	142
0,14	0,05	180,0%	8,58%	3,06%	552	1,03%	0,41%	62	101,60%	104,30%	-270
0,09	-0,10	/	15,93%	15,85%	7	2,10%	2,11%	-1	96,00%	95,00%	100
0,76	0,75	1,3%	16.36%	16.30%	6	2,54%	3,18%	-64	186,90%	179,87%	703
0,56	0,43	31,3%	17,93%	16,71%	122	2,51%	2,42%	9	72,00%	70,60%	140
0,13	0,06	113,5%	10,99%	7,01%	398	1,78%	1,11%	67	84,53%	85,83%	-130
2,21	2,95	-25,0%	15,19%	19,83%	-463	2,58%	3,49%	-91	195,40%	173,70%	2170
12,38	12,93	-4,3%	8,24%	8,80%	-56	1,28%	1,36%	-8	101,73%	97,70%	403
/	/	/	8,56%	8,31%	25	1,37%	1,29%	8	128,62%	127,80%	82
0,69	0,10	590,0%	5,35%	4,75%	59	0,69%	0,67%	2	82,72%	81,09%	163
0,58	0,59	-2,4%	12,26%	13,17%	-91	1,64%	1,82%	-17	97,00%	100,00%	-300
0,39	0,40	-2,0%	15,55%	17,15%	-159	2,72%	3,00%	-28	89,96%	97,99%	-803
0,40	0,40	0,0%	14,84%	10,68%	416	2,85%	2,34%	51	135,55%	60,24%	7531
/	/	/	16,19%	25,04%	-885	1,62%	2,94%	-132	130,13%	124,78%	536
0,97	0,85	14,1%	15,84%	12,13%	371	2,25%	1,61%	64	192,91%	187,52%	538
0,25	-7,29	/	11,71%	16,53%	-482	1,60%	2,45%	-84	96,00%	88,40%	760
0,34	0,60	-42,6%	15,00%	14,85%	15	1,75%	1,72%	4	96,50%	97,80%	-130
0,83	0,37	124,3%	19,16%	16,65%	251	2,29%	2,28%	1	94,11%	94,75%	-64
0,20	0,20	0,0%	19,95%	20,41%	-45	2,59%	2,80%	-20	115,41%	109,50%	591
0,01	-29,93	/	7,99%	18,02%	-1004	1,51%	2,27%	-77	107,36%	84,97%	2239
/	/	/	4,08%	6,62%	-253	0,49%	0,77%	-28	75,94%	74,93%	101
0,11	0,24	-54,2%	11,14%	14,06%	-292	1,29%	1,75%	-46	87,16%	72,80%	1435
-0,04	0,37	-110,1%	25,11%	16,24%	887	3,08%	2,06%	102	104,04%	112,04%	-800
/	/	/	3,00%	3,55%	-55	0,37%	0,42%	-6	180,18%	193,40%	-1322
0,27	0,33	-18,2%	4,97%	7,67%	-270	0,55%	0,95%	-40	103,34%	104,39%	-106
					-25			-7			284

Table 13: Own elaboration representing the second part of the data sample analysis

5.2   Effects over the Equity (CET1)

The important indexes about banks that permits us to compare them, independently from different size and operating activities (different clients or different services offered) are the CET1 ratio and the Total capital ratio.

The Core Equity Tier 1 was introduced with Basel III regulation about Capital Adequacy that reform the previous regulation (Basel II) strengthening the requirement of capital, prescribing improvement of it both in respect of quality and quantity. This important change was request after the 2008 financial crisis in which banks faced the inadequacy of their capital level for responding at the shortage of liquidity on the market, so the capital and reserves owned have not be sufficient for cover the possible risk faced by financial institutions (BCBS, 2010).

The Basel III reform requests a minimum Regulatory Capital that still 8% of the total risk weighted assets, but at the same time requires that a higher portion of it, at least 4.5% need to be of high quality, and in any case that at least 6% of it is satisfied through Tier 1 Capital.

Furthermore, banks are required to maintain an additional capital conservation buffer of 2%, otherwise the central authorities (ECB, Bank of Italy…) could establish constraints in the distribution of dividends and repurchase of own shares. The Tier 1 Capital is composed by: ordinary shares, retained earnings, reserves (net of goodwill, intangible assets, current and brought-forward losses) and preferred shares; Anyway, elements that are perpetual and which claims ranked below all other claims in the case of insolvency or liquidation of the bank.

With the introduction of IFRS 9, as remarked in the preamble of this chapter, the majority of banks experienced a decline over CET 1 and consequently over the Total capital ratio (also if both need to be coherent with Basel III), this does not means a lower stability of banks, since there is an acknowledgment of expected future losses that were not previously usual, therefore it seems normal to have a negative variation for the first implementation of the innovative impairment model. Indeed in the following year the stability of the banks can only benefits from the new principles, it will make them more resilient in period of crisis but in general against all the possible risk that they are going to face in their normal operating activities (market, credit and counterparty risks).

The CET 1 ratio is calculated as: $\frac{\text{Tier 1 Capital}}{\text{RWAs}}$ so, higher is the ratio, better is the stability of banks, remembering that this ratio is also used in the stress test that the ECB make over banks every two years.

Now it is useful to looking at the data sample elaborated in a way to confirm what we have affirmed, in particular it is important to divide banks in base of the method use for the

calculation of the RWAs, because as we saw in the ECB documents, but also as we can understand from the formula above, different methods that financial institution are using: the Standardise approach, the IRB approach or a combination of the two system, have a divergent impacts over the calculation of RWAs and consequently of the ratio.

In our analysis the following table highlight the segmentation of banks around the three approaches:

RWAs Measurement approach	Number of banks	AVG effect CET 1
Banks using mainly IRB	17	-32
Banks mainly use SA	6	-74
Banks using both system	16	-26
Total	39	-35

Table 14: Own elaboration on the usage of different approach by banks in the sample, for the calculation of RWAs

From *Table 14* as expected we can saw that banks using IRB approach have experienced a lower impact (-32 bps on average) over CET1, in respect of banks that are using only the SA approach (-74 bps on average).

For understand better the reason behind this, it is useful to looking at the different formulas for the calculation of RWAs on the two system:

RWAs SA approach= RW* EV_{SA}	RWAs IRB approach= RW* EV_{IRB}
EV_{SA} = (Nominal value – Specific credit risk adjustment) * Conversion factor – Credit risk mitigation	EV_{IRB*} = Nominal value – Credit risk mitigation *gross of the Specific credit risk adjustment
$$EV_{SA} \leq EV_{IRB}\,{}^{117}$$	

Table 15: Own elaboration on the different calculation system

It is crystal clear that the EV in the IRB is always higher than the EV calculated in the SA approach, this means higher RWAs, that have been already present before the application of the IFRS 9, permitting at the banks who utilized this system to have a less impact over CET 1. The *Figure 10* below represent the distribution of all the banks in the sample base on the variation suffered over CET1 in bps.

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[117] For further in-depth study is useful to look at S IMON M., 2014, *"A comparison of the IRB approach and the Standard Approach under CRR for purchased defaulted retail exposures"*
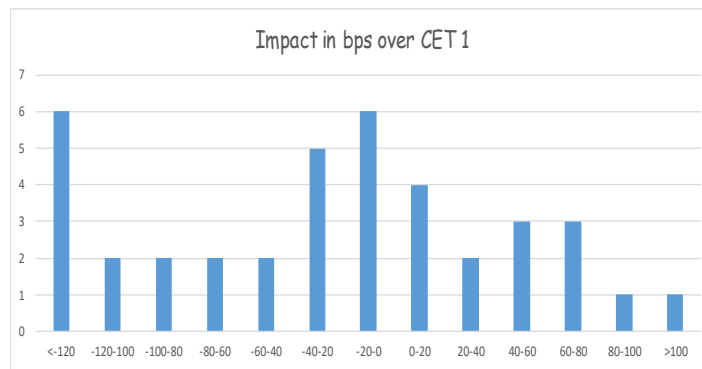
Figure 10: Impacts in bps over CET1 for all the banks in the sample (Own elaboration)

5.3 Effects over the Equity (Total capital ratio)

Another index used for measuring the stability and solidity of the banks is the Total capital ratio, that includes beyond the Tier 1 capital also the Tier 2 capital.

The Tier 2 Capital, less secure and permanent than the Tier 1 capital, is composed by: undisclosed Reserves, general loss reserves, hybrid debt capital instruments and subordinated debts; Then it includes less stable elements in respects to the constituencies of Tier 1 capital but without seniority on claims, thus resembling equity instruments.

The Total Capital ratio following the directive of Basel III need to be higher than 10,5% as requested for minimum requirements that banks have to follow.

The Total Capital ratio (TC) is calculated as: $\frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{RWAs}$

It is important to look at the various effect that happened over the data sample for the Total Capital ratio as what we have done for the CET 1 ratio, segmenting all the banks base on the usage of the three different approaches in the valuation of RWAs.

Indeed, also in this ratio, banks that are using an IRB approach instead of the SA ones, had a lower impact in the TC, given the lower amount of RWAs, also if banks that were using a mix of both have been able to reduce at minimum the impact of the new IFRS 9 (*Table 16*).

RWAs Measurement approach	Number of banks	AVG effect CET 1	AVG effect TC ratio
Banks using mainly IRB	17	-32	-44
Banks mainly use SA	6	-74	-94
Banks using both system	16	-26	-9
Total	39	-35	-37

Table 16: Own elaboration on the usage of different approach by banks in the sample, for the calculation of RWAs

The *Figure 11* below represents the distribution of banks over the same intervals seen in CET 1, and looking the distribution we can recognize similar trends.
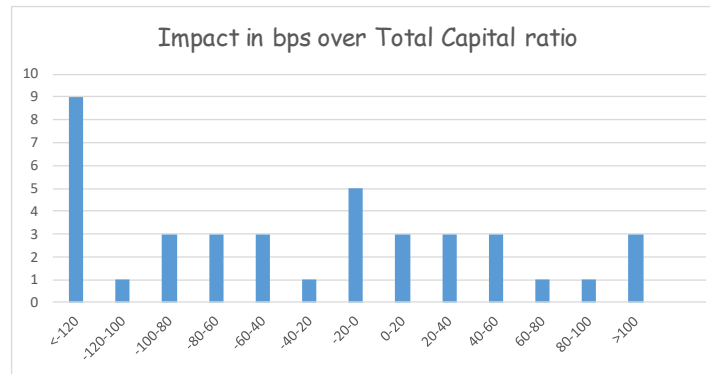

Figure 11: Impacts in bps over the Total Capital ratio for all the banks in the sample (Own elaboration)

At this point it seems useful to check the correlation among the two measures, remembering that this index represents how the displacement of the two variables taken in consideration, are associated and in the same direction. Calculating the correlation among the effects had over the CET 1 ratio and the TC ratio, we found $\rho = \frac{Cov\,(Cet1,TC)}{s_{Cet\,1} * s_{Tc}} \simeq 0.89$, this means that we have a strong positive relationship on variable changes (the two measures move in the same direction, but with a lower intensity), given the fact that the ρ is between 0 and 1, being more near to the maximum extreme of the interval. In real terms means that the changes in CET1 are higher respect the changes happen in the Total Capital ratio, this could be easily understandable looking at the formula for the calculation of TC ratio, indeed we have at the numerator the addition of the Tier 2 capital which have a mitigation effect.

In a way to represents clearly the correlation and the variation in both variables, it is useful the creation of a linear 2D graph in a way to summarize together the two effects in bps, in fact from this is chart straightforward the greater variation in the CET 1 than that we have had over the Total Capital ratio (*Figure 12*).
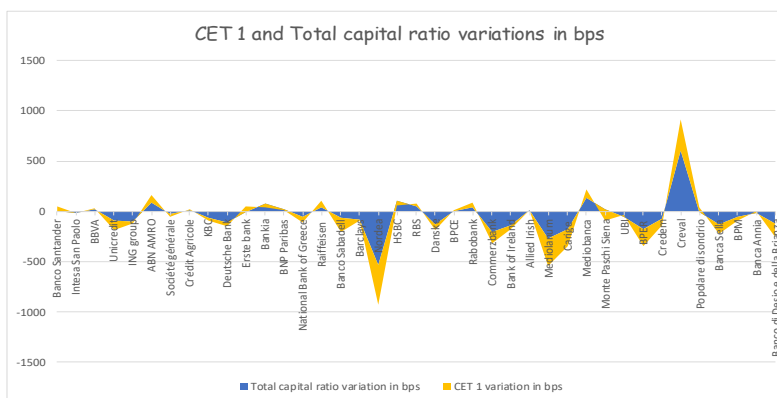
	Variation in bps Cet1	Variation in bps TC
Variation in bps Cet1	1	
Variation in bps TC	0,891253774	1

Figure 12: Impacts in bps over CET1 and TC ratio for the banks in the sample and the relative correlation (Own elaboration)

5.4   Analysis of loan to deposit ratio (LDR)

The loan to deposit ratio was an important index for looking at the liquidity of banks mainly in the period in which in Italy we had the so called "Specializzazione Bancaria" (1895-1936), nowadays the index has lost of significance because banks can rise funds through so many sources, instead of only deposits.

The loan to deposit ratio shows the bank's ability to cover possible loans losses that will be able to happen due by normal or bad market conditions, in a way that the bank remain liquid, also in the case of massive withdrawals of funds by current accounts holders. This ratio represents the ability of the banks to retain their clients too, obviously if the ratio will increase it will be due by the acquisition of new clients and money. It is somewhat counterintuitive in a sense that the loans for a bank represent assets, instead deposit are liabilities, so the ratio could increase because the bank lends more money given the more liquidity acquired, so as to make it bearing interest, knowing the high disparity among positive and negative interest applied on the two categories. The LDR ratio is important for analysing banks, because obviously this influence the profit margins of them, in the case in which a bank lends more than what have, obviously need to pay interest to other banks for having the liquidity needed (debt service expenses), but this imply a more exposition in the case of a market downturn.

For concluding the ideal LDR is around 100%, meaning that for every euro deposited the banks lend it to their clients generating revenues (active interest > passive interest) and new money (banking money creation), then in a way to having the right liquidity for current account holders that could withdraw huge funds, it is proper for the banks to have a ratio in the range of 80% to 90%, remaining liquid.

The LDR ratio that we have calculated as : $\frac{Loans\ to\ customers}{Deposits\ form\ customers}$ for all the banks in the sample is around 100%, and contrary to what expected for the banks analysed the majority of them presents an increase in this ratio from the year 2017 to 2018.

In fact the average change was of +284 bps, this could be linked to the fact that bank given the higher level of provision requested by IFRS 9, which have to be registered on the Income statement and in order to maintain stable the level of profits from one year to another, they found it necessary to increase the loans in a way to have more active interests, given also the lower level of interest rate to paid over the liquidity obtainable through MTROS, LTROS or through the interbank market (*Figure 13*).
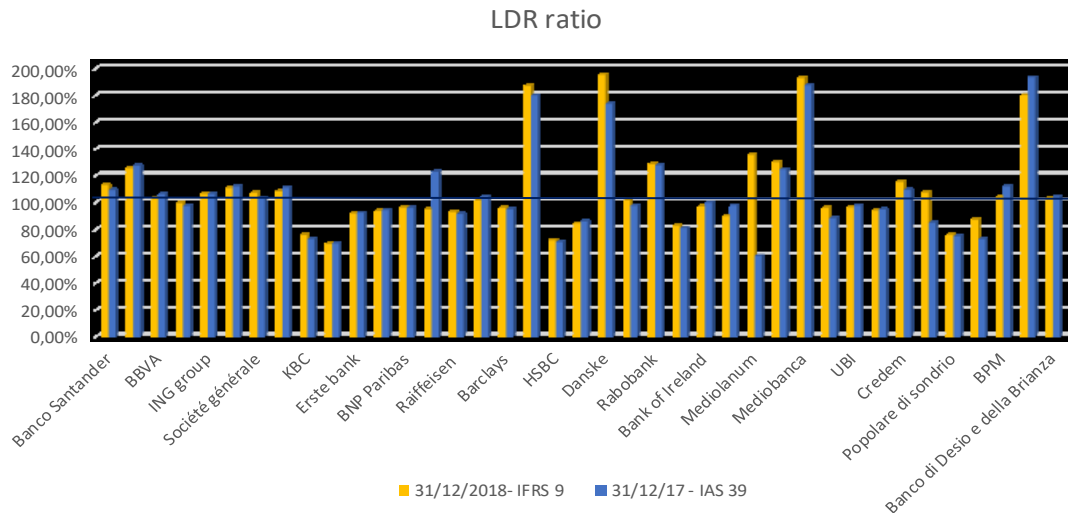
Figure 13: Impacts in bps over Loan to deposit ratio for the banks in the sample and the relative change (Own elaboration)

There are some limitations in the usage of this ratio because:

- We do not take in the consideration the maturity of loans, so it is more essay the calculation of this ratio over different time horizons, checking the liquidity at the disposition of the banks base on different maturities (short, medium, long term);
- We do not take in the consideration the quality of the loans issued by the banks but only the nominal amount, avoiding the consideration over the loans quality and so the risks imply by them;
- This ratio is not so much comparable among different banks because it has a certain meaning only when we analyse banks that own the same: sizes, mark-ups and the places of registered offices.

5.5   Profitability analysis (ROTC)

The ROTC (Return over the Tier 1 Capital) is an important index for the bank's performance analysis and could be compare with the ROE (Return on Equity) for the normal commercial companies presents on the market.

The ratio is calculated as: $\dfrac{Operating\ income}{Tier\ 1\ capital\ ratio} = \overbrace{\dfrac{Operating\ income}{RWAs}}^{RORWA} * \dfrac{1}{Capital\ ratio}$ and represents

how the managers effectively rule the company in a way to granted profits through the operating activity (core activities representing the normal business) of the bank, every year.

83

This index could be influenced by the changing on the Tier 1 capital, so it is related with the capital structure and it does not indicate the real going of the company, that may not improve its operating performances but could increase in any case this ratio.

The banks in fact, in order to show an increase in terms of ROTC have only to buy back parts of their own shares, decreasing in this method their Tier 1 capital and thus increasing the ratio. Following the reasoning made, we could understand that this index lack of stability over years and it is also not so many comparable among banks that owns a different capital structure, so the size matter.

The results over our data sample shows on average a negative variation over the ROTC (-25 bps) after the application of IFRS 9, despite of the reduction had in the capital ratio that would bring a positive impact over the index calculation, prevail the opposite effect given by the increase in RWAs and the probable reduction in operating income, due by more impairment and remeasurement effect (*Figure 14*). It seems nothing more than a small variation that banks have had in terms of operating result, but in reality, it is not so negligible, given that the banks analysed have their operating results over the millions of euro.
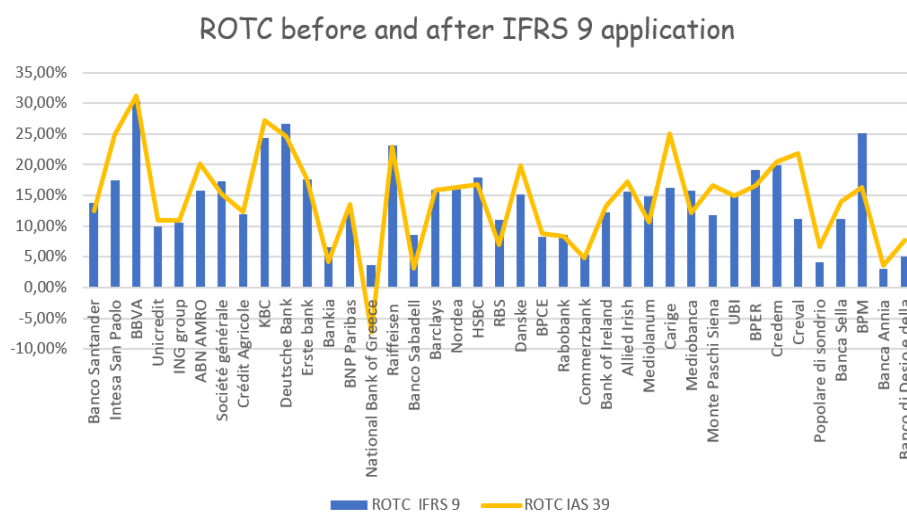

Figure 14: Variation of ROTC due to the application of IFRS 9 (Own elaboration)

The ROTC is important for the analysis of banks, but only allows an analysis of them individually, in fact, with this measure we cannot make any comparison between them, the only thing we can do is provide a general comment on trends that we have had from year to year such as we did above.

For solving this problem of comparability among banks, in a way to compare them among each other, with the objective to identify which of them have had the best operating performances

(finding so the more efficient one, that is able to achieve more profits), we need a ratio independent of the capital structure that is represented by the RORWA.

5.6   Profitability analysis (RORWA)

The RORWA (Return Over Risk Weighted Assets) analyse the performances of banking business independently from their capital structure, resembling the ROA calculated over the commercial companies.

The ratio is calculated as: $\frac{Operating\ income}{RWAs}$ and in this way we could analyse the relative performances among banks in the sample, permitting also the comparison among different types of them (investing, mortgages, commercial and public finance banks).

Form our data sample, following the decrease seen in the ROTC, we have an average drop in the RORWA too, of around -7 bps. The best performing among other banks is KBC, which owns the best operating performances, although reduced after the introduction of IFRS 9 for -54 bps, a huge decrease given the operating income of around 3.667 million on 2017.

Below it we find the most important groups, between which: BBVA, Deutsche Bank, Intesa San Paolo, Commerzbank, Mediolanum and BPM, which has seen a greater increase in performance by moving to IFRS 9 (*Figure 15*).
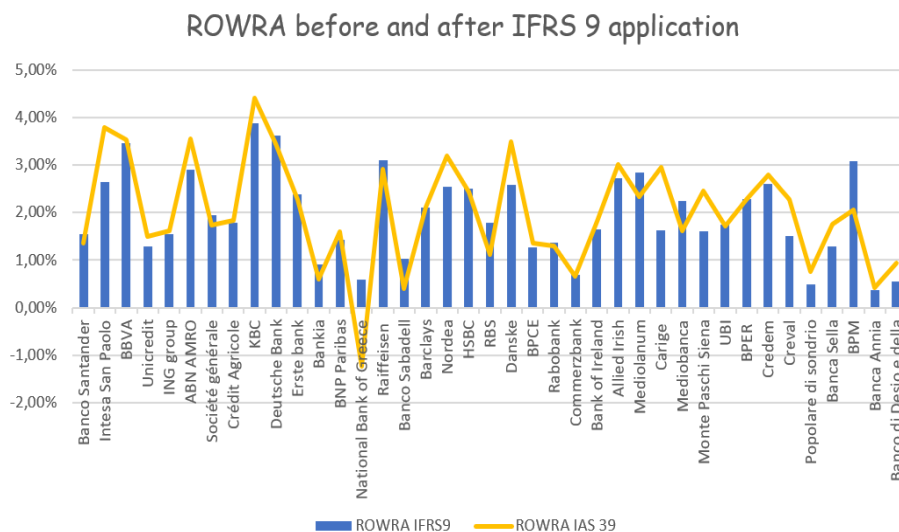

Figure 15: Variation of RORWA due to the application of IFRS 9 (Own elaboration)

Also this ratio despite everything have some limitation linked with the denominator, because mainly for banks that were using or that are using the SA approach for the calculation of the RWAs, can apply percentages assigned to some instruments that do not truly represents the risk linked with them (an evident example is linked with Greek Bonds at which was assigned a very low percentage of risk, that was not fair).

Then for concluding, it is useful to make a correlation analysis among ROTC, RORWA and CET 1. Given the fact that the ROTC is the index that sums up the others, it is relevant to look at the effect had in the case in which the other suffer some variation, in particular we find that there is a huge positive relationship of $\simeq$ 0.82 with the RORWA, and a less but also relevant negative variation if we have an increase in CET 1 $\simeq$ -0.26 (*Figure 16*).

$$\uparrow \text{ROTC} = \uparrow RORWA * \frac{1}{CET\ 1} \downarrow$$

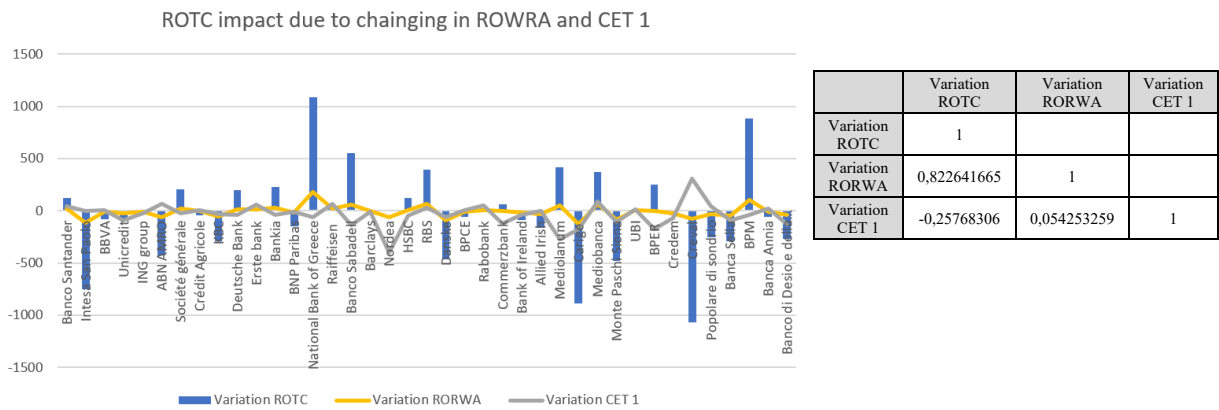|	Variation ROTC	Variation RORWA	Variation CET 1
Variation ROTC	1		
Variation RORWA	0,822641665	1	
Variation CET 1	-0,25768306	0,054253259	1

Figure 16: Variation of RORWA due to the application of IFRS 9 (Own elaboration)

5.7   Effect over Impairment and EPS

The IFRS 9 main changes happen over the impairment and allowances that banks have to maintain every year following the new ECL model, which cause all the variation in terms of capital and profitability that we have seen above. In particular the increase had in provisions from IAS 39 and the new standards is summarized in a reclassification scheme presents in every 2018 Balance Sheet, generally located on the initial parts, or after the Notes. From our sample, we have seen that all the banks have had an increase in the level of provision and so on impairment (+12% on average).

As we can understand from *Table 17* below, the banks who suffer more are those that were using the SA approach +16,78%, instead IRB banks showed a lower increase of +11,67% and those who use both the systems have had only limited impact in respect of the others for +11,38%. This means that the effect showed over CET 1 is not only due by the different system for the measurement of RWAs, but also from the different impairment increase had by those banks, which bring them to have less equity, given the reduction over the retain earnings.

In fact, we can notice that there is a negative correlation among the Earning per share and the level of impairment, that obviously is limited by the others income statement captions, remaining in any case relevant of $\simeq$ -0,13.

Types of Banks	Provision variation			EPS variation %	Impairment variation %
IRB Banks	+11,67%		EPS variation %	1	
SA Banks	+16,78%				
IRB/SA Banks	+11,38%		Impairment variation %	-0,12740003	1

Table 17: Provision variation after the IFRS 9 emission, and correlation with EPS (Own elaboration)

5.8   Regression model

For going deeper in our analysis, we have decided to elaborate a linear model, in a way to analysing if from the shareholder perspective the introduction of IFRS 9 have had influence over banking shares prices. In our analysis we took into consideration a wide range of banks, through the "EURO STOXX Banks" index, which includes around 24 banks form various European countries. Thus, elaborating the following equation:

$$Yprice = \beta_0 + \beta_1 euro + \beta_2 inflation + \beta_3 euribor + \beta_4 gdp$$

Where:

- Yprice: Represents the variation over the "EURO STOXX Banks" index over quarterly interval from 2005 to 2019;
- Euro: Represents the variations happened quarterly over the "EURO STOXX 50" (index which reflects the prices of the 50 most important companies of European countries), from 2005 to 2019;
- Inflation: It represents, as the others, the quarterly variations incurred in the level of inflation in the European Union, from 2005 to 2019;

- Euribor: It represents the quarterly variations incurred in the level of Euribor interest rate in the European interbank market, from 2005 to 2019;
- GDP: It represent the quarterly variations at the level of GDP in the European Union, always from 2005 to 2019.

The results of our regression are the following and we are going to consider also the GDP, because while not being relevant into the model, it remains a main indicator of the market health, in fact, if the GDP going down all the market is suffering. The R^2 is bigger than 0.5 and the model is relevant and linear, as shown on figure below by the residuals that present linearity. Continuing our analysis over residuals (*Figure 18*) we have made the Breusch-Pagan test, that in this case suggest refusing the H0 hypothesises, rejecting the presence of heteroscedasticity in the model, given that the p-value>0.5, and so residuals are independent among each other. Moreover, with the Durbin-Watson test we have checked the presence of autocorrelation and as we can see, it is present, given DW less than 2, a normal thing given the analysis over time series.

```
Call:
lm(formula = bank ~ euro + inflation + euribor + gdp)

Residuals:
     Min        1Q    Median        3Q       Max
-0.099706 -0.046834 -0.005979  0.042784  0.130712

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) -0.020570   0.010429  -1.972  0.05370 .
euro         1.554257   0.140486  11.063 1.69e-15 ***
inflation    0.007724   0.002681   2.881  0.00567 **
euribor     -0.053849   0.019053  -2.826  0.00659 **
gdp          0.070726   0.968477   0.073  0.94205
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.06507 on 54 degrees of freedom
Multiple R-squared:  0.7793,    Adjusted R-squared:  0.7629
F-statistic: 47.66 on 4 and 54 DF,  p-value: < 2.2e-16
```
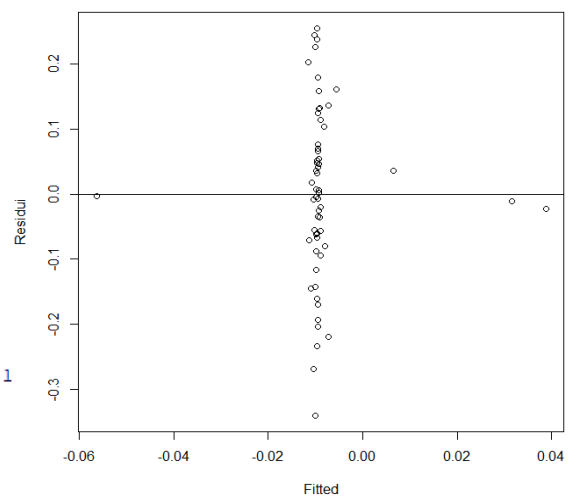

Figure 17: Model analysed, and its residuals plotted (Own elaboration)

> bptest(formula = model, studentize = TRUE)

```
        studentized Breusch-Pagan test

data:  model
BP = 2.6025, df = 4, p-value = 0.6264
```

```
> dwtest(model)

        Durbin-Watson test

data:  model
DW = 1.3873, p-value = 0.007925
alternative hypothesis: true autocorrelation is greater than 0
```

Figure 18: Residuals tests (Own elaboration)

Now analysing the historical series of "EURO STOXX Banks", "EURO STOXX 50", Euribor and GDP (*Figure 19*), we want to verify whether with the introduction of IFRS 9 there is an anomaly in the movement of the banks' index, with respect to the usual variations or not. Looking at the graph below it is possible to see an important anomaly in the movement, precisely in the first quarter of 2018, not explicable by the other variables and not in line with the usual cyclical movement.

This makes us think, that this variation is probably due for the introduction of the new principles, given an opposite movement in the other considered variables. In conclusion, from our examination, we can say that IFRS 9 introduction has caused a significant impact in the major European banks regarding their share prices, but at the same time limited in terms of time frames, while the effects on their balance sheets will be persistent in the long-term.

```
> ts.plot(bank, euro, gdp, euribor main="Trend analysis")
> lines(bank, col="red")
> lines(euro, col="blue")
```
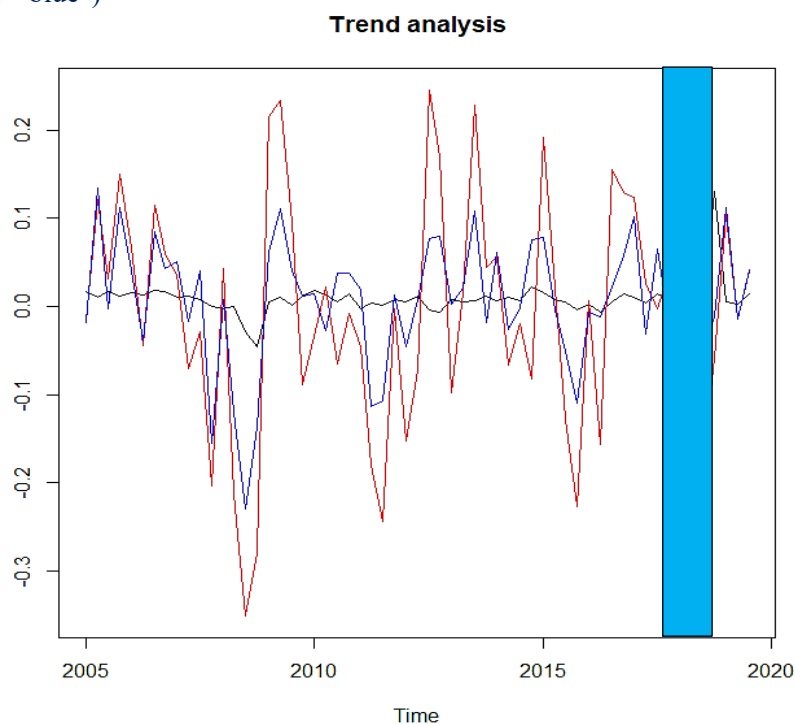

Figure 19: Historical series analysis (Own elaboration)

5.8   Conclusion

The introduction of IFRS 9, that was inevitable, given the evident gaps and complexity of IAS 39, bringing important changes on banking industry under the accounting point of view. In fact, first of all it has reduced the number of assets and liabilities captions presents in the IAS regulation, reducing the complexity and improving the legibility of banking balance sheets. Secondly, it has improved the banking stability thanks to the introduction of the new ECL model, requesting the creation of in advance allowances before losses manifestation.

During this thesis we have analysed in details the various changes incurred in the assets and liabilities new classification captions, explain how the captions are changed and how the financial institutions has to manage their instruments among them, following the business model and the SPPI test. We have also treated the new impairment method under the ECL model, highlighting the increase in the level of impairment provisions, because the IFRS 9 request higher provisions, introducing the consideration of 12-months expected credit losses also for the Stage 1 and increasing to lifetime expected credit losses provisions for the Stage 2. The previous regulation was more permissive and less prudent under this aspect; indeed, it prescribed no provisions for Stage 1 assets and only 12-months expected credit losses provisions for the Stage 2.

Simultaneously to these important changes we have had also the introduction of Basel III, in terms of regulatory measures, for increasing the stability and solvability of Banks, aspiring to increase the total regulatory capital quality bringing the CET 1 from 2% to 4.5 %, the Tier 1 capital from 4% to 6% and arriving thus at the minimum total capital of 10,5 %. This introduction, although not applicable in its entirety until 2026, it has already established a different impairment requirement in respect of IFRS' principles, in a way to deal with credit risk. There is therefore a problem in matching both the accounting and regulatory policy, that need to be solved as highlight in our treatise.

Anyway, we can find uniqueness of purposes in the two discipline in improve the solidity of banking industry, avoiding as much as possible drastic crises that then would be translated in the real economy. In this paper we have want to analyse also the effects of the new reform introduction, mainly in the short-term effects after the changes, in a way to giving an idea of the shock that need to be absorbed by banks' balance sheets from one year to another, expressing also the relevance of those measures in economic terms. Therefore, taking the cue from the most important studies made by the EBA and by the "Big Four" in the accounting sector, we

have analysed the effect of the new regulation over the 40 most important European's banks. In the course of our analysis, indeed, we looked at the pre and post introduction of the principles, with regard the Provisions, CET1, Total capital ratio, ROTC, RORWA, EPS, Loan to deposit ratio and Total assets. The final outcome results different, presenting an inhomogeneity influence over banking balance sheets, in fact banks that were already applying the IRB approach suffered less the new ECL model application, than those financial institutions who were applying the SA approach.

We can summarize the impacts of IFRS 9 introduction in the following points:

- Decrease in CET 1 of around -35bps, with a more negative influence over SA banks, that saw a decrease of -74 bps in respects of IRB's banks, that instead have had a limited impact of -32bps;

- Decrease in Total capital ratio of around -37bps, with a more negative influence over SA banks, that saw a decrease of -94 bps in respects of IRB's banks, that instead have had a limited impact of -44bps;

- General increase in provisions of 12%, always showing a higher increase for SA banks, that was around 16%;

- Reduction in average of ROTC of -25 bps and of ROWRA of -7bps, that seem nothing, but in real terms, considering the high operating income of the banks in the sample, it is very relevant.

The regulatory authorities being conscious of this negative effect, they searched in part to mitigate it with transitional arrangement, permitting a sort of reduction factor at each year, decreasing through time but that will last until 2022, although with a limited effect of 25% in discount.

In conclusion with our paper, we have wanted to present in a quantitative and empirical way the effect of the new standards application in the banking industry. Concentrating ourselves mainly on the accounting regulations, although there are some disagreements with the regulatory regulations, but until they are both not fully applicable, there is a space for harmonizing the two policies.

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