# UNIVERSITA' DEGLI STUDI DI PADOVA


**DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI**

**"M. FANNO"**

**CORSO DI LAUREA MAGISTRALE IN**

**ECONOMICS AND FINANCE**


**TESI DI LAUREA**

## "NON-PERFORMING LOANS AND BANK LENDING:

## THE IMPACT OF BAD DEBTS ON BANK BEHAVIOUR"


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**ANNO ACCADEMICO 2016 –2017**

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Firma dello studente

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*Ai miei genitori*

*che mi hanno sempre appoggiata durante questo percorso.*

*A Irene, ai nonni e alle mie amiche.*

*A Giuseppe.*

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# INTRODUCTION

The aim of the thesis is to analyse the phenomenon of non-performing loans in a EU-wide prospective and to verify whether a shock in term of asset quality affects banks willingness and ability to grant new credit to domestic private sector.

After the outbreak of the financial crisis in late 2007, the European banking system was hit by a severe asset quality issue. Even if during the last year the data confirm the existence of a trend of slow recovery, the ratio of NPLs of the European banks has doubled since 2008, reaching 5.2 per cent of total loans at end-2016. On the contrary, write-offs rates are not adequate, especially if compared with the levels of American banks, thus additionally worsening the problem of growing impaired assets.

This upward trend of the NPL ratio is driven by both a decrease in total loans granted by the European banks and the deterioration of the existing exposures.

Italian situation is in this sense even worse: the latest available data for Italian banks show a NPL ratio slightly below 17 per cent (EBA, 2016).

In this scenario, it is important to understand which are the main macro-economic drivers of such a high stock of non-performing assets. To this extend, Chapter 2 will broadly analyse the theoretical literature studying the macro determinants of NPLs. The review leads to the conclusion that beside bank's ability to assess borrowers' creditworthiness, credit risk is in general driven by a limited set of variables common to different economies: for instance, the real GDP growth rate as measure of the economic cycle, the unemployment, interest and exchange rates.

The second part of the chapter aims at understanding which are the main obstacle for an effective resolution strategy. The market for NPLs is characterised by a sever asymmetric information problem: the potential investors do not have sufficient data in order to assess the quality of the assets being offered for sale and consequently bid a low price. This can be interpreted as a classical market for lemons (Akerlof, 1977), additionally worsened by the fact that even the bank does not have perfect information on the quality of the non-performing loans.

The analysis then points out the structural inefficiencies arising from both demand and supply side of the market, resulting in a wide bid-ask spread which reflects the great difference in the valuations that the bank and the potential investors make of non-performing loans.

In Chapter 3, the analysis presents the main distortive effects that high levels of NPLs have on the economic growth and on banks profitability. The empirical literature analysing the problems with panel data techniques confirms the hypothesis of a significant negative effect of NPLs on both real GDP and credit growth.
Hypothesis which is based on the fact that problem loans constitutes a drag on economic activity because they strongly harm banks profitability by increasing significantly funding costs and by locking up a consistent amount of valuable capital.

In this context, the thesis proposes in the last chapter an empirical study of the intertemporal relationship between NPLs and credit growth: the aims is assessing whether the deterioration of banking asset quality during recent years has a significant impact on banks' lending behaviour.
It considers a panel dataset including observations in the period between 2006 and 2015 for eleven European countries, namely Austria, Belgium, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, and Sweden. The empirical results are obtained by using both static and dynamic panel data estimation techniques.
The findings suggest that the relationship between the NPLs ratio and the rate of growth of credit to private sector is negative and statistically significant, confirming the initial hypothesis.
When the analysis is conducted by considering only the observation relative to the *distressed* countries sample (Greece, Ireland, Italy, Portugal, and Spain) the results are almost the same; when on the contrary the sample analysed includes just non-distressed countries, the results are instead widely different. In fact, in this case the relationship is no longer statistically significant.
This leads to the conclusion that banks are conditioned in their lending behaviour by past bad debts only when their NPLs reach considerable levels, as is the case of *distressed* countries' baking systems.

These results once again confirm the strongly negative effect that NPLs have on the economic recovery by influencing banks' lending behaviour and remark the need of an immediate and comprehensive resolution strategy to address the problem of bad loans in Europe.

# CHAPTER I – PRELIMINARY CONSIDERATIONS

In recent years, European banks have faced significant challenges in managing their high levels of non-performing loans. The economic crisis and the subsequent recession have left in fact many banks in many countries with elevated levels of non-performing loans; while lately the economic conditions have gradually stabilized across Europe, NPLs continue to be a serious source of concern in many stressed economies, such as Italy, albeit at a slower pace.

The chapter will report first the definitions that the European regulator provides for non-performing loans and forbearance measures, highlighting the process that leads to these definitions and the rationale behind them.

Then, the analysis will focus on the current situation regarding NPLs in Europe and in Italy, respectively, reporting the most relevant data regarding the ratio of non-performing loans locked in banks balance sheets and their coverage ratios, in order to provide a clear picture of the general situation. This will provide a base for the considerations made in the following chapters, especially for the empirical analysis.

## 1.1– DEFINITIONS OF NON-PERFORMING EXPOSURES AND FORBEARANCE

The financial crisis has highlight how supervisors and investors could have difficulties in comparing information about credit categorization reported in banks' balance sheets across jurisdictions. There were in fact significant differences in the way in which banks measure and report data relative to their asset quality: their valuations were based on different assumptions and conducted with different methodologies, significantly reducing the possibility for the investors to assess banks' risk profiles.

Prior to 2013, "forbearance" and "non-performing exposures" were commonly used terms covered by existing accounting requirements to disclose information on loans and debt securities and their credit quality. However, there were neither comprehensive definitions of these concepts, nor specified and detailed supervisory reporting requirements.

Nine EU jurisdictions had been using a classification scheme on the basis of an explicit national definition of non-performing exposure, providing a template in accordance with their own supervisory framework, more or less connected to EU-wide existing concepts of impairment or

default. On the other hand, eleven EU jurisdictions had not been using a national definition, but directly referred to the definitions of default, impairment (IFRS or GAAP) or various categories in supervisory or accounting classification scheme.
Furthermore, even if most jurisdictions identify in the accounting or regulatory framework exposures modified because of difficulties of the debtor, forbearance concept never appeared in local regulations.

In response to this issue, in 2013 the European Banking Authority published for the first time some Implementing Technical Standards which provided some detailed technical archetypes regarding forbearance activities and non-performing exposures, issuing newly harmonized definitions aimed at providing clarity in terminology and guidance on criteria for credit categorisation.
The intent was to reduce the wide margin of discretion in the accounting and prudential models applied by the Member States, in order to obtain data which can be compared because based on definitions fixed at European level.
The categorization of banks' exposures on the basis of their quality is the fundamental supervision tool necessary to assess the riskiness of banks' credit portfolios and to identify credit risk-related issues that may require some kind of intervention. Without a clear definition of practices and categories relative to deteriorated assets, at a system-wide level, supervisors cannot effectively assess credit risk on the basis of common benchmarks, and therefore they cannot coordinate proper interventions. Moreover, at a bank level, differences in assessment methodologies across jurisdictions can make it difficult for the institutions to properly detect an increase in credit risk and to early prevent its dramatic consequences.
Thus, define a common reference scheme was a necessary condition to contrast the general trend of deteriorating asset quality across the European Union and to enhance the stability of the European financial system as a whole.

The newly issued definitions provide a common framework across the EU to accommodate differing national practices, but do not change accounting and regulatory standards, which keep their relevance and are essential building blocks of the draft definitions. Consequently, the implementation of the new archetypes does not have any impact in reporting institutions' profitability or capital requirements.

With respect of the original draft ITS of 2013, the European Banking Authority has conducted open public consultations, analysing the potential costs and benefits related to their implementation, and requested the opinion of the Banking Stakeholder Group. As a result, the EBA published a new

version of the ITS in March 2015 which, however, contains amendments that do not involve significant changes in substantive terms.

### *1.1.1 – DEFINITION OF NON-PERFORMING EXPOSURES*

Even if the commonly used term which describes a deteriorated asset is "non-performing loan", the only definition issued by the EBA in this sense is the general one referring to "non-performing exposure". However, this does not lead to any interpretation problem: in fact, the total amount of NPE is given by the summing up non-performing loans, non-performing debt securities and nonperforming off-balance-sheet items. In addition, although institutions are strongly encouraged to apply the definition of NPE also in their internal risk management practices, strictly speaking, it is binding only for supervisory reporting purposes.

According to subtitle 29, Annex V of Regulation (EU) No. 227/2015, an exposure shall be considered non-performing when:

(i) it is defaulted according to Basel framework or impaired in accordance with the specific accounting regulation;
(ii) it is more than 90 days past due;
(iii) there is evidence that the debtor is unlikely to pay in full the principal and the interest without realization of collateral, regardless of the existence of any past due amount or of the number of days past due.

For the purpose of the template, in exposure category are included all debt instruments and off-balance sheet exposures, except those held for trading. To the purpose of the template, off-balance sheet exposures comprise instead loans commitments, financial guarantees, or other commitments given by the borrower.

In defining the NPE, the EBA relies mainly on past-due and unlikely to pay concepts.
Looking at the first one, an exposure can be past-due only if there exists a contractual obligation for the borrower to make a payment and this payment is compulsory. In the cases in which this legal obligation is not certain, banks should assess carefully the situation.
With respect to delayed payments, even if the definition of NPE provided by the EBA does not specifically require the use of a given allocation convention or order of priority, banks may be required to use a specific criterion, such as FIFO or LIFO, in order to decide which of the obligation

missed would be settled earlier by any future payment, and a specific scheme to determine whether the cash flow should first settle unpaid principal or unpaid interests.

With respect to the unlikely to pay criterion, it relies less on quantitative criteria and refers instead to some events that trigger the classification of an exposure as non-performing. The regulation is in this sense less objective, and banks must have clearly defined internal standards in order to identify the situations which lie under the unlikely to pay concept. Examples of events that usually lead automatically to the non-performing classification are the bankruptcy of the debtor, or the booking of some kind of credit adjustments (ECB, 2016). However, in order to avoid misjudgements, the bank has to analyse even less evident situations, considering the creditworthiness and the repayment capacity of its clients by looking at past payment behaviours or at the general financial situation of the counterparty.

It is important to remark that the classification of an exposure as non-performing should be done regardless the existence of any collateral. As a consequence, when an unlikely-to-pay situations occurs, an exposure should be classified as non-performing even if it is fully collateralized and even when the debtor is willing to fully realise the collateral in order to avoid any kind of legal consequence.

The regulator distinguishes then between exposures that are non-performing on an individual basis (*transaction based*) and those that are non-performing for the overall exposure to a given debtor (*debtor based*). Where an institution has on-balance sheet exposures to a debtor that are past due by more than 90 days and the gross carrying amount of the past due exposures represents more than 20% of the gross carrying amount of all on-balance sheet exposures to that debtor, all on- and off-balance sheet exposures to that debtor shall be considered as non-performing.

In conclusion, an exposure shall be reclassified as performing because it has ceased being non-performing when at least one of the following objective criteria is met:

(i) the debtor does not have any amount past-due by more than three months;

(ii) a significant improvement in the financial situation of the borrower allows the bank to reasonably expect the full repayment of the debt.

(iii) the exposure is no longer “defaulted” or “impaired” according to the Basel II and the accounting framework, respectively.

The partial write-off, the repossession of collaterals, or the granting of forbearance measures are not sufficient conditions to allow the reclassification of a non-performing exposure as performing.

### *1.1.2 – DEFINITION OF FORBEARANCE MEASURES*

Forbearance measures are defined and regulated by subtitle 30, Annex V of Regulation No. 227/2015. Forbearance occurs when a debtor is experiencing financial difficulties in meeting its obligations, and the bank grants a concession that it would not otherwise consider in normal circumstances. Exposures shall therefore be considered forborne when a concession has been made exclusively due to financial difficulties of the borrower, irrespective of whether any amount is past due or of the classification as impaired or default. In other words, an exposure can be considered forborne regardless its performing or non-performing status.

Concession refers in this context to special contractual terms and conditions provided by the bank to distressed borrowers with the aim of increasing the possibility to obtain a full repayment of the due amount. They may regard also total or partial refinancing of a troubled debt contract, or the execution of clauses which enable the debtor to change the terms of the contract.
The most commonly used examples of concessions are, among others, the extension of the loan terms, the rescheduling of the repayments, the reduction of the interest rate, the acceptance of lower levels of collateralization, or the conversion of the debt to equity (ECB, 2016).

Generally speaking, the may objective of granting forbearance measures is to provide to non-performing borrowers a way to exit their status, or to prevent performing borrowers from becoming insolvent in the near future. Therefore, forbearance measures should in theory return the exposure to a financially sustainable situation. However, forbearance solutions are in many cases not fully in line with that objective, thus leading the bank to misrepresent its effective asset quality. For instance, this may happen when the forbearance measures do not resolve the issue of the over-indebtedness of a borrower.

According to the Regulation, the forbearance measures are considered effective and therefore the classification of the exposure as forborne shall be discontinued when:

(i) the repayments as scheduled by the revised terms of the contract have been made in a timely manner over a minimum period of one year;
(ii) the counterparty proves to have solved its financial difficulties.

### *1.1.3 – ITALIAN CATEGORIES OF NPEs*

In providing the rules that Italian banks and Italian branches of foreign banks have to follow in the context of financial supervision, the Bank of Italy divides the non-performing loans category into four additional subcategories, on the basis of their quality and their probability of repayment[1]. Clearly, in doing this, the Italian regulator keeps as general building block the definition of non-performing exposure provided by the European Commission and discussed before.
It is important to remark that these subcategories simply represent an unharmonized Italian concept.

The first category refers to the so called *bad debts* (or *sofferenze*), and includes all the exposures to an insolvent debtor or to a debtor whose insolvency has not been declared but whose financial situation is substantially comparable to the state of insolvency. The rules exclude exposures whose lower quality is related to factors connected with the country risk.

The second category contains *unlikely to pay exposures* (or *inadempienze probabili*)[2], exposures to those debtors that in bank's judgment are unlikely to pay for their obligations without the execution of the guarantees, if existing, or without the implementation of adequate measures or concessions. In this case, the bank has to assess the probability of repayment without considering the amounts past due, and so it is not necessary the debtor to be explicitly insolvent to fall under this category. The classification as unlikely to pay is extended to the gross carrying amount of all balance sheet exposures to a debtor, unless the conditions necessary to consider them as bad debts are met.

The exposures not classified as bad debts or unlikely to pay fall under the *overdue/overdrawn* category (or *esposizioni scadute e/o sconfinanti deteriorate*) whether at the end of the period are past due or overdue by more than 90 days.

Finally, the Bank of Italy makes one last distinction referring to *exposures subject to forbearance measures* (or *esposizioni oggetto di concessioni*) and contains the non-performing exposures with forbearance measures and the forborne performing exposures as defined by the ITS. However, this

[1] See the 8th update of Bank of Italy Circular No. 272/2008 issued on March 15th, 2016.

[2] Since 2015, the unlikely to pay category substitutes the substandard loans category (or *incagli*) to adequate the Italian classification system with the new templates proposed by the ECB. The new terminology better reflects the concrete possibility that the loans and exposures included in the category further deteriorate becoming bad debts.

does not constitute a proper independent class of non-performing loans, as NPE subject to forbearance measures are already classified in one of the previous subcategories.

## 1.2 – NON-PERFORMING LOANS IN EUROPE

Seven years after the outbreak of the financial crisis, the European banking system is still suffering from an asset quality problem as a consequence of the deep recession in which it fell after the burst of the subprime bubble in the United States.

Many European banks have worrisome level of NPLs stocked in their balance sheets and currently a real market for impaired loans does not exist.

Given the need to support Europe's recovery, resolving the NPLs problems is of first-order importance to enhance new lending and to solve the problem of bad assets locked in banks' balance sheets. New policies to handle asset quality issues in the European Union are strongly needed, in particular in light of the negative effects that a high stock of NPLs can have on the real economy analysed deeply in next chapters.

After the financial collapse in 2008, NPLs to gross loans ratio has risen sharply across Europe: starting from a value of 2.8 per cent in 2008, NPLs to total gross loans ratio has doubled reaching 5.2 per cent at the end of 2016 (EBA, 2016).

Following the process of repair of banks' balance sheets, in 2013 the EBA recommended to Competent Authorities (CA) to run asset quality reviews for their banks, on the basis of the newly harmonized definitions of non-performing loans issued with the ITS. In 2014, CAs performed comprehensive reviews of banks' assets in preparation for the 2014 EU-wide stress test. The analysis has contributed to the identification of a slight reduction of NPL ratios, trend confirmed also by the recent data referred to the biennium 2015-2016.

This improvement in the ratio has been driven both by an increase in total loans, despite some volatility during last years, and a decrease in impaired loans (Figure 1.1, panel a).

However, the overall level remains considerably high, especially in countries where the level of NPLs is greater because of the prolonged economic recession.

Countries with low ratio of bad loans follow a stable trend, maintaining and in some cases improving their assets quality. In this sense, a handful of countries such as Germany, France, Slovak Republic, Netherlands and United Kingdom show during 2016 an improvement in terms of NPLs to total loans ratio with respect to the post crisis data of end-2009. On the other hand,

countries such as Italy, Ireland, Greece and Portugal which already have a high ratio of non-performing loans show in recent years an even further deterioration of asset quality.

Furthermore, a cross country comparison suggests that the average NPL ratio is more than three times higher in the European Union than in other global jurisdictions (Figure 1.1, panel b).

Figure 1.1 (a) - NPL Ratio Trends

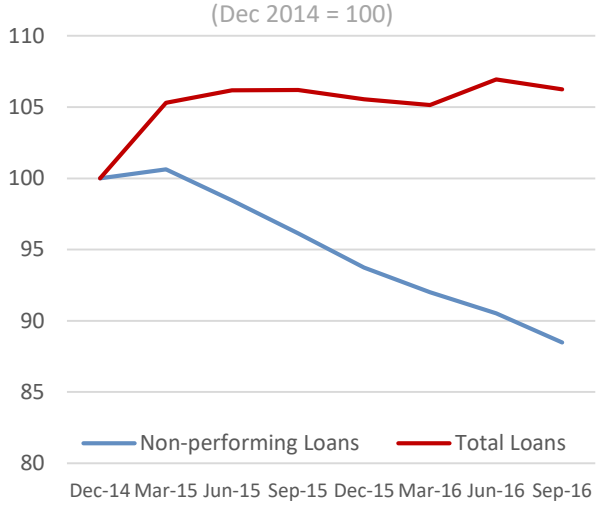
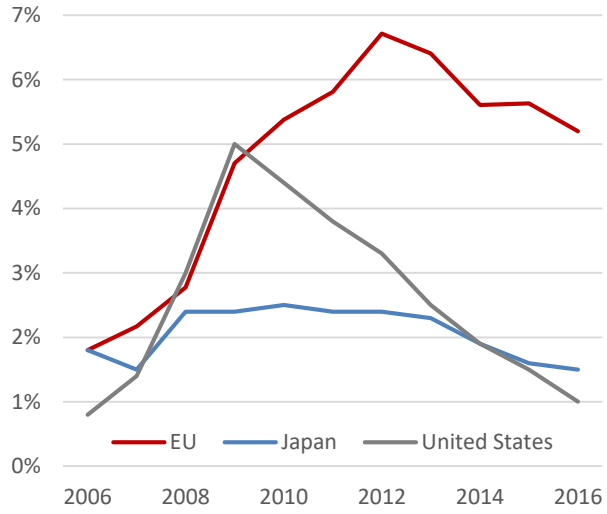
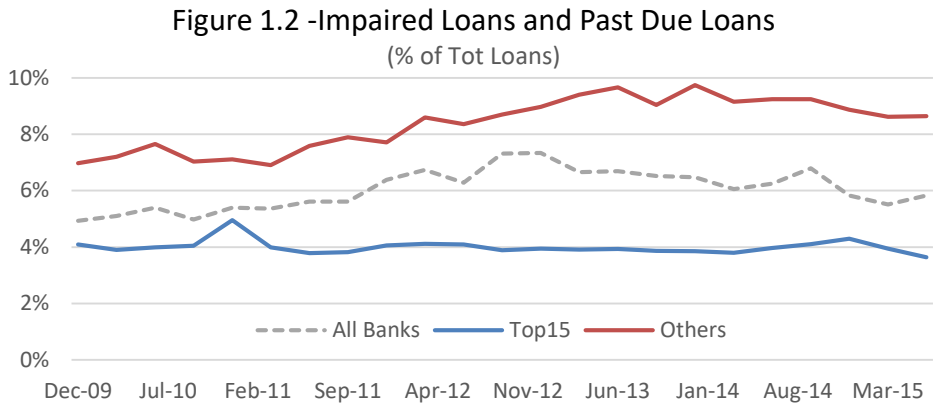



Figure 1.1 (b) - NPL Ratio per Region




Source: (a) EBA Risk Dashboard Q3 2016; (b) IMF, Financial Soundness Indicator.

Latest data available shows that dispersion remains significant also between the fifteen largest banks and all the others: the ratio of impaired and overdue loans for the latter is still significantly above that for the largest banks (Figure 1.2). Indeed, the smaller the size of a bank, the more difficult is for it to efficiently manage and eventually sell impaired and past due loans: while the largest banks are able to dispose of NPLs and can invest a great extent of resources in internal NPL management, small credit institutions have limited experience and capacity to deal with NPLs, because of their limited risk assessment capabilities, their little expertise, and the low possibilities they have to access to distressed debt markets.




Source: EBA Risk Dashboard, Q3 2015.

The sector of the economy mostly affected by the asset quality problem is surely the corporate sector, most notably the small and medium enterprises (SMEs), which contributes to the greatest extent to Europe's output and employment and which relies the most on banks' financing.

The EU weighted average for problem loans with a small or mid-sized corporation as counterparty was 16.8 per cent in June 2016, showing small improvements since end-2014, even if this is not a consistent trend in all countries. This can find a possible explanation on the fact that divestments and other active measures to reduce NPLs are ineffective in improving the asset quality for loans to this sector; moreover, the SMEs are strongly dependent on bank financing and have a low resilience to adverse economic conditions if compared with other corporates.

NPL ratios for large non-financial corporations have recovered in most of Member States, and the EU weighted average from a value of 9.2 per cent at the end of 2014 has reach 7.5 per cent in June 2016. According to the EBA, only in a couple of Member States the asset quality of loans to large corporates worsened during last years, mainly because of negative economic trends in these countries, measured as slow GDP growth.

This could be explained by the capability of large enterprises to rapidly adjust to the general economic conditions, but also by the implementation of more effective resolution strategies for loans to large entities. Furthermore, large corporates are on average geographically more broadly diversified, and might for this reason benefit from positive economic developments in both their home countries and abroad.

With respect to households, the level of NPLs remained stable for the EU on average, and most Member States experienced little improvements in their ratios.

In June 2016, the EU weighted average NPL ratio for loans to households was 4.9 per cent, improving from 5 per cent at the end of 2014. This was influenced by the low interest rate, which

had in general a positive impact on the available funds for households to pay back loans. However, the relative stability of the ratios over time might also highlight the length of the recovery process for households and the longer time to deal with those exposures because of the lack of adequate personal insolvency procedures.

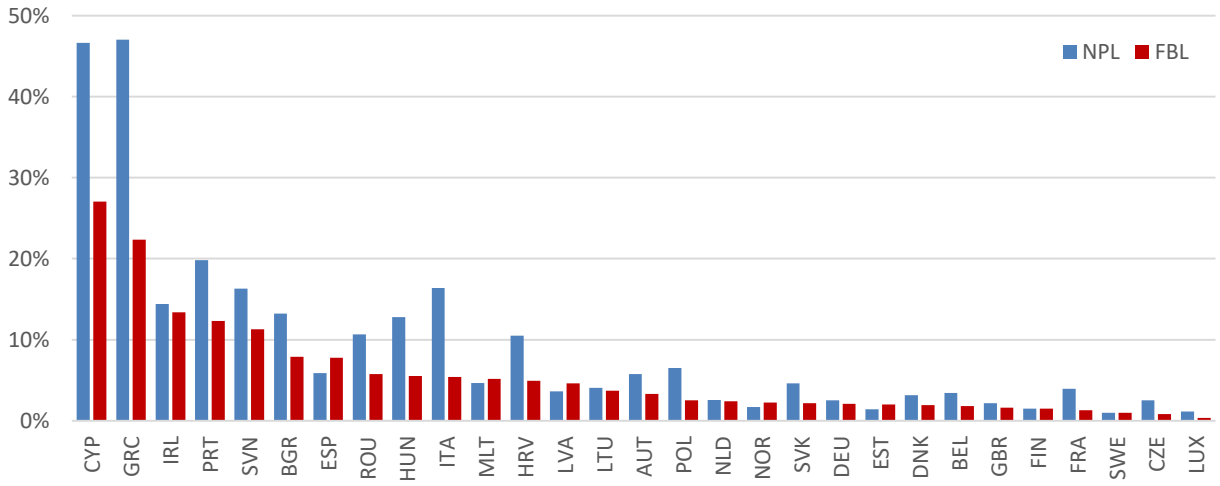
In order to better assess credit risk, beside the data relative to the NPL ratio it is necessary to consider even the ones referred to the forborne loans (FBLs). The category of assets subject to forbearance measures includes in fact both performing and non-performing loans. However, because of their basic characteristics, FBLs are prone to suffer from further deteriorations in the case of a worsening in general economic conditions and so they have to be taken into account in order to have a clear picture of banks' credit quality.

The ratio of loans subject to forbearance measures has followed recently dynamic similar to NPLs, reaching 3.5 per cent in March 2016.

According to EBA data referred to a sample covering 166 banking groups from all the Member States and Norway, there seems to be a relationship between the forborne loans and the NPLs (Figure 1.3).

This is observed in countries like Ireland, Portugal or Slovenia which exhibit high levels of both indicators. In other country such as Finland, Norway, Sweden, Germany or Great Britain which are characterized by low NPLs ratios the relationship seems confirmed. On the other hand, data for Cyprus, Greece, Italy or Czech Republic do not indicate a clear correlation between the two ratios (EBA, 2016). This may be due to the fact that the percentages of performing and non-performing assets which compose the FBL category are different depending on the practices common in each country. Indeed, in most of the Member States the majority of FBLs are non-performing, and so there is a positive relationship between the two ratios; in some other countries, however, the greatest part of FBLs is classified as performing, inducing the relationship between FBL and NPL ratio to assume a negative sign.

Figure 1.3 – NPL and FBL Ratios




Source: EBA Risk Dashboard Q3 2016.

In nearly all Member States forbearance measures are used mainly for loans towards SMEs. The EU weighted average ratio of FBLs to SMEs is equal to 9.7 per cent in June 2015. Forbearance of loans to large enterprises showed a similar trend as the NPL ratio for the same segment: the EU weighted average FBL ratio decreased to 5.1 per cent in June 2015. Moreover, the ratio of FBLs to households remained stable at 3.5 per cent in June 2015, again following the trend of NPL ratios.

In analysing the NPL exposure of the European banking system, it is important to look at the coverage ratio, i.e. the ratio between specific provisions of capital for non-performing loans and advances and the total impaired gross loans. The level of NPL is linked with banks' provisioning policies since the higher the capital provisions, the higher will be the probability to easily dismiss assets. Analyse the coverage ratio can so highlight the provisioning dynamics at banks, keeping in mind that the legal and juridical framework in each country is peculiar and can significantly affect the policies of banks. However, it is very difficult to identify this relationship on the basis of available data.

The increasing trend in the coverage ratio in most countries is probably due to higher regulatory scrutiny in relation to the AQR and also to negative developments of collateral values, which lead to an increase in impairment. The EU weighted average coverage ratio in September 2016 was equal to 43.3 per cent, almost replicating the value reported at end-2015. Large banks have higher coverage ratios, but all the other banks follow a sharp increasing trend in last years. The slightly increase in the ratio across time was driven by a reduction in the denominator (total non-performing loans) that compensate for the little reduction in the numerator.

Figure 1.4 (a) - Coverage Ratio

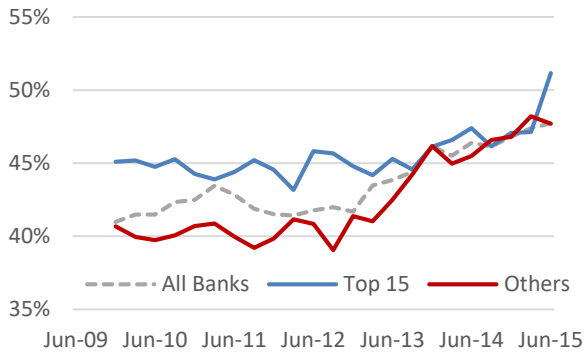
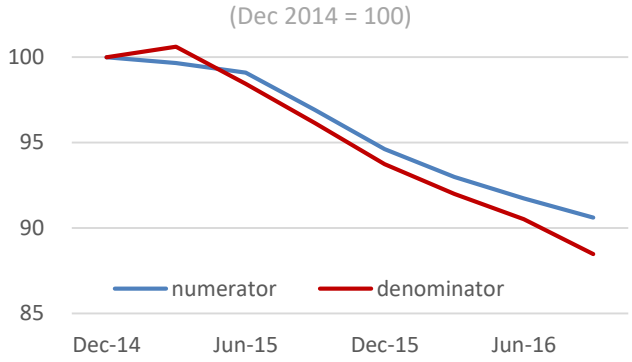


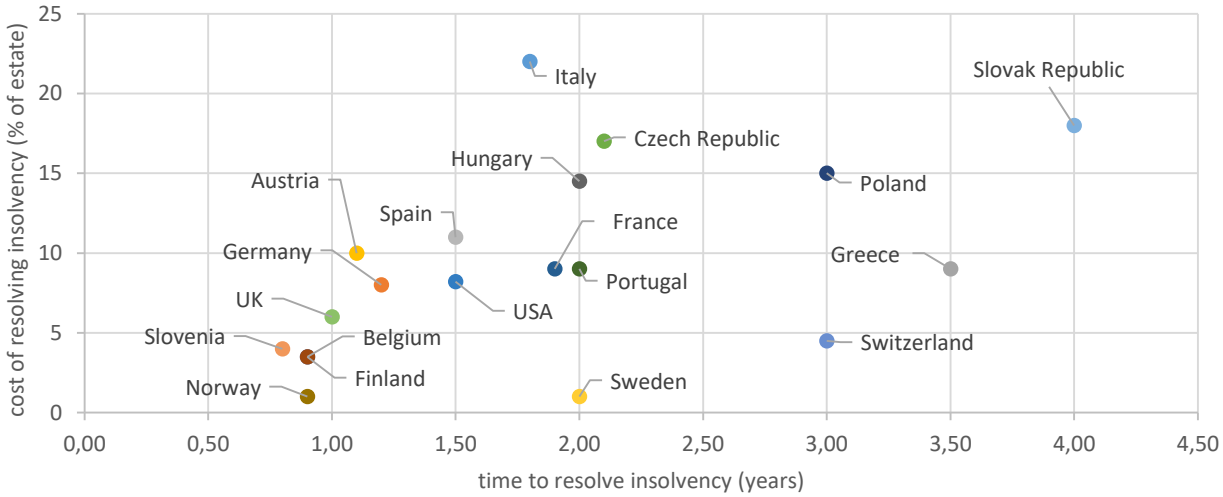

Figure 1.4 (b) - Coverage Ratio: Trends




Source: (a) EBA Risk Dashboard Q3 2015; (b) EBA Risk Dashboard Q3 2016.

One of the major impediments to a reliable resolution of the NPL problem especially in financial stressed countries is the slow process and significant work-overload of the juridical system in these countries. Indeed, data indicate that the level of provisions is higher in countries with a longer duration of legal proceedings. There exists a link between the expected duration of insolvency proceedings and coverage ratios: provisions strongly depends on collaterals posted and recovery rates, but also the speed of the recovery process becomes a key determinant. Out of court restructuring of debt under judicial supervision could be a valid alternative to reduce the time to foreclosure and to easily deal with insolvent debtors. However, at the moment this does not seem to be a frequently used method in most of Member States.

Figure 1.5 - Length and Cost of Insolvency - 2015



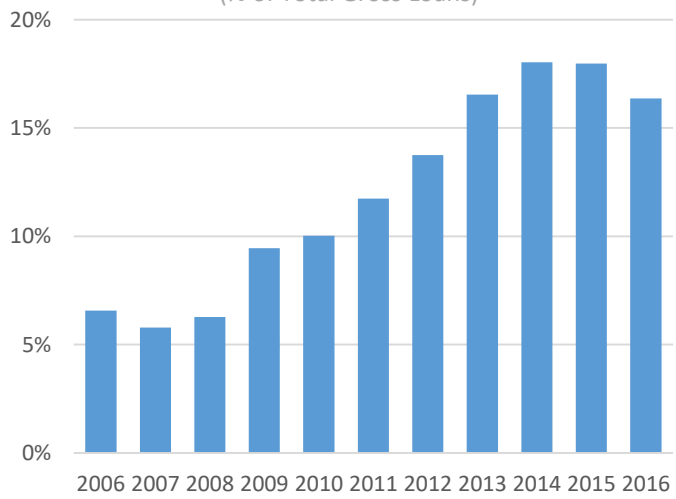

Note: the horizontal axis approximates the time required by bankruptcy proceeding involving domestic institutions and measures the time interval between the filing for insolvency in court and the resolution of distressed assets. On the vertical axis are reported the value referred to the cost of proceeding (including direct and indirect fees and levies), measured as percentage of the real estate serving as real guarantee.
Source: World Bank, Doing Business Report.

## 1.3 – NON PERFORMING LOANS IN ITALY

The stock of non-performing loans hold by Italian banks in their balance sheets has dramatically increased after the 2008 financial crisis and the 2010 sovereign debt crisis: according to the data collected by the IMF, after reaching the peak at €326 billion in September 2015, the stock of NPLs in Italian banks balance sheets has fallen slightly for the first time since 2008 and in September 2016 it amounts to €320 billion. which in relative terms is more than 15 percentage points higher than German and American levels (IMF, 2016). In proportion to total loans to customers, from a value of 5.8 per cent in 2007, the ratio of non-performing loans has tripled reaching 17.9 per cent in 2015 and 16.4 per cent in September 2016. Net of special loan-loss provisions of capital, the NPLs amount to 10.8 per cent of total loans, 4.8 per cent for bad debts category.

This rapid rise is due in part to the prolonged recession which has worsened the creditworthiness of borrowers. At the same time, the inefficient judicial process and the limited incentives to write-off loans, has held back the pace of NPL resolution (see Chapter 3 for details). Without a significant intervention, NPLs will continue to remain high and a drag on bank profitability and market confidence.

Figure 1.6 - Italian NPLs



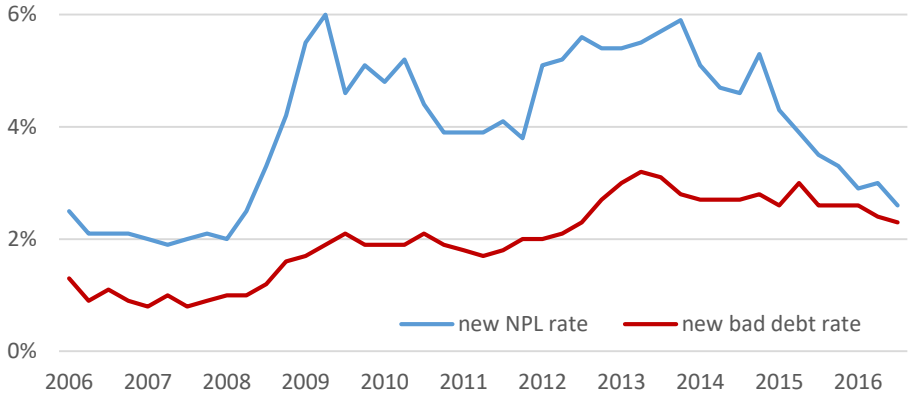

Note: latest available data refers to September 2016.
Source: IMF, Financial Soundness Indicator.

Recently the risk indicators associated with Italian banks asset quality continue to improve. Already in the fourth quarter of 2015 the flow of new non-performing loans fell to 3.3 per cent of total loans, the lowest level recorded since 2008.

According to the projections made by the Bank of Italy taking in consideration the latest macroeconomic scenarios and Consensus Economic forecasts, the flow of new bad debt is expected to decline in 2016. In the scenario hypothesized, the Bank of Italy takes into account the quite optimistic forecasts for economic activity for 2016 which are expected to contribute to the recovery of the domestic demand.

For households, at the end of 2016 the new bad debt rate is projected to return to levels slightly higher than those of the pre-crisis period; for firms, the rate of new bad debts which is currently equal to 4.1 per cent would be below 3 per cent at the end of year.

Figure 1.7 - New NPL and New Bad Debt Rates




Source: Bank of Italy, Financial Stability Report 2016.

Looking at the level of non-performing assets reported at the end of 2015 by the mayor listed Italian banks, Unicredit and Intesa Sanpaolo are 'healthy' in terms of asset quality, with a percentage of non-performing assets below 10 per cent and in line with the one accumulated by the other main European banks. The situation of Banco Popolare and Monte dei Paschi di Siena is on the contrary severe, with an amount of non-performing assets equal to more than 17.1 per cent and 27.6 per cent of total assets, respectively. UBI occupies an intermediate position, with a percentage of bad assets equal to 11.4 per cent of the total.

The latest available data show that more than 75% of the total amount of NPLs in Italians banks' balance sheets regards non-financial corporations. One of the possible reasons explaining this phenomenon can be the extremely weak profitability, together with the high level of indebtedness of Italian corporate sector due to the difficulties in recovery after the 2008 financial crisis.

Figure 1.8 (a) - NPLs Breakdown by Sector

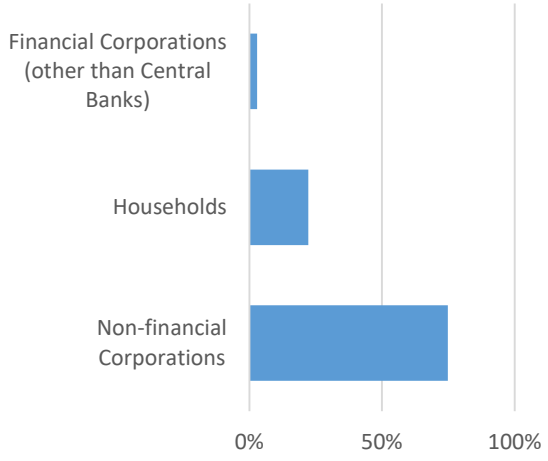
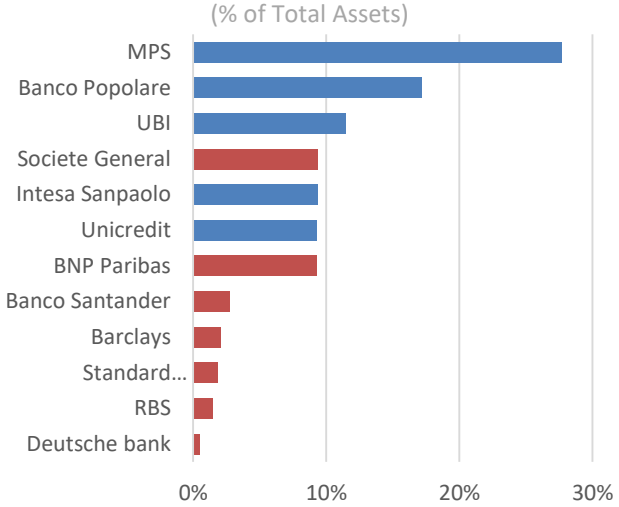



Figure 1.8 (b) - Non-performing Assets




Source: (a) European Central Bank (June 2016); (b) Thomson Reuters – Eikon (end-2015).

Non-performing loans category is identified following the harmonized definition provided by the EBA in 2013 through the Implementing Technical Standards. As explained in the previous section, in addition to the European definition, the Bank of Italy divides NPLs in four additional subcategories according to the creditworthiness of the debtors: bad debts, unlikely to pay, overdue/overdraw exposures and non-performing exposures with forbearance measures.

In September 2016, the bad debts are equal to more than 57 per cent of the total Italian NPLs. The shares of exposures unlikely to pay or overdue are quite low, equal to 33.5 and 3.3 per cent respectively, while the exposures subject to forbearance measures accounts for 5.2 per cent of the total.

Figure 1.9 (a) - NPLs Category

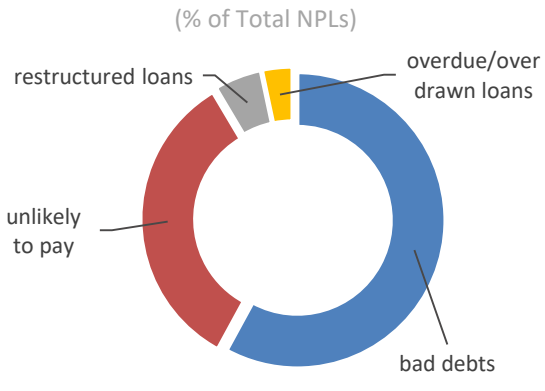
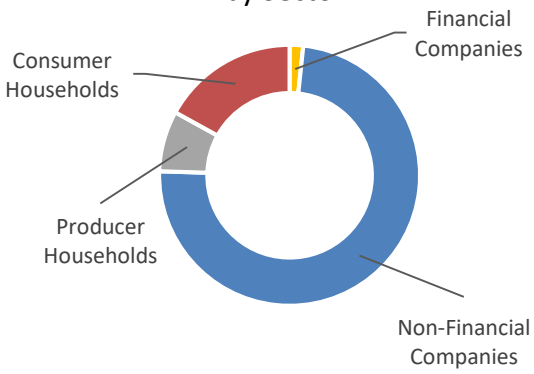



Figure 1.9 (b) - Bad Debts: Breakdown by Sector



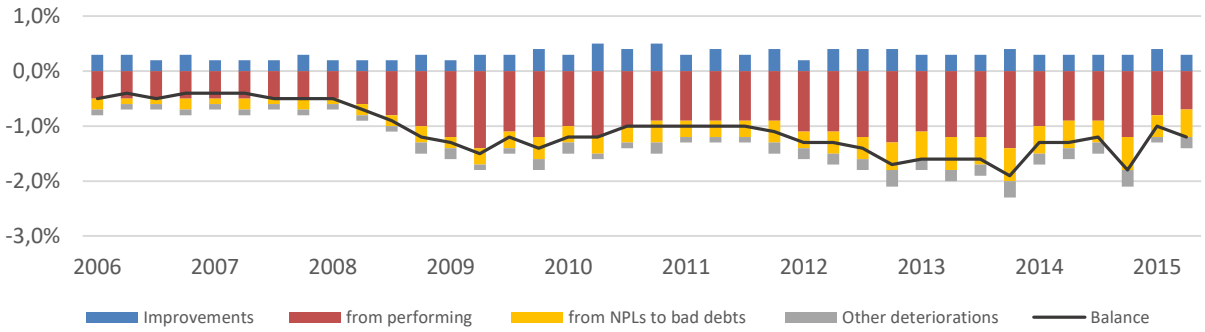

Source: Bank of Italy, Statistical Bulletin (December 2016).

The rate of new bad debt is increasing, differently from the rate of new NPLs, which is slightly decreasing. This increasing trend is ascribable to the reclassification of loans that were already included in the non performing class and further deteriorate.

Figure 1.11 shows the movements of loans between the different categories of credit quality. The relative data are calculated as the balance between the shares of loans whose quality deteriorated or improved in the preceding years.

The improvements are quite small, between 0.2 and 0.4 per cent in the period 2006-2015, while the deterioration of asset that were considered performing the previous year is quite large, on average 0.9 per cent in the period. The balance is certainly negative, indicating a progressive deterioration of assets and a progressive transaction of assets toward the worse categories.

Figure 1.10 - Deterioration Between Categories




Source: Bank of Italy, Financial Stability Report No.2 2015.

Provisioning coverage has not kept pace with the rise of NPLs. The average provisions of capital for Italian banks has declined from 54 per cent of the gross NPLs in 2007 to a low of 39 per cent in 2012. As a result of the Bank of Italy's special loan inspections and in preparation for the European AQR, provisioning coverage has subsequently increased to 45 per cent in 2014. The improvement, however, can be explained also by the changes in the template used to identify the non-performing exposures with the implementation of the new EBA harmonized definition. At end-2016, the coverage ratio for Italian banks is equal to 46.8 per cent.

Dividing Italian banks on the basis of the size, the greatest coverage ratio characterizes small banks, while minor banks have a ratio of loan loss provisions below the level of the overall banking system.

The division proposed by the Bank of Italy refers to the composition of banking groups at the end of 2015. The five largest groups category includes Unicredit, Intesa Sanpaolo, Monte dei Paschi di Siena, UBI Banca and Banco Popolare. The other size classes refer to banks with total assets greater

than €21.5 billion, between €3.6 billion and €21.5 billion, and below €3.6 billion, respectively. The sample does not include Italian branches of foreign banks.

Figure 1.11 (a) - NPL and Coverage Ratio

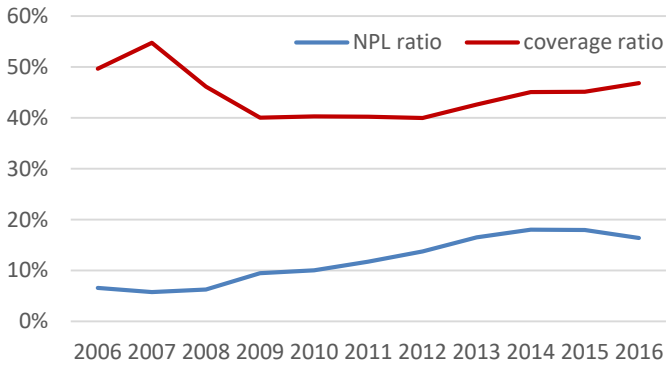
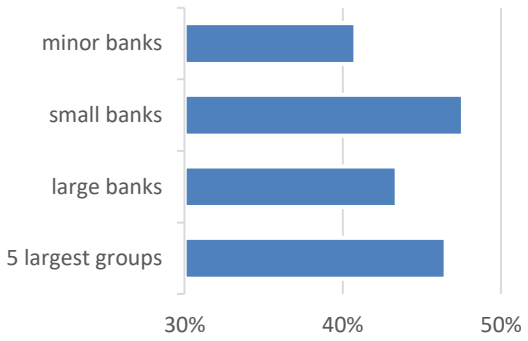



Figure 1.11 (b) - Coverage Ratio: Size Classes




Source: (a) IMF Financial Soundness Indicator; (b) Bank of Italy, Financial Stability Report 2016.

While the coverage ratio is slowly increasing, the pace of NPLs write-offs has slowed.

The practices concerning write-offs are heavily influenced by fiscal and judicial requirements, together with prudential considerations. Chapter 3 will analysis these aspects in details.

The slow pace of write-offs is an important factor in the rapid build-up of NPLs: write-off is in fact one of the most efficient means of removing bad assets from banks' balance sheets.

Instead of selling them to third parties, Italian banks tend to hold on to NPLs, while pursuing internal loan restructuring efforts. In normal circumstances, this strategy would allow banks to gradually reduce the stock of NPLs as the flow of new bad debt declines with the recovery; however, in the context of prolonged recession, the inflow of new NPLs has remained high while write-off rates have not increased significantly, leading to a large accumulation of bad debts.

The situation is slowly improving as €9 billion worth of bad debts were sold in 2015, and by consequence derecognized from banks' balance sheets, twice as much as in 2014. The 80 per cent of the bad debts sold consisted of loans to firms, for a total amount of more than €7 billion.

The slow pace of write-offs in Italy stands in contrast with other countries that have experienced a rapid increase of NPLs. For example, after U.S. banks' NPLs reached 5 per cent in 2009, provision and write-off rates rose quickly, helping to push the percentage of NPL with respect to total gross loans to below their pre-crisis levels within 3 years. Similarly, in Japan after its banking crisis, aggressive supervisory policies reduced the NPL ratio of Japanese banks from 8.5 per cent in 2001, to below 2 per cent in 2005. In contrast, NPLs in Italy and the euro area as a whole continue to rise, reflecting in part slow write offs and sales rates.

As sad before, the inefficiency of the Italian judicial system is one of the factors explaining the difficulties of the Italian banks in recovering the amount associated with an exposure which falls under the conditions necessary to be qualified as non-performing.

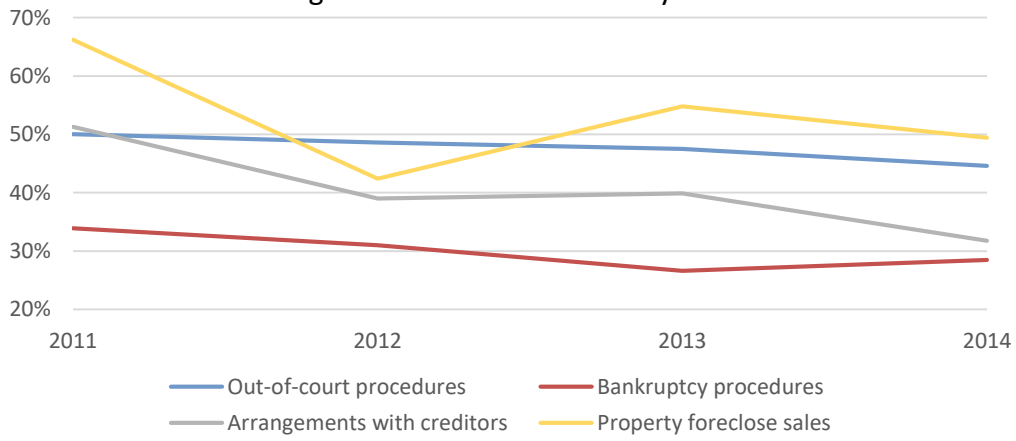
Banks indicate that court backlogs and the complexity of the procedures were the main impediments to effective credit recovery. In their view, restructurings are delayed mainly by the difficulty of providing new credit after the start of the procedure, professional fees, and coordination obstacles with non-financial creditors.

In 2015, the Bank of Italy conducted a survey on the effectiveness of the processes for managing non-performing loans at 25 large Italian banking groups to obtain information on recovery times and rates, the use of the different procedures, and the chief impediments to effective credit recovery (Carpinelli and others, 2016). The recovery rate for liquidation procedures in the period 2011 - 2014 is on average equal to 40 per cent, under 30 per cent for bankruptcy and just above 50 per cent for foreclosure sale. Regardless the type of procedure, the overall percentage of recovery in the period declines, reflecting the growing difficulties in selling defaulted firms' assets on the market considered the unfavourable cyclical circumstances. This kind of data are unfortunately not comparable with the coverage ratios, since they do not refer to individual loans.

With respect to the time of recovery, it strongly depends on the type of procedure used by the bank to deal with the liquidation.

The graph represented in Figure 1.13 shows the procedures under way at the end of 2014: the average period of time in which the liquidation had been open is 3.5 years. Moreover, the great majority of the volume refers to procedures open for less than four years, probably pushed by the recession after the 2008 crisis.

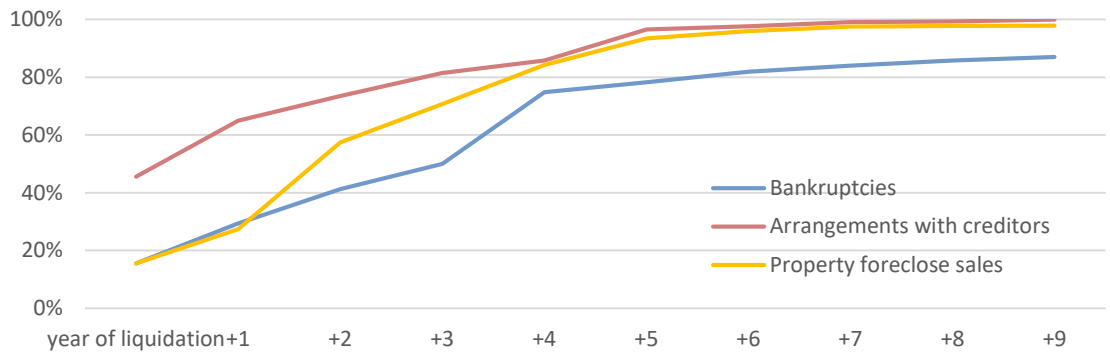
Figure 1.12 - Overall Recovery Rate




Source: Bank of Italy, Financial Stability Report (April 2016).

The Bank of Italy survey collected information also on the characteristics of the restructuring procedures, whose purpose is to enable firms to stay in business differently from liquidation ones. At the end of 2014, the restructuring procedures had been open for an average of 1.8 years and almost 90 per cent of the volume refers to procedures under way for less than three years.
It is important to remark than restructuring is rarely the definitive solution; four years after their inception 62 per cent were still under way, 23 per cent had been transformed into liquidations, 10 per cent had been concluded successfully with a return to equilibrium, and the remaining 5 per cent with the acquisition by other firms.

Figure 1.13 - Cumulative Share of Overall Recovery




Source: Bank of Italy, Financial Stability Report (April 2016).

According to the Financial Stability Report of April 2016, on average, loans to firms subject to restructuring are backed by collateral security for 50 per cent of their total amount, 8 per percentage points more than loans to firms on liquidation. This indicates than the willingness of the debtors to reach agreements with banks is directly proportional to the increase of the collateralized part of the loans.

# CHAPTER II – NPLs AND MACRO ENVIRONMENT

As explained in the first chapter, the problem of NPLs in Europe is quite severe and requires some special attentions because of the great impact that it has on the real economy. Although shocks affecting the financial system in terms of asset quality may arise from bank-specific factors, the theoretic literature confirms that macro-economic conditions affect asset quality and consequently banks credit risk. For this reason, the first section will present a brief review of the literature studying which are the macro-economic drivers of NPLs.

The chapter will then discuss the structural obstacles responsible for the limited pace at which European banks address their problem loans, with special regards to the Italian banking system. The analysis underlies how the existence of interrelated impediments to NPLs resolution is due to both supply and demand side: on the one hand, banks find inconvenient to sell NPLs because of their inadequate level of provisions and the unfavourable tax treatment; on the other hand, demand factors such as legal obstacles imposed by the insolvency law and the inefficiency of the judicial system further limited the incentives for banks to sell or write-off non-performing loans. This results in a wide bid-ask spread which leads inevitably to market failure, especially considering the existence of a severe problem of asymmetric information.

Indeed, despite the higher stock of NPLs, European banks write-off and disposing rates are not sufficient, especially if compared with those of U.S. banks, for instance.

## 2.1 - MACROECONOMIC DRIVERS OF NPLs

Over past decades, the credit quality of loan portfolios across most banks in different countries was relatively stable until in 2007-2008 the financial crises hit the global economy. Since then, banks' asset quality deteriorated sharply across almost all banking systems, due to many factors related with the global economic recession.

Obviously, the main factor affecting the amount of NPLs a bank holds is the ability of the bank itself to assess potential borrowers' creditworthiness and the associated credit risk. The risk of the credit, is in general measured using some common indicators such as probability of default, loss given default and exposure at default. The common practice in risk management recommends then the use of different assessment models for various asset classes, in order to make the loan approval process automatic and based on objective criteria. The automation inevitably reduces the costs,

simplifies the process and increases the level of control on the approval decision-making procedure (Nikolic, Zarkic-Joksimovic, Stojanovski, Joksimovic, 2013).
Clearly, a loan that initially performs normally may further deteriorate because of changes in the personal conditions of the borrower, or because of a systemic shock which negatively impact not only the financial markets, but also the economic system as an all (Patro, Qi, Sun, 2013).

As a consequence, even if the credit risk assessment by banks has to rely mostly on individual factors affecting the capability of the potential borrower to repay the loan in the future, they have to consider some important macro-economic determinants in order to obtain a complete framework of applicant's risk and to avoid incurring in asset quality issues in the future.
In environment with a low risk concerning macro-economic factors, the weight of idiosyncratic risk is higher, and therefore the approval decision-making process has to focus on the financial indicators of loans applicants.

However, it is well known that the systematic risk is significantly higher in banking sector if compared with other industry sectors, and this strong dependency is driven by common factors, rather than idiosyncratic factors (see for instance Fiordelisi and Marques-Ibanez 2013). Consequently, in the case in which the conditions of many borrowers are acceptable and the bank does not consider in the proper way the macro-economic factors, a credit boom may arise, and a credit boom is one of the best indicator of a financial crisis and may compromise the market stability.

Thanks to vast number of studies confirming the role of macro-economic factors in affecting the future stock of NPLs, it is now well accepted that they are central for access credit risk and capital structure decisions. Even if the empirical literature analysing the problem is vast and diverse[1], it leads to a common conclusion: there exist a positive and significant relationship between economic growth and asset quality[2] (see Table 2.1).
In most of the cases, the relationship is studied relating the phase of the business cycle with the economic stability. The basic idea is that the expansionary phase of the economy is characterized

[1] The classical literature studying the interactions between macroeconomic factors and financial fundamentals goes back to the models of King and Plosser (1984), Bernanke and Gertler (1989), Kiyotaki and Moore (1997) and Bernanke, Gertler and Gilchrist (1998).

[2] This has already been shown in numerous papers, for instance Athanasoglou, Brissimis and Delis (2008) or Beck, Jakubik, Piloiu (2013).

by a relatively small amount of bad loans, as companies and consumers have sufficient revenue to cover their debts in predetermined schedule.

In general, studies modelling NPLs considering the explicit role of the business cycle offer a good basis for the theoretical analysis because they account for the cyclical nature of counterparty and credit risk (Williamson, 1987).

Nevertheless, what differs is the measures of asset quality used in these papers. Most of the studies used the development of expected default frequencies, loan loss provisions, loss given default and NPLs as a measure of asset quality. In the case in which the appropriate data are available, probability of default can be modelled directly (as for example, in Hamerle, Liebig and Scheule, 2004) or indirectly (see for example Fungačová and Jakubík, 2012**)**. On the contrary, if it is no possible to gather these information that are usually unavailable, NPLs data are used as measure of the credit risk.

Among others, the factor that is usually cited by the literature as key determinant for the NPLs is the real GDP growth rate[3]. The intuition is that higher levels of GDP growth lead to higher levels of income and so to an improvement in borrowers' financial conditions and repayment capacity. When there is a positive growth in terms of real GDP, the stock of bad loans will decrease improving the overall stability of the system.

Together with the economic growth, the second factor considered is the interest rate. According to the findings of Espinoza and Prasad (2010), who used a dynamic panel over 1995-2008 on sample of banks in the Gulf Cooperation Council, lower economic growth and higher interest rates have a negative impact on credit quality, implying an increase in NPLs. Moreover, the paper also finds that there exists a negative relationship between lagged credit growth and bad assets. Nkusu (2011), who studied the relationship between NPLs and macro-economic factors through a panel vector autoregressive on a sample of 26 advanced economies from 1998 to 2009, confirms these results. The author concludes that there is a significant relationship between the quality of banks' assets and macro-financial vulnerabilities.

Much of the empirical literature modelling the determinants of NPLs is based on country specific models.

Jimenez and Saurina (2006), revising the previous work of Salas and Saurina (2002), analyzed the Spanish banking sector and find out that the factors affecting NPL ratio are GDP growth, real

[3] See, among others, Salas and Saurina (2002); Jimenez and Saurina (2006); Khemraj and Pasha (2009); Dash and Kabra (2010).

interest rates and credit conditions. Starting from this model, Khemraj and Pasha (2009) consider the exchange rate ad new macro-economic factor affecting credit quality beside the real GDP growth and the interest rate. The authors find that when there is an appreciation of the local currency, the NPLs ratio is expected to increase. Therefore, an appreciation in the real effective exchange rate implies a negative effect increasing the amount of impaired loans.

The model proposed by Louzis and others (2010) analyses the Greek banking system between 2003 and 2009 and, by using a dynamic panel data, they look at the factors affecting NPLs distinguishing between different loans categories. They conclude that there is a significant relationship between GDP growth, interest and unemployment rate and the stock of impaired loans. In addition, they state that mortgage loans, i.e. backed by a real estate security, are less sensitive than "standard" unguaranteed loans to changes in the macro-economic environment.

Similarly, the study of Quagliariello (2007) looks at the Italian banking system. The paper check whether loan loss provisions, NPLs and the return on assets follow a cyclical pattern and concludes that banks' behaviour, riskiness and profitability depend on the business cycle.

Also Bofondi and Ropele (2011) examined the Italian banking system in the period 1990-2010. They studied the impact of macro-economic determinants on the assets quality as measured by the ratio of new NPLs, taking in consideration also the nature of the borrowers. Their model states that a limited number of mainly macro-economic variables affect both category of borrowers, individuals and businesses, together with important factors as level of debt and cost of borrowing.

Finally, Roland Beck, Petr Jakubik and Anamaria Piloiu (2013) model the empirical determinants of NPLs using a unique data sample covering a large number of countries. They exploit cross-country differences in non-performing loan trends and yield more robust results. They confirm that real GDP growth is the main driver of the recent increase of NPLs, while in countries with specific vulnerabilities additional factors may affect asset quality: exchange rate depreciation has a negative effect on the stock of NPLs in countries with a high percentage of lending in foreign currency; moreover, a drop in stock prices also lead to a negative impact on loan portfolio value, especially in countries with large stock markets.

Recently, many supervisory authorities (in the European Union, in the United States and in the United Kingdom for example) has run some stress-test exercise in order to assess the conditions of the banking system in terms of stability and resiliency to problematic situations. In this type of exercise, the credit risk has a crucial role because of its impact on banks' balance sheets.

For this reason, a significant branch of the literature relates to stress-testing in order to model the link between the changes in macro-economic conditions and the credit risk[4]. Some of these studies underlie that the relationship between macro-economic shocks and credit risk exists but it is not linear (Drehmann, 2005; Jakubík, 2007).

In order to enhance accuracy in results, recent works on the topic substituted the classical static balance sheet method with dynamic approach allowing the balance sheet items to change over time in order to capture the impact of the lending rate on banks' capital and NPLs ratios[5].

While macro-economic determinants of credit quality have been analyzed deeply so far, there was a limited focus on the extent to which differing business models may explain differences in banks' risk parameters, mainly because of the difficulties in gathering non-public data.

This will certainly be one of the main aspects on which the economic research will focus in the near future to provide a complete view of the problem regarding NPLs.

[4] Pesola (2005); Boss, Krenn, Schwaiger and Wegschaider (2004); Peng, Lai, Leung and Shu (2003).

[5] The models of Jakubík and Schmieder (2008); Schmieder, Puhr and Hasan (2011).

Table 2.1 - Literature Review: Impact of Macro-Economic Conditions on NPLs

| Authors (year) | Region | Time Period | Main Findings |
|---|---|---|---|
| *country-specific analysis* | | | |
| Salas and Saurina (2002) | U.S. banks | 1998 - 1999 | Macroeconomic variables, especially real GDP growth as measure of the business cycle, have a strong effect on the level of NPLs. |
| Jimenez and Saurina (2006) | Spain | 1984 - 2002 | |
| Quagliariello (2007) | Italy | 1985 - 2002 | |
| Louzis and others (2010) | Greece | 2003 - 2009 | |
| *cross-country analysis* | | | |
| Bofondi and Ropele (2011) | 52 countries | 1990 - 2010 | There exists a significant inverse relationship between real GDP growth and NPLs; unemployment, interest rate and exchange rate have an impact on NPLs too. |
| Beck and others (2013) | 75 countries | 2000 - 2010 | |
| Espinoza and Prasad (2010) | 5 GCC countries | 1995 - 2008 | |
| Nkusu (2011) | 26 advanced economies | 1998 - 2009 | |
| *stress tests* | | | |
| Pesola (2005) | EU countries | 1980 - 2002 | Credit risk is explained by a limited set of variables for different economies. There can be a substantial increase in the default rates also in case of relatively minor changes of the macroeconomic environment. |
| Boss and others (2004) | CEE region | 2004 - 2006 | |
| Schmieder and others (2011) | | | |
| Jakubík and Schmieder (2008) | Czech Republic and Germany | 1994 - 2006 | |

## 2.2 – OBSTACLES TO AN EFFECTIVE RESOLUTION STRATEGY

The European market for bad loans is relatively small and underdeveloped, especially compared with the size of the stock of NPLs. At end-2013, for instance, despite a stock of NPLs several time bigger than in United States, the market value of transactions involving distressed debt in Europe was only €64 billion, while the same data referred to United States amounts to $469 billion (IMF, 2013). Looking at more recent data, Deloitte (2016) and KPMG (2016) highlight for example that despite a stock of €2,000 billion of non-core assets on bank balance sheets, of which about a half is constituted by NPLs, transactions involving distressed debts amount to slightly more than a €100 billion.

### *2.2.1 – THE PROBLEM OF ASYMMETRIC INFORMATION*

NPLs can be divided into two main categories. The first includes unsecured NPL, such as credit card debt, retail loans, etc., that have been most actively traded in the secondary. They are in fact simple to work out and there is sufficient transparency for investors regarding their value. Due to the unsecured nature of these assets, transactions usually take place at very low prices if compared to their book value, making it easier for investors to obtain their targeted returns.

The second category represents instead the secured NPLs, and so more complex loans, whose secondary market can be characterized by large asymmetric information problems. This second category, in contrast with the unsecured one, includes in fact loans that are more opaque and less granular, that are carried at much lower provisioning levels as banks value significantly the collateral. Consequently, as asymmetric information problem exists, in particular for collateralized loans, their secondary market can be characterized as a so-called market for "lemons" (Akerlof, 1970).

As in a classical market for lemon context, the buyer, who knows less about asset quality than the seller, fears that assets he is bidding for are of low quality, and by consequence bid a low price. The seller, who has an informational advantage and can distinguish between low quality and high quality assets, decides to trade only the former type, the "lemons". As a consequence, the market for the high quality assets fails.

In the case of NPL, the problem of informational asymmetry is additionally complicated by the fact that even the seller has not a perfect information concerning the quality (Fell and others, 2016).

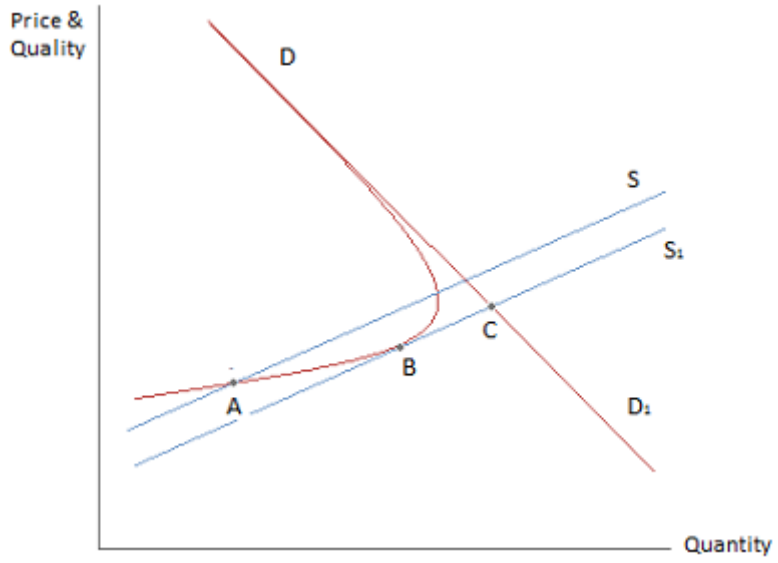
In the market for "lemons", demand function depends not only on price, but also on the average quality of the assets being traded:

$$d = 1 - p + \propto q$$

where $d$ is demand, $p$ is price, $q$ is average quality, and is positive $\propto$ a parameter that relates quality to demand.

As a result, in this situation multiple equilibria can arise (Figure 2.1).

Figure 2.1 – Market with Asymmetric Information




Source: Fell and others, 2016.

The supply curve positively intercepts the ordinate axis, at a level which depends on banks' ability to dispose of NPLs. In point A, the "bad" market equilibrium, only a small quantity of "lemons" is traded, a situation that is similar to the actual situation in Europe.

For these assets, banks face lower capital constraints, because of the higher prudential requirements; moreover, bid-ask spread may be lower than average, due to the little discrepancy between the actual and the perceived quality of these assets. Indeed, banks may also sell highly provisioned assets, as no additional losses would be realized in the process.

In this context, if the supply curve shifts downward, a better equilibrium is reached (B in Figure 2.1), although the overall gains remain limited. In fact, effort that involves only supply-side constraints leads to a limited relief in market functioning, given the unusual shape that the demand curve assumes in this case. In this sense, additional supply would not be absorbed by the market.

On the contrary, overcoming the problem of asymmetric information has greater potential to deal with market failure. Looking at Figure 2.1, if this problem can be addressed, then an improved equilibrium C is reached through improving demand (represented by the change in the shape of the demand curve).

A problem of asymmetric information may also arise from an inefficient cherry-picking behaviour of banks in deciding which assets to sell. They are indeed incentivized to retain the best assets and the best client relationships, trying to sell instead only the bad assets. Aware of this misleading behaviour of credit institutions and accounting for the effects of the adverse selection of the assets up for sale, the investors offer even lower prices, exacerbating the wide bid-ask spread.

### *2.2.2 – MARKET STRUCTURAL INEFFICIENCIES: SUPPLY AND DEMAND FACTORS*

A vast range of factors play a role in determining the low supply of NPLs.

The inefficient behaviour of banks is attributable first to the low provisioning, which held back sales and write-offs. In fact, when the level of provisions is not large enough, the write-off of a bad loan generates losses that are not attributable to bank's capital and directly decrease operating income. As a consequence, instead of realizing the loss through the sale, often they prefer to wait for an upturn in asset values.

Similarly, when the investor perceives the current level of provisions as not large enough, he further revises downward the bid and the sale of a NPL would imply for the bank a considerable loss with respect to the book value.

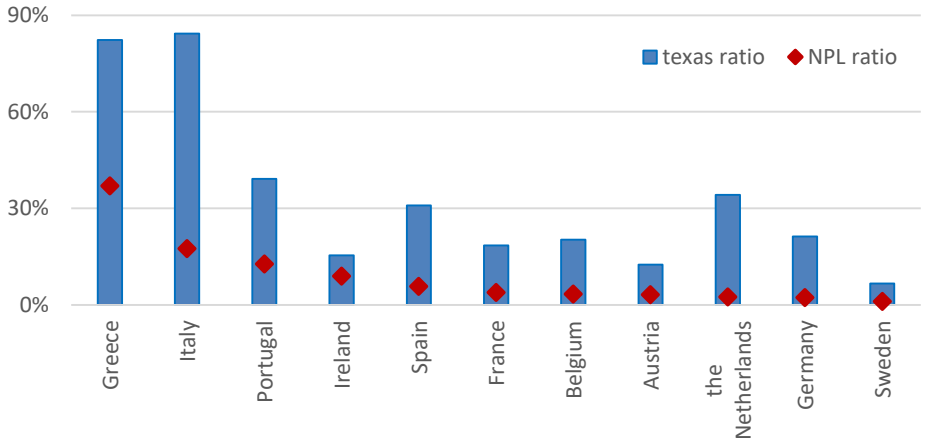
Another problem arises in the case in which there exists differences in provisioning rates across banks for the same borrower: in this circumstance, the pricing gap will reflect this discrepancy and the bank could face even some kind of creditor holdout problems when trying to sell problem loans.

In addition, banks often have the incentive to hold on rather than dispose of provisioned loans to maintain an adequate coverage ratio, the commonly used indicator to assess credit risk. In fact, if the bank writes-off loans that are fully provisioned, it obtains the twofold effect of decreasing both the level of overall provisions and the gross loans amount, which may determine a decrease in the coverage ratio. Thus, in the case in which the reduction in gross loans is higher than the reduction in provisions, the bank finds the disadvantages in term of coverage ratio predominant on the advantage of disposing highly provisioned problem loans. This happens in particular when the NPLs ratio is high and the bank is facing a situation of strong market pressure because to maintain its coverage ratio at an adequate level.

The low level of sales and write-offs may reflect then the bank's limited capital buffers, which are voluntary kept thin to absorb future credit losses. In this sense, the ratio indicating the share of unprovisioned NPLs on the total capital and reserves, the so-called Texas ratio, show how in countries with high levels of NPLs the capital cushions are low, highlighting banks' vulnerability to further credit losses.

For instance, as of June 2016, the Texas ratio for Italian banks stood at 84 per cent, well above those reported by all other European countries.

Figure 2.2 - Texas Ratio and NPL Ratio




Note: data referred to Q2 2016, with the exception of Germany for which latest available data are of enf-2014.
Source: IMF Financial Soundness Indicator.

Another supply-side factor related to banks' willingness to sell troubled loans may stem from banks desire to avoid incurring in the first-mover disadvantage effect. So, if the price offered by the investors does not compensate for these additional costs, supply may be low.

In addition, when the bank is strongly resilient on collateral and this guarantee given by the borrower provides an adequate level of coverage against future losses, it has no incentive to sell or write-off its non-performing loans because it holds a non-costly "call option" to wait for the loan value to recover in the near future and so prefers to wait and collect the recovery amount at the end of foreclosure process (IMF, 2015).

In Italy, according to the Credit Register data, banks remain strongly reliant on collateral: personal or real forms of guarantees cover over two-thirds of total loans, while one quarter of the loans to non-financial corporations are backed by real estate collateral.

An additional element that discourage banks from disposing of loans is the long-standing relationships that they have with their customers and the negative impact that this may have on their reputation. In general, relationship-based lending mitigate credit risk because it enables banks to gather private information that reduce the asymmetry in information and to better assess borrowers' creditworthiness. However, strong NPLs disposal may harm banks' business model and reputation, rising the likelihood of a prolonged resolution process and the costs for early NPL disposal.

Often, tax regime has a crucial role in explaining the reasons behind the slow pace of NPL resolution. Tax treatments of problem loans can in fact discourage banks from increasing capital provisions and from the write-offs of NPLs.

The tax regime applied to loan loss provisions and write-offs in Europe is in fact particularly unfavourable. The International Financial Reporting Standards (IFRS) do not provide any clear guidance on write-offs treatment and, in some cases, banks are forced to follow the rules stated for loans cancellation (derecognition), thereby being subjected to a stricter regime that delay the resolution process. Moreover, the accounting treatment of interest income allows for a recognition of interests on certain categories of NPLs, further reducing the incentive to remove them from banks' balance sheets.

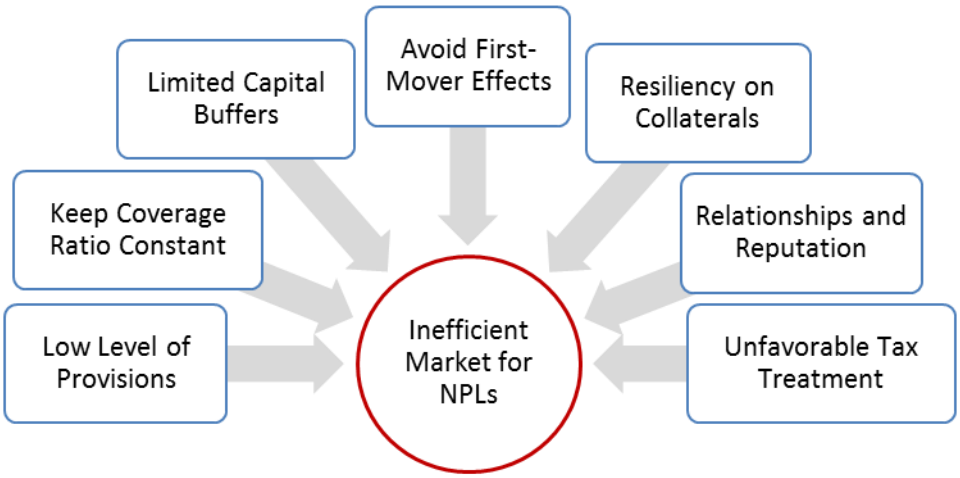
In this sense, the European Union is moving in the correct direction, implementing from 2018 the new IFRS 9, which will clearly distinguish between write-off and loan cancellation in order to force banks to write-off non-performing loans earlier.

Looking at Italy, until recently fiscal regulation allowed banks to deduct losses resulting only from circumstances of legal certainty and accuracy of loss amount which have to be confirmed by court judgements and formal declaration of insolvency. Without this legal certainty support, write downs could only be deducted within 0.30 per cent of the overall book value of the loans, while the remaining provisions were treated as a deferred tax asset deductible from taxable revenues over 18 years. Considering how judicial process in Italy ranges for 6 to 11 years depending on the region (IMF, 2014) and how banks structure their provisioning and write-offs policies also trying to avoid problems with the fiscal authority, the result is a longer timeframe for loan workouts.

The Growth Decree of June 2012, issued to encourage banks to write-off or sell NPLs, provides for the tax deductibility of provisions and write-off in equal instalments over five years with a higher tax rate. The regulation is still more restrictive with respect to other countries, but if compared to the past it represents a significant step forward. More recently, the Italian Government

intervened on the bankruptcy regulation. In particular, since 2015, new write-downs and write-offs are now fully deductible, changing the previous rule by which they were deductible only over five years. As a consequence, the amount of deferred tax losses on banks' balance sheets will be reduced, and the competitive handicap affecting Italian banks at international level is eliminated. In addition, the change in the regulation makes more prudent loan valuation policies less costly and ends the forced loan to the Treasury, implicit in the previous deductibility instalments.

Figure 2.3 – Supply Factors




Consider now the demand factors affecting this lack of effective resolution measures.

First, the lengthy and inefficient judicial process negatively affects the costs of foreclosure. As a consequence, insolvent debtors may be aware that collateral cannot quickly be enforced and therefore may not cooperate with their creditor. In addition, performing debtors may strategically choose to default, as the process of collateral realization is slow and does not act as an effective deterrent. As the time for recovery may be long and unpredictable, future cash flows from NPLs may be discounted at excessive rates, additionally decreasing demand side of the market.

The World Bank, in the Doing Business Report, measures the average time needed in a country to resolve insolvency. Even from the graphical representation in Figure 2.4, it is clear than in countries such as Greece, Italy, or Portugal the severe conditions in terms of NPLs ratio is additionally worsened by an inefficient legal system.

In Italy, amendments to the Code of Civil Procedure in 2015 aim to make procedures shorter and more efficient, simplifying court proceeding for forced sales of collateral.

The new rules regulating public auctions state that bids can be accepted even at a price below the asset's estimated value, only if lower not by more than one quarter. Moreover, the new regulation

simplifies the mechanism through which foreclosed assets are assigned and so create an incentive for creditors to get the collateral assigned to them.

Then, the old method of publishing notices is replaced by a new on-line procedure in order to enhance the transparency of the whole process and its efficiency, better safeguarding the interests of both debtors and creditors. The measures are expected to shorten bankruptcy proceedings from their actual average length of over six years to an average between three and five years.

Figure 2.4 (a) - Time to Resolve Insolvency

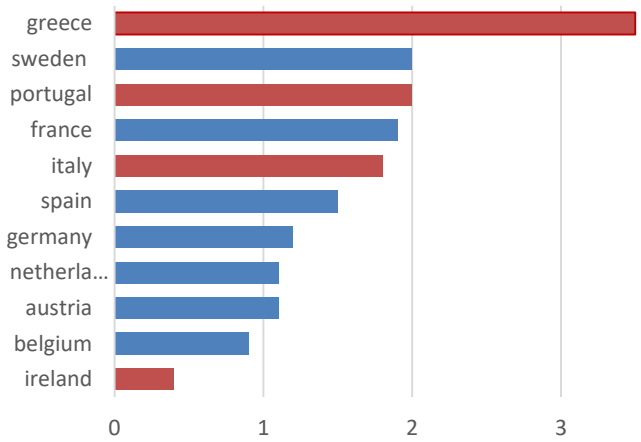
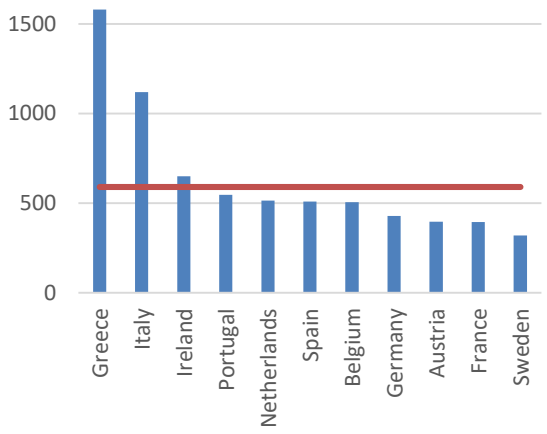



Figure 2.4 (b) - Time to Enforce a Contract




Note: panel (a) reports the data in terms of calendar years, while panel (b) measures the time in terms of days.
Source: World Bank, Doing Business Report 2015.

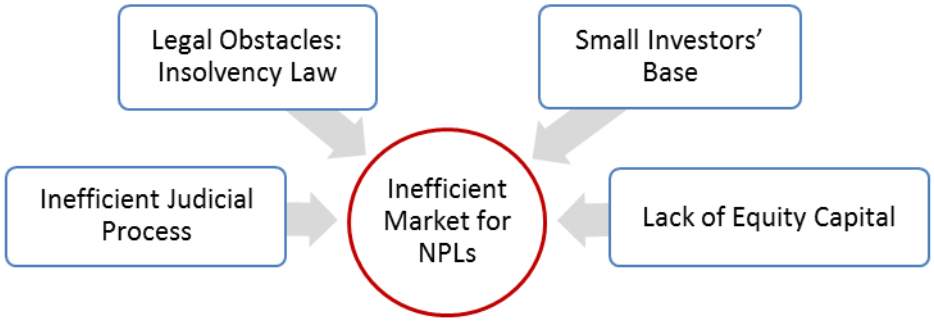
Second, the insolvency law is itself a detrimental factor for demand. A sudden shock on NPLs levels may originate capacity bottlenecks especially in inefficient judicial systems, thus deterring investors from buying NPLs or inducing them to bid lower prices.

In Italy, since 2005, various modifications of the insolvency system have allowed for both out-of-court and court-led restructurings alternatives, in order to make the procedure more efficient. In 2007, the Italian legislator introduced the so-called *Concordato Preventivo*, which quite replicates the US Chapter-11 procedure for resolving insolvency. The new instrument allows the debtor to find an agreement with creditors and grants an automatic stay against precautionary judgements or enforcements for a period of less than 180 days. Despite these interventions, the pace of insolvency remains low and induces the Government to further intervene in order to remove the legal and fiscal obstacles to the development of a market in impaired loans.

With 2015 reform, the Italian Government issued some changes of bankruptcy law and of the Code of Civil Procedure with the main objective to make bankruptcy and enforcement procedures more effective and shorter, and to make loan write-downs and write-offs immediately tax deductible.
With respect to Bankruptcy Law, the main changes regard the tools for addressing corporate crisis, in particular the agreements with creditors and out-of-court settlements.
In fact, the reform introduces measures act to increase creditors' recovery rates and incentives for debtors to choose restructuring procedures as an alternative to asset liquidation. In addition, the reform introduces a new type of out-of-court settlement for firms whose debts to banks is greater than the 50 per cent of their total liabilities. In the case in which the banks hold more than the 75 per cent of the firm's liabilities, the agreement becomes binding also over dissenting creditors. This new form of agreement neutralizes any opportunistic behaviour of minority creditors.

Finally, an additional reason behind the lack of an efficient market for impaired loans may be related with the structural characteristics of the financial system. In particular, small investors' base and the lack of equity capital can be the causes of the great stock of NPLs locked in banks' balance sheets in countries whose financial systems have these as peculiar elements.
In fact, if on one hand banks face additional difficulties in corporate restructuring because of the capital requirements they have to comply with for holding converted equity pursuant to Basel III regime, on the other hand, private equity or restructuring funds, which are better equipped in term of risk capital and could properly address the problem, are usually small or not well developed.
In Italy, for example, private equity occupies a small share of the financial market, with an amount of transactions limited to an amount around €3 billion per year (IMF, 2015). Moreover, in Italy pension funds and insurance companies tend to follow a conservative portfolio strategy, with a small share invested in distressed debt or other alternative assets.

Figure 2.5 – Demand Factors



In order to summarize the previous discussion, it may be useful to refer to the study promoted by Aiyar and other (2015) on the experience in NPL resolution in Europe. The analysis involves nineteen European countries with a NPL ratio higher than 10 per cent in the period between 2008 and 2010, of which nine are euro area members[6], and ten cross-border banking groups operating in these jurisdictions[7]. The study is composed by two part: a "country survey", completed by country supervisory authorities, and a "bank survey" reflecting instead banks' view.

The institutional obstacles are grouped into five areas:

(i) informational shortcoming
(ii) the supervisory framework;
(iii) the legal system;
(iv) distressed debt market, and
(v) the tax regime.

The legal framework and underdevelopment in debt markets are, one average, perceived as the most severe obstacles, even if the scores presented by the other areas, namely information, supervision and taxation, are not significantly lower. Therefore, the analysis concludes that there exist some interlinkages between the different types of obstacles. A second conclusion is that, as one would expect, greater severity of structural obstacles is associated with higher level of NPLs. On average, the perceived severity of the structural obstacles is lower for euro area countries than for non-euro area ones: the latter are facing greater challenges especially in terms of distressed debt markets, the tax regime, and the legal framework.

[6] Cyprus, Greece, Ireland, Italy, Latvia, Lithuania, Portugal, Slovenia, and Spain. The other countries involved are Albania, Bosnia and Herzegovina (from two separate jurisdictions), Croatia, Hungary, Iceland, Romania, Macedonia, Montenegro, San Marino, and Serbia.

[7] The banking groups involved in the survey are: Alpha Bank, Intesa, NBG, Piraeus, Pro Credit, Raiffeisen, Societe Generale, Unicredit, Eurobank, and Erste Group.

Table 2.2 - IMF Survey-Based Scores on Obstacles to NPL Resolution

| | Information | Legal Framework | Supervisory Framework | Distressed Debt Market | Tax Regime | Overall Score |
|---|---|---|---|---|---|---|
| **EA** | 2.6 | 3 | 2.5 | 3 | 3 | 2.8 |
| **EA** | 2.2 | 2.5 | 2 | 2 | 1 | 1.9 |
| **EA** | 1.4 | 2.3 | 1.8 | 3 | 1 | 1.9 |
| **EA** | 1.8 | 1.4 | 2 | 2 | 1.3 | 1.7 |
| **EA** | 2.4 | 2.4 | 1.8 | 2.7 | 2 | 2.3 |
| **EA** | 1.8 | 1.7 | 1.5 | 1 | 2 | 1.6 |
| **EA** | 1 | 2 | 1.3 | 1 | 2 | 1.5 |
| **EA** | 1.2 | 1 | 2 | 2 | 1 | 1.4 |
| **EA** | 1 | 1 | 1 | 1 | 1 | 1 |
| **NEA** | 2 | 2.5 | 2.3 | 3 | 1.6 | 2.3 |
| **NEA** | 1.8 | 2.1 | 2 | 2.7 | 2.8 | 2.3 |
| **NEA** | 1.7 | 2 | 2.3 | 3 | 2 | 2.2 |
| **NEA** | 1.8 | 2.3 | 1.8 | 3 | 2 | 2.2 |
| **NEA** | 1.8 | 2.1 | 1.8 | 3 | 2 | 2.1 |
| **NEA** | 2 | 3 | 1.5 | 2 | 1.8 | 2.1 |
| **NEA** | 1.3 | 2 | 1.5 | 3 | 2 | 2 |
| **NEA** | 1.8 | 2 | 1.3 | 2.5 | 2 | 1.9 |
| **NEA** | 1.8 | 2 | 1.5 | 2 | 2.3 | 1.9 |
| **NEA** | 2 | 1.7 | 2 | 2 | 1.2 | 1.8 |
| **NEA** | 1.8 | 1.7 | 1.5 | 1 | 2 | 1.6 |
| **Average** | 1.8 | 2 | 1.8 | 2.2 | 1.8 | |

Note: the country names are not shown at the request of the country authorities. EA stands for *euro area* countries; NEA indicates instead *non-euro area* countries. Scores range from 1 to 3, with 3 meaning high degree of concern. The reported score represents the max from country and bank survey.

*2.2.3 – THE WIDE BID-ASK SPREAD*

The information asymmetries and the structural inefficiencies presented in the previous sections are the main responsible for the wide bid-ask spread characterizing the market for impaired assets, which in turn explains why European banks do not usually sell or write-off problematic loans. Indeed, there exists a broad discrepancy between the price that investors are willing to offer and the price that would be at least neutral for banks in terms of their capital position.

For instance, according to the data collected by the Bank of Italy in 2016, Italian banks have on their balance sheet bad debts at net book value for an amount equal to 41 per cent of gross exposure value, while specialized investors are willing to buy them for an amount that on average is slightly above 22 per cent of gross exposure value. This gap of about 19 percentage points drastically hampers the development of an effective market for NPLs.

In order to understand how this gap is generated, the Bank of Italy proposes an interesting example (Ciavoliello and others, 2016).

The example considers an exposure classified as bad loans in bank's balance sheet with a gross book value of 100 and partially secured by a real guarantee. The bank expects only one cash inflow equal to 47 per cent of the gross exposure value, which will be collected in 4 years at the end of the recovery procedure.

Table 2.3 - Bank's and Investors' Valuation of Bad Loan

| Bad Loans Valuation | | Bank | Bank with Indirect Costs | Investor (IRR 15%) | Investor (IRR 25%) |
|---|---|---|---|---|---|
| Gross Exposure Value | ( a ) | 100 | 100 | 100 | 100 |
| Expected Value Collected at Maturity | ( b ) | 47 | 47 | 47 | 47 |
| Residual Time | ( c ) | 4 | 4 | 4 | 4 |
| Avg. Weighted Cost of Liabilities | ( d ) | - | - | 15% | 25% |
| Indirect Costs | ( e ) | 0% | 6% | 6% | 6% |
| Avg. Discounting Rate | ( f ) | 4% | 4% | 15% | 25% |
| Discounted Cash Flow | ( g = b/(1+f)^c ) | 40.2 | 40.2 | 26.9 | 19.3 |
| Indirect Costs | ( h = e*b ) | - | 2.8 | 2.8 | 2.8 |
| Net Book Value/Price | ( i = g-h ) | 40.2 | 37.4 | 24.1 | 16.4 |
| Expected Losses (Coverage Ratio) | ( a - i ) | 59.8 | 62.6 | - | - |

Source: Ciavoliello and others, 2016.

In order to translate the assumptions into the valuation of a position from bank's point of view, an additional specification must be made. According to IAS 39, banks have to discount the future cash flow on NPLs using original lending rates, which cannot be adjusted on the basis of the creditworthiness of the borrower. In the example, this is set at 4 per cent, consistently with the data collected during the 2014 asset quality review promoted by the ECB.
It is now possible to compute the net book value of the bad loan and it results equal to 40 per cent of the gross exposure amount, with a coverage ratio of 60 per cent.

Considering instead the investors' point of view, the method used to estimate the value of bad loans is completely different:

(i) they first deduct from the price the administrative expenses and the services fees they will incur during the future 4 years;
(ii) they aim for an internal rate of return which is higher than the discounting value used by banks, in order to be compensated for the risk associated to the loan recoveries and because of asymmetries in information in credit market.

There are at least three additional important factors that affect bank's and investors' process of determining prices.

(i) Indirect management costs effect*:* if for hypothesis a bank takes into consideration these costs, contravening accounting principles, it must increase provisioning as the present value of bad loan will be lower.
(ii) Rates of return effect*:* anecdotal evidence suggests that investors' IRR to acquire bad loans varies between 15 and 25 per cent, and this substantially influences the final valuation.
(i) Overall effect*:* as a whole, taking both indirect costs and IRR effect into account, the different approach used by investors would originate a price gap with respect to bank's valuation of between 13 and 24 percentage points of the initial gross exposure value.

# CHAPTER III – NON-PERFORMING LOANS AND GROWTH

Non-performing loans are problematic for a vast range of reasons, but the more concerning one may be the implication that a large stock of bad debts has on banks' lending behaviour, and consequently on growth. Banks which owns a significant amount of deteriorated assets seem to be inevitably constrained in their investment choices because of the impact that these have on their profitability and because of the significant amount of capital that they require, for instance.

The data reported in Figure 3.1 seem to confirm the thesis that in countries where banks report alarming levels of NPL ratio, credit growth remains slow in recent years, keeping levels even worse than those reported in the immediate after-crisis period in the biennium 2009-2011.

Figure 3.1 (a) - European Union

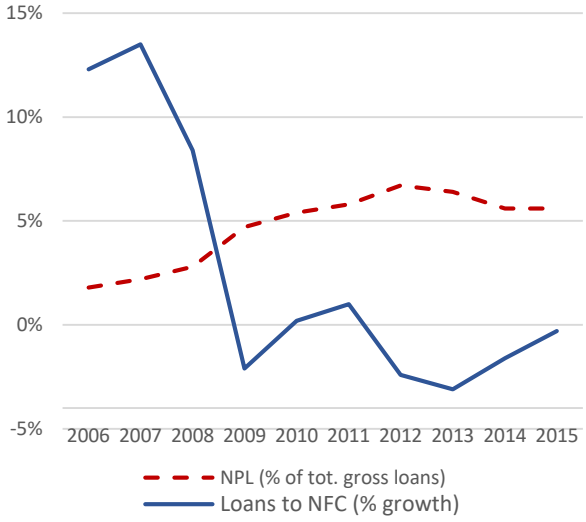
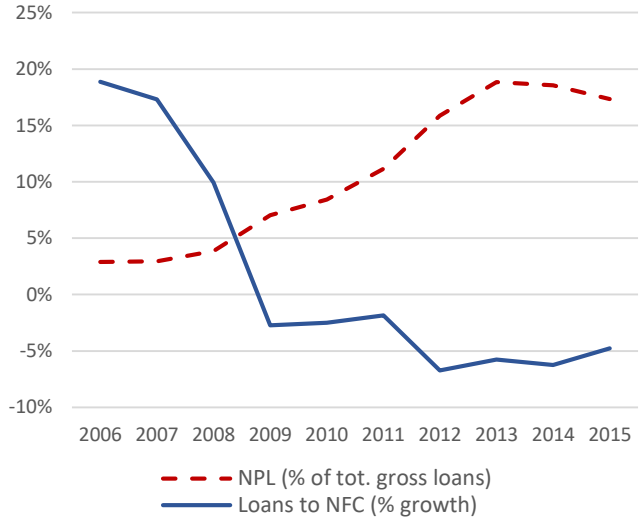



Figure 3.1 (b) - Distressed Countries




Note: panel (b) reports the average data for Greece, Ireland, Italy, Portugal, and Spain.
Source: IMF Financial Soundness Indicator and ECB Consolidated Balance Sheet Dataset.

The empirical literature provides strong evidences of a significantly negative effect of NPL on both GDP growth and credit growth.

The aim of this chapter is to analyse the main findings of the empirical studies examining the problematic relationship between NPLs and credit growth, and then to illustrate the main factors explaining it, considering in particular banks' perspective.

## 3.1 - EMPIRICAL LITERATURE REVIEW

The literature offers a large number of models and empirical analysis studying the feedback effect between the financial sector and the real economy.
Last chapter have present the macroeconomics dynamics driving NPLs, and the main explanation given regards the fact that adverse economic conditions impact borrowers' capacity to face their obligations and to repay their debt (Klein, 2013). The feedback from NPLs to real economy is instead traditionally identified through the credit supply channel.

For instance, Diawan and Rodrik (1992) suggest that when the level of provisioning is not adequate, a high NPL ratio increases the uncertainty concerning banks capital position and therefore limits their access to financing. As a consequence, banks are forced to increase their lending rates, negatively impact credit growth. Moreover, Mohd and others (2010) underlie how the high costs associated with the management of high NPLs negatively affect credit supply and therefore have strong implications for economic recovery.

However, the feedback effects from NPLs to the real sector of the economy have been analyzed by the empirical literature by considering channels alternatives to credit supply especially on a cross-country perspective.

Espinoza and Prasad (2010), for example, use a VAR model applied to a dataset composed by 80 banks of the Gulf Cooperation Council (GCC) region to investigate the consequences of an increase in NPLs on credit and growth. They find that an increase by 2.1 per cent in the NPL ratio reduces credit growth by 1.5 and 2.2 per cent after two and three years. Similarly, an increase equal to 2 percentage point in the NPL ratio reduces non-oil GDP growth by 0.8 per cent a year after the shock.

Similarly, Nkusu (2011) analysis investigates the feedback effects between the NPL ratio and its macroeconomic determinants in a panel VAR model, focusing on 26 advanced economies in the period between 1998 and 2009. He concludes that in developed countries, an increase in NPL ratio of 0.6 to 1.7 percentage points can trigger very adverse macroeconomic developments. With respect to GDP growth, the study finds that adverse responses of 0.6 to 1.4 per cent are significant in advanced economies whose median growth is only 2.5 percent.

The same topic has been examined by De Bock and Demyanets (2012) from a different perspective; they assess the vulnerability of emerging markets to financial shocks between 1996 and 2010 and

find that when non-performing loans increase, economic activity slows down. The analysis demonstrates through a panel VAR that worsening asset quality negatively affects GDP growth and finds that this slowdown is more pronounced if a decline in foreign portfolio inflows and a depreciation of the exchange rate accompany the positive shocks in NPL ratios.

The work of Klein (2013) investigates the feedback effects from the banking system to the real economy in the period of 1998–2011 in Central, Eastern and South-Eastern Europe (CESEE). Its results confirm that a negative and statistically significant relationship between NPL ratio and credit exists: a shock regarding NPLs causes a prolonged period of reduction in credit-to-GDP ratio, with important repercussions on economic activity. In this regard, a one percent increase in NPL ratio leads to a cumulative decline in credit-to-GDP ratio of 1.7 percentage points; the same shock results in a contraction of 1 per cent in real GDP over two years.

Finally, Bending and others (2014) confirm the existence of a negative effect of NPLs on lending, especially at the corporate level. According to their findings in fact, a 1 percentage point increase in the fraction of NPL on total loans causes a decrease in the rate of growth of credit to non-financial corporations by almost 3 per cent. The study then corrects for country-level aggregates, and finds that the effect decreases slightly to 0.8 percentage points, reaching a level almost equal to a third of the average corporate credit growth in the period between 2010 and 2013. If instead the changes in the total amount of NPLs is considered, a smaller impact is observed, equal to 0.03 per cent.

Table 3.1 – NPLs and Growth: Literature Review

| Authors (year) | Region | Time Period | Main Findings |
|---|---|---|---|
| Mohd and others (2010) | Malaysia and Singapore | 1995 - 2000 | High levels of NPL have a negative impact on cost efficiency since banks will incur in operating costs from non-value creating activities |
| Espinoza and Prasad (2010) | 5 GCC countries | 1995 - 2008 | Shocks on NPLs have a negative and significant impact on credit and real GDP growth. Impact of 1pcp increase on NPL ratio on lending/GDP growth:<br>• -0.4 pcp after one year, -0.7 pcp after two years (Espinoza and Prasad, 2010);<br>• -0.3 pcp, -0.2 pcp after one year (Nkusu, 2011);<br>• -0.5 pcp after one year, -1.7 pcp after two years (De Bock and others, 2012);<br>• -0.8 pcp, -0.6 pcp after two years (Klein, 2013); and<br>• -0.8 pcp after two years (Bending and others, 2014). |
| Nkusu (2011) | 26 advanced economies | 1998 - 2009 | |
| De Bock and others (2012) | 25 emerging countries | 1996 - 2010 | |
| Klein (2013) | 16 CESEE countries | 1998 - 2011 | |
| Bending and others (2014) | 16 euro area countries | 2004 - 2013 | |

## 3.2 - IMPACT ON BANK PROFITABILITY

According to a study by Aiyar and others (2015), for countries that rely mainly on the banking sector as source of financing, as is the case of the European Union, the high stock of NPLs constitutes a drag on economic activity mainly because of three interrelated factors:

(i) non-performing loans strongly increases banks' funding costs;
(ii) significantly harm banks' profitability, and
(iii) ties up a consistent amount of capital.

Looking at banks' profitability, the deterioration of asset quality has a negative effect on the sustainability of banks' provisioning policy. As credit conditions may reflect subsequent loans performance, an increase in NPLs ratio determines an increase in resultant provisioning needs, with the twofold result of pushing up the minimum lending rate that allows banks to keep their profitability constant and of putting pressure on interest rate margins from new lending (Diawan and Rodrik, 1992). In other words, even if it has set aside provisions in accordance with expected losses, in the case in which the asset quality suffers from a deterioration, a bank should increase the lending rate in order to raise sufficient resources to keep loan loss reserves at an adequate level (IMF, 2016).

Profits are then further reduced also by the great extent of human, organizational, and administrative costs needed to actively and efficiently monitor high NPL stock. In fact, the management of these distressed assets requires the bank to use a systematic and focused approach, which includes also the

(i) alignment of the business model with the regulatory requirements imposed by the supervisory authorities, as for example the creation of separate and dedicated in-house units for NPLs;
(ii) rigorous identification and categorization of the distressed assets;
(iii) generation of a standardized work-out, together with processes for the legal enforcement and the underwriting of the bad loans; and
(iv) development of structured financial products with the aim to drive the restructuring procedure[1].

[1] Alvarez and Marsal, 2016.

Clearly, allocating these resources to these no revenues generating items instead of use them to support new investment with a positive net present value, leads banks to systematically lose valuable opportunities because of their debt overhang (see for instance Mohd and others, 2010). It is important to remark that, while they require this considerable amount of resources, the NPLs do not produce any interest revenues, and generate so the so called 'negative carry' phenomenon, especially if they are locked in the balance sheets for a long period of time.

### *3.2.1 – COST OF CAPITAL*

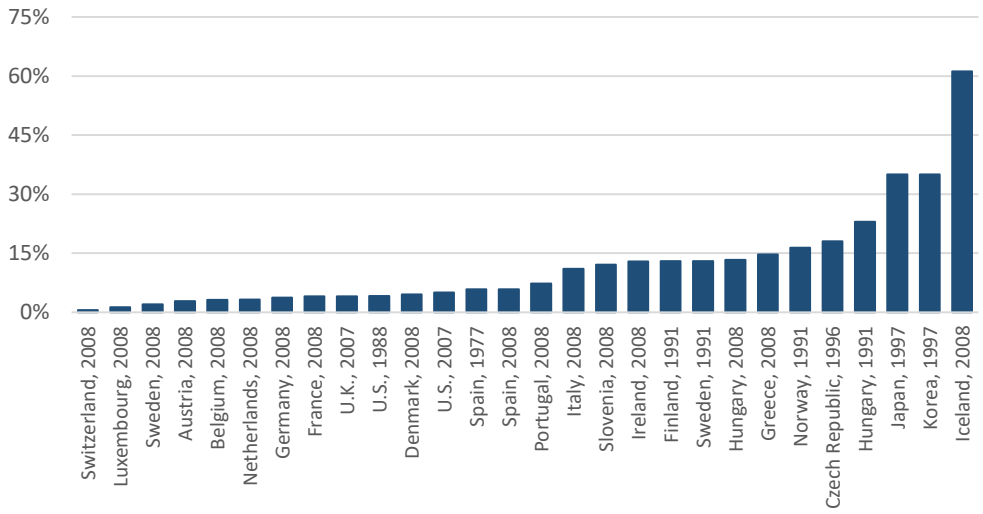
Beside the mentioned costs, an important source of expenditure for the bad loans is represented by the amount of capital used for holding these assets: even if adequately provisioned, they absorb in fact a significant amount of capital that could possibly support other investment projects which differently from NPLs are value generating assets.
The issue is to measure how much capital banks need to absorb loan losses and maintain a positive profitability, hence avoiding losses.

To this purpose, Dagher, Dall'Ariccia and others (2013) propose a four step procedure to estimate the capital that banks need during a crisis to absorb the losses generated by NPLs.

First, they collect data on NPL ratios during banking crisis in the past. Then, they convert these data into loan losses, adjusting NPL ratios for loss given default. Because of low availability of data regarding LGD, they use as proxy estimates for the United States, suggesting that the mean loss given default in the period 1970–2003 varied between 50 per cent on average in normal times and up to 75 percent during banking crisis[2]. Part of these losses can clearly be absorbed by prior loan loss reserves, assumed in this case to be equal to 1.5 per cent.

[2] See Schuermann 2004; Shibut and Singer 2014; Johnston Ross and Shibut 2015.

Figure 3.2 - Peak NPLs Ratios During Banking Crisis




Note: NPLs are shown for the peak year of the crisis; years represent the onset of the crisis.
Source: Dagher, Dall'Ariccia and others (2013), Leaven and Valencia (2013) and IMF Financial Soundness Indicator.

In the third step, the authors compute the capital ratio that would enable banks to completely absorb the estimated losses. They took bank capital equivalent to loan losses net of provisions and added an additional 1 per cent as "margin of safety". In order to convert the resulting unweighted capital in terms of risk-weighted assets (RWA), they applied a 1.75 ratio of total assets to RWA equal to the average such ratio for U.S. banks (Le Lesle and Avramova 2012).

The process of converting loan losses experienced during a crisis into the risk-weighted capital ratios needed to absorb them can be summarized by the following formulas:

$$Net\ Loan\ Losses = (NPL * LGD) - Provisions$$

$$Capital / Tot.\ Assets = (NPL * LGD - Provisions + Safety\ Margin)$$

$$Capital / RWA = Capital / Tot.\ Assets * (Total\ assets / RWA)$$

Looking at the results of this estimation, the baseline column of Table 3.2 illustrates the calculation of the capital necessary to cover a given share of NPLs in terms of total bank assets. There, a hypothetical 18 percent NPL ratio corresponds to 9 per cent loan losses, which net of provisions corresponds to the 7.5 per cent of total assets. To cover these amounts of loan losses with a margin of safety, a bank needs a risk-weighted capital ratio approximately equal to 15 per cent.

Clearly, the higher the LGD or the share of total assets in terms of risk-weighted assets, the higher will be the capital ratio needed to absorb completely the expected losses deriving from the NPLs.

Table 3.2 - Capital Needed to Absorb NPLs

| parameters | baseline | higher LGD (per cent) | higher Tot assets/RWA (per cent) | higher margin of safety (per cent) |
|---|---|---|---|---|
| 1. NPLs during a Banking Crisis | 18 | 18 | 18 | 18 |
| 2. Loss Given Default | 50 | **75** | 50 | 50 |
| 3. Loan Losses (1 * 2) (Mean point) | 9 | 13.5 | 9 | 9 |
| 4. Absorbed by Prior Provisioning | 1.5 | 1.5 | 1.5 | 1.5 |
| 5. Loan Losses Net of Provisions (3 – 4) | 7.5 | 12 | 7.5 | 7.5 |
| 6. Margin of Safety (Residual Capital) | 1 | 1 | 1 | **3** |
| 7. Capital to Assets Ratio (5 + 6) | 8.5 | 13 | 8.5 | 10.5 |
| 8. Total Assets/RWA | 175 | 175 | **250** | 175 |
| 9. Capital/RWA (7 * 8) | 14.9 | 22.8 | 21.3 | 18.4 |

Source: Dagher, Dall'Ariccia and others (2013).

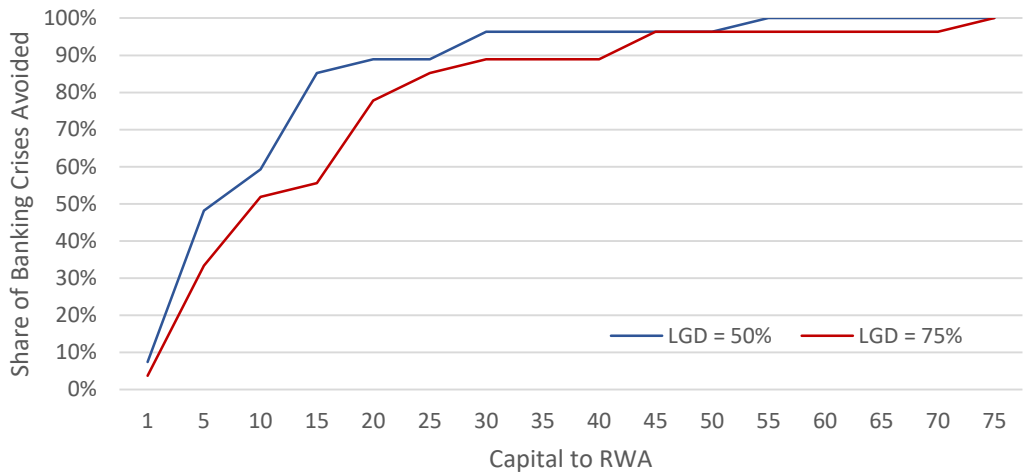
The analysis proposed by the IMF uses then the distribution of NPL ratios during the past banking crises to correlate each level of capital ratio to the share of banking crises in which it would have been high enough to guarantee a full absorption of the losses generated by the NPLs.

Figure 3.3 reports the function for both LGD mean value, equal to 50 per cent, and LGD during crisis, equal to 75 per cent.

The first schedule (LGD 50%) suggests that the marginal benefit of additional capital is relatively high when the capital ratio is below 15 per cent. A similar capital ratio would have enabled banks to avoid losses in 85 per cent of banking crises. After this threshold, the marginal benefit of additional capital declines rapidly. This means that absorbing losses in an exceptionally extreme crisis requires very high capital ratios.

When the LGD is instead equal to 75 per cent, the curve is shifted downward, meaning that in conditions of systemic crisis, the capital ratio that enables banks to absorb losses deriving from NPLs with a relatively high margin of safety is higher, which is by the way quite obvious.

Figure 3.3 - Share of Banking Crises without Creditor Losses




Source: Dagher, Dall'Ariccia and others. (2013).

In order to calculate the effective cost of capital for holding non-performing loans, even the method chosen by the bank to assess credit risk should be considered.

In fact, in the case in which the bank uses the standardized method, the capital charge for NPLs is approximately 12 per cent of risk-weighted assets. However, this cost applies only to those NPLs that are not collateralized or adequately provisioned. This approach is followed by almost all small and mid-sized banks.

On the contrary, when the bank uses internal rating-based models, the capital charge depends on the risk approach:

(i) if the bank is under the IRB foundation (IRBF) it has to deduct just the IRB shortfall[3];

(ii) if the bank is on the contrary under the Basel II IRB Advanced regime (IRBA), it has to add at the IRB shortfall an additional capital charge for gross NPLs, even if adequately provisioned, estimated on the basis of internal models.

This considerable amount of capital that banks have to keep to avoid losses, if released consequently to a reduction in the NPL ratio, can free up a significant amount of funds that could support new loans.

[3] The IRB shortfall is defined as "*the difference between expected loss amounts and credit risk adjustments, additional value adjustments and other own funds reductions for the purpose of own funds recognition*" by the EBA Final Draft RTS of July 2016. The RTS also specify that this difference should be calculated at an aggregate level, separately for the portfolio of defaulted and not defaulted exposures respectively.

For instance, Aiyar and others (2015) consider a representative sample of European banks, and assume that the NPL ratio returns to reach its historical average, equal to 3-4 per cent, while the capital adequacy ratio remains constantly equal to 16 per cent.

If the banks sell their bad assets at a price equal to their book value (and so net of provisions) an amount of capital equal to approximatively €54 billion will be freed up, creating a new lending capacity of up to €553 billion.

If the banks sell instead their NPLs at a uniform haircut of 5 per cent on net book value, the capital that will be freed up is approximately €24 billion, allowing banks to support new lending up to €247 billion. As long as the haircuts required increase, the capital freed up will be lower, reaching even negative levels in some cases. In general, banks required higher haircuts the longer the average time to foreclosure, determined by inefficiency of the enforcement system and the insolvency regime.

Clearly, considering how the distribution of NPLs among European countries is not uniform at all, countries such as Portugal, Spain, Greece, Italy, and Ireland will be characterized by a higher capital release.

# CHAPTER IV - EMPIRICAL ANALYSIS

After having deeply analysed the phenomenon of NPLs and having discussed how the theoretical and empirical literature explains the relationship between these non-performing assets and credit growth, the aim of this chapter is to propose an empirical study of the evolution of NPLs on banks' lending.

The research investigates the role that the stock of toxic assets held in banks' balance sheets may have on banks' behaviour. The main objective is to understand whether the relationship between the NPL ratio, i.e. the amount of non-performing loans on total loans, and the growth rate of the loans that banks give to non-Monetary Financial Institutions (non-MFIs) not only exists, but is statistically significant. The basic idea behind the analysis concerns the fact that bad assets leave a 'bad legacy' and so negatively affect the credit growth rate, further compromising the recovery of the real economy as a whole.

## 4.1 - DATA

The analysis relies mostly on

(i) the Balance Sheet Items dataset provided by the European Central Bank;
(ii) the statistics provided by the International Monetary Fund relative to the financial sector, namely the International Financial Statistics (IFS), the Financial Soundness Indicator (FSI), and the data contained into the Global Financial Stability Report;
(iii) the EuroStat Excessive Deficit Procedure statistics, and
(iv) the Wold Bank Doing Business report.

The first dataset collects information about the aggregate balance sheet of the monetary financial institutions sector, with the exclusion of the central banks for the EU countries. The aggregated balance sheet is obtained by making the sum of the balance sheets of all the resident MFIs.

According to the definition provided by the ECB, the MFIs sector includes central banks, money market funds, resident credit institutions, and other resident financial institutions which receive

deposits and which, for their own account, grant credits and/or make investments in securities[1]. All the MFIs resident in the euro area are obliged to report data from their accounting systems to the central banks of their country of residence, which in turn reports the national aggregates to the ECB. The balance sheet reporting system allows to supply monthly detailed data on the business of MFIs in order to provide to the ECB a comprehensive statistical picture of monetary developments in the euro area.

With respect to the statistics provided by the IMF, the analysis relies on the International Financial Statistics in order to gather macroeconomic data. The dataset covers in fact a wide range of topics from the balance of payments to government finance, from labour statistics to prices and GDP growth, for more than 200 countries since 1948.

The Financial Soundness Indicator dataset collects instead information aimed at supporting macro-prudential analysis. In particular, it has the objective to facilitate the assessment and the surveillance of the vulnerabilities threatening the stability of the financial systems, creating indeed a new area of statistics able to combine micro-prudential data and macro-economic statistics.

Finally, the data contained into the Global Financial Stability Report provide an assessment of the global financial system, focusing on current market conditions and highlighting in particular systemic issues that can harm the financial stability on an international perspective.

Furthermore, the analysis considers as a source of data the Excessive Deficit Procedure statistics collected by the EuroStat since 2009. They refer to data relative to the measures undertaken by the general government with the precise aim of supporting financial institutions adopted in each Member State after the burst of the financial crisis and the rise of concerns about the stability of the financial system.

In the end, the analysis collects data about the quality and efficiency of the enforcement system from the Doing Business database of the World Bank, which offers economic data since 2003 and is considered highly reliable. The database contains information about the time, the cost, and outcomes of the insolvency proceeding involving domestic judicial entities. These data are derived from questionnaire responses by insolvency practitioners, and confirmed by the study of the

[1] For further details on the definition, see ECB Explanatory notes on statistics on the Monetary Financial Institutions sector.

relative laws and regulations with the aim of identifying the weaknesses in existing insolvency law and the main procedural bottlenecks in the insolvency process.

Table 4.1 – Variables and Sources

| Variable Name | Source |
|---|---|
| Loans to non-MFIs | ECB - Balance Sheet Items |
| NPL ratio | IMF - Financial Soundness Indicator |
| Capital to Assets ratio | IMF – Global Financial Stability Report |
| Real GDP growth | IMF - International Financial Statistics |
| Government Support | EuroStat - EDP Statistics |
| Time to Resolve Insolvency | World Bank - Doing Business Report |

*4.1.1 - DEPENDET VARIABLE*

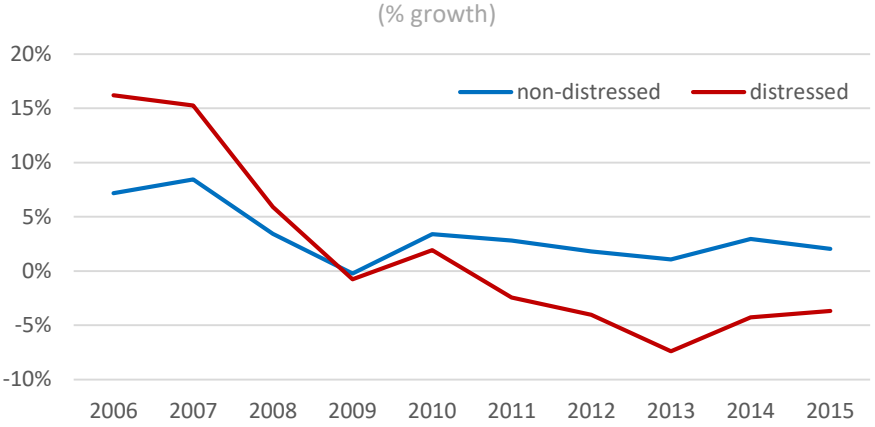
The analysis uses as dependent variable the annual rate of growth of loans granted by monetary and financial institutions, with the exclusion of the European System of Central Banks (ESCB), to domestic counterparties belonging to the non-MFIs sector, excluding the general Government.

The information relative to loans growth rates are contained in the asset side of the aggregate balance sheet and are further divided according to the sector and residency of the counterpart, the original maturity, and the currency of denomination.

They are collected by the ECB on a monthly basis but, for consistency and comparability reasons, the analysis transforms them in order to obtain data with an annual frequency. Furthermore, the information concerning the nominal amounts of loans granted by the MFIs to the domestic private sector are subject neither to seasonal nor working day adjustments.

As shown in Figure 4.1, credit growth in Europe is stagnating or even decreasing in some countries since 2007. Lending to private sector has contracted significantly since the outbreak of the financial crisis especially in the most crisis-hit countries, such as Italy, Ireland, Greece, Spain, and Portugal. The pattern is slightly different for *non-distressed* countries, which experienced a lower contraction in lending during the past decade. In the context of the current weak economic recovery, the trend of bank lending seems to gradually improve.

Figure 4.1 - Credit to Private Sector




Note: *distressed* countries comprises Italy, Ireland, Greece, Spain, and Portugal; *non-distressed* includes instead Austria, Belgium, France, Germany, the Netherlands, and Sweden.
Source: ECB, Balance Sheet Items.

### *4.1.2 - INDEPENDENT VARIABLES*

The analysis regresses the rate of growth of loans granted by MFIs on a set of explanatory variables with the aim of explaining which factors actually affects banks choices in terms of lending behaviour.

The most important regressor is for sure the NPL ratio (*NPL*), considered with a time lag of one period. The ratio is commonly used as measure of quality for banks credit portfolio, measuring the share of loans considered non-performing on the total gross amount of loans granted. As a result, the hypothesis is that an increase in bank's credit risk triggered by a shock in the NPL ratio induces institution to supply less credit in the future, skipping valuable investments opportunities because of past bad debts which absorb resources without creating revenues.
As a consequence, a negative sign is expected for the coefficient of this regressor.

The model controls then for the capital to asset ratio (*CA*), i.e. the ratio of bank capital and reserves to total assets, as a measure of banks financial strength from a regulatory point of view[2]. The nominator includes tier 1 capital and total regulatory capital, which incorporates different specified types of subordinated debt instruments, such as tier 2 and tier 3 capital. The denominator includes

[2] As an alternative, the ratio of tier 1 capital on total or risk-weighted assets could be used. However, the data have in this case a short time dimension, being available only from 2008.

instead both non-financial and financial assets. Also in this case the variable is included with a time lag of one period.

The relationship between bank capital and bank lending has been deeply studied by theoretical and empirical literature so far. The essential building block in this sense is the Modigliani-Miller theorem (Modigliani and Miller, 1958), according to which, in absence of market frictions, changes in the composition of a bank's liabilities should not affect the overall funding cost and, as a consequence, has not impact on lending growth. However, when the tax deductibility of interests, debt overhang (Myers, 1977), or the asymmetries in information (Myers and Majluf, 1984) are considered, and increase in capital has a negative impact on bank's funding costs and therefore on bank's lending[3]. As a consequence, the sign expected for the coefficient is negative.

In order to control for the general economic conditions which may drive also demand for loans, the model includes the rate of growth of real GDP (*GDP_growth*) as additional regressor (Gambacorta and Mistrulli, 2004; Klein, 2013). In this case, the hypothesis is that a positive shock of the growth of real GDP could lead to an increasing in bank lending rate, as during an expansionary phase of the business cycle the demand for credit increases and the banks are willing to lend with lower concerns about credit and counterparty risk.

Furthermore, the regression includes as explanatory variable a measure of government support to the financial sector (*Gov_Support*). This value refers to the net impact that direct government interventions aimed at supporting financial institutions have on the government deficit/surplus. The amount is weighted for 2015 nominal GDP.

The variable takes into consideration only initiatives undertaken by the government with the specific objective to sustain the institutions operating in the financial sector after the 2008 crisis, and therefore does not include wider economic stimulus packages.

By hypothesis, the greater the impact on government deficit of measures studied to support the financial system and so the extent of resources spent to sustain the credit institutions, the greater would be, consequently, the incentive for banks to increase lending.

Thus, in general the expected sign is positive. However, in some cases the measures provided by the government do not lead directly to an increase in lending, so also a negative sign may be expected.

[3] See for instance Jackson (1999) and Bridges and others (2014).

Finally, the last control is a variable measuring the time in calendar year needed to resolve insolvency (*Time_Resolve_Insolvency*). The time is measured starting with the company's declaration of default and ending with the repayment of a significant part of all the debts to the bank. In collecting the data, the World Bank takes into consideration also the tactical potential delays used by the parties, such as requests for extension or the filing of dilatory appeals.
The regressor is included with the objective of identifying weaknesses in insolvency law and in administrative procedures in the insolvency process which may disincentives banks to lend and creditors to apply for loans. Thus, the sign expected for the coefficient is negative.
Sometimes, due to multi-collinearity problems, the variable is omitted. In these cases, the model includes instead the variable measuring the time needed to enforce a contract from the Doing Business dataset as an approximation.

Table 4.2 reports the expected sign of the coefficient associated with each of the variable included in the model.

Table 4.2 – Variables and Expected Sign

| Variable | Expected Sign |
|---|---|
| Loans to non-MFIs | Dependent Variable |
| Loans to non-MFIs (t-1) | + |
| NPL ratio (t-1) | - |
| Capital to Assets ratio (t-1) | - |
| Real GDP growth | + |
| Real GDP growth (t-1) | + |
| Government Support (t-1) | + / - |
| Time to Resolve Insolvency | - |

### *4.1.3 – DESCRIPTIVE STATISTICS*

The sample considered for the analysis includes eleven countries belonging to the European Union, namely Austria, Belgium, France, Germany, Greece, Italy, Ireland, the Netherlands, Portugal, Spain, and Sweden. The panel dataset has a time dimension of ten years, from 2006 to 2015, for a

total of 110 complete observations. The banking systems of the countries included in the sample granted an amount of loans to their respective domestic private sectors equal to more than 92 per cent of the loans granted to private sector in the entire European Union. The countries belonging to the European Union, such as for instance Bulgaria, Czech Republic, Finland, or Hungary, are excluded from the sample because of lack in the available information or because of the short time dimensions of the data relative to their banking systems.

In the second part of the analysis, the sample is divided into two parts which contain, respectively, the data about *distressed* and *non-distressed* countries. In the first subsample are included observations for Greece, Ireland, Italy, Portugal, and Spain; in the second, observations for Austria, Belgium, France, Germany, the Netherlands, and Sweden.

The data used are collected at annual frequency. The information regarding particularly NPL ratios and Capital to Asset ratios, even if collected quarterly by the supervisory authorities, are usually not publicly available with an infra-annual frequency; in addition, the available quarterly data have often an even shorter time dimension.

Table 4.3 reports the summary statistics relative to both dependent and independent variables included in the model. For each of them, the number of observation is equal to 110, as long as the panel dataset includes 10 yearly observations for each of the eleven countries composing the sample.

Table 4.3 – Summary Statistics

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Loans to non-MFIs (growth rate) | 110 | 2.55% | 6.70% | -16.20% | 24.80% |
| NPL ratio, t-1 | 110 | 5.58% | 6.42% | 0.08% | 33.78% |
| Capital to Assets ratio, t-1 | 110 | 5.46% | 1.42% | 2.70% | 12.70% |
| Real GDP (growth rate) | 110 | 0.84% | 3.84% | -9.13% | 26.28% |
| Real GDP (growth rate), t-1 | 110 | 0.70% | 3.01% | -9.13% | 8.46% |
| Government Support, t-1 | 110 | 0.39% | 1.77% | -0.55% | 13.89% |
| Time to Resolve Insolvency (years) | 110 | 1.48 | 0.59 | 0.40 | 3.50 |

## 4.2 - ECONOMETRIC FRAMEWORK

The analysis aims at investigating whether a shock in the NPL ratio of the aggregate banking system translates into a decrease in the rate of growth of the overall amount of loans granted by the credit institutions, all other factors being equal.
It is conducted by using panel data techniques: this allows on the one hand to capture the country-specific effects and on the other hand to control for the unobserved differences between countries; moreover, this approach allows to take into consideration the biases deriving from both the omitted variables problem and from different forms of potential heterogeneity.

### *4.2.1 - STATIC PANEL ESTIMATION: FIXED EFFECT MODEL*

As first step of the analysis, the effects of the NPL ratio and of the other controls are measured by using fixed effects estimations in order to control for the time-constant unobserved heterogeneity between the different countries included in the sample. The use of this technique is justified also by the fact that the regression analysis includes variables that are all time varying and it is limited to a specific set of countries.
Indeed, the fixed effects method allows for an arbitrary correlation between the time-invariant components of the error term and the explanatory variables (Wooldridge, 2002) and so takes into account the country specific characteristics in estimating the coefficients. In addition, the fact that it controls for the country-specific components of the error term permits to successfully address the omitted-variable bias problem.

In order to confirm this reasoning and to exclude the hypothesis to use a random effect estimation, it is necessary to conduct an Hausman test. In this case, the test conducted on the data suggests that there is a strong evidence in favour of the fixed effect estimation instead of the random effect one.
The model is represented by the equations below:

$$Loans\_growth_{it} = \beta_1 NPL_{i,t-1} + \beta_2 CA_{i,t-1} + \beta_3 GDP_{growth_{i\,t}} + \beta_4 GDP\_growth_{i,t-1} + \beta_5 Gov\_Support_{i,t-1} + \beta_6 Time\_Resolve\_Insolvency_{i\,t} + e_{it}$$

$$e_{it} = u_{it} + f_i \tag{1}$$

$$E(f_i) = E(u_{it}) = E(f_i\, u_{it}) = 0$$

where $u_{it}$ is the idiosyncratic component of the disturbance term, $f_i$ is the fixed effect.

*4.2.2 - DYNAMIC PANEL ESTIMATION: GMM MODEL*

In order to capture the persistence of the growth of the loans granted, it may be useful to extend in the analysis by using a dynamic model including as explanatory variable the lagged value of the dependent variable itself. The general model of the data-generating process is similar to the one in the previous section:

$$Loans\_growth_{it} = \beta_1 Loans\_growth_{i,t-1} + \beta_2 NPL_{i\,t-1} + \beta_2 CA_{i,t-1} + \beta_4 GDP\_growth_{i\,t} + \beta_5 GDP\_growth_{i,t-1} + \beta_6 Gov\_Support_{i,t-1} + \beta_7 Time\_Resolve\_Insolvency_{i\,t} + e_{it}$$

$$e_{it} = u_{it} + f_i \qquad (2)$$

$$E(f_i) = E(u_{it}) = E(f_i\, u_{it}) = 0$$

Even in this case the disturbance term has to orthogonal components, the fixed effect $f_i$ and the idiosyncratic shock, $u_{it}$ .

The estimation of equation (2) may lead to several econometric problems:

(i) the process is dynamic, with current realizations of *Loans_growth* influenced by past ones: this gives rise to autocorrelation problems and to the so-called dynamic panel bias (Nickell 1981, Bond 2002);

(ii) the error term contains a time-invariant country specific component ($f_i$ in equation 2) that may be correlated with the explanatory variables;

(iii) the variable *GDP_growth* is assumed to be endogenous, and so correlated with the error term, because causality may run in both directions – from economic growth to loans expansion and vice versa; in addition, *NPL* and *CA*, even if predetermined, is not strictly exogenous as they may correlate with the past realizations of the error term;

(iv) the idiosyncratic component of the error term may follow patterns of heteroskedasticity and serial correlation; and

(v) the panel dataset considered in the analysis has a time dimension (T = 10) smaller than the country dimension (N = 11) (Roodman, 2006).

All the issues discussed above are addressed in the analysis by using the Arellano-Bond (1991) difference generalized method of moments (GMM) estimation, with robust standard errors.

Look first at the problem of dynamic-panel bias: the inclusion of the lagged value of the dependent variable in the regression makes the within-groups estimator to be both inconsistent and biased.
In general terms, under the within-groups transformation, the lagged dependent variable $y^*_{i,t-1} = y_{i,t-1} - \{1/(T-1)\}(y_{i2} + \cdots + y_{iT})$ and the error becomes $u^*_{it} = u_{it} - \{1/(T-1)\}(u_{i2} + \cdots + u_{iT})$. The sample is restricted to t = 2…T because of the inclusion of the lagged dependent variable as a regressor. The problem is that $y_{i,t-1}$ contained into $y^*_{i,t-1}$ correlates with the $-\{1/(T-1)\}u_{i,t-1}$ in term $u^*_{it}$, and, symmetrically, $-\{1/(T-1)\}y_{i,t}$ correlates with $u_{it}$. So, the transformation does not eliminate the correlation between the regressor and error (Nickell 1981, Bond 2002). If T were large, the problem would be solved because both $-\{1/(T-1)\}u_{i,t-1}$ and $-\{1/(T-1)\}y_{i,t}$ would be insignificant, but this is not the case in finite samples.

As an alternative to fixed effects estimation, the solution proposed by Kiviet (1995) handles dynamic panel bias by performing a least-squared dummy variable regression, and then correct the results for the bias. However, this approach works only for balanced panels and most importantly is not useful to address the potential endogeneity of other regressors.

As a result, the more practical strategy adopted by the literature has been to develop an estimation method that theoretically need no correlation.
What can remove directly dynamic panel bias is a different transformation of the data which is able to expurgate fixed effects while avoiding to make any observation of $y^*$correlated to every other for an individual, as within-groups estimation actually does.

According to Arellano and Bond, the solution needed to handle dynamic panel bias is a difference transformation. The following equation represents the commonly used ones.

$$\Delta Loans\_growth_{it} = \beta_1 \Delta Loans\_growth_{i\,t-1} + \beta_2 \Delta NPL_{i\,t-1} + \beta_3 \Delta CA_{i\,t} + \cdots + \Delta e_{it}$$
$$\Delta e_{it} = \Delta u_{it} + \Delta f_i = (u_{it} - u_{it-1}) + (f_i - f_i) = \Delta u_{it} \qquad (3)$$

Through first difference, the fixed effect is eliminated, but a potential endogeneity of lagged dependent variable persists, because the $Loans\_growth_{i,t-1}$ term in $\Delta Loans\_growth_{i,t-1} = Loans\_growth_{i,t-1} - Loans\_growth_{it-2}$ is correlated with the $u_{it-1}$ in $\Delta u_{it} = u_{it} - u_{it-1}$. Likewise, *NPL* or *CA* which are not strictly exogenous are now potentially endogenous because they may be related to $u_{it-1}$. However, longer lags of the regressors are still orthogonal to the error and can be used as instruments.

In order to solve this problem of endogeneity in the regressors, the simplest available instruments for $Loans\_growth_{i,t-1}$ are $Loans\_growth_{it-2}$ or, if the data are in the transformed form, $\Delta Loans\_growth_{it-2}$. In fact, both these values are related from a mathematical point of view with $\Delta Loans\_growth_{it-1}$ but do not correlates with the disturbance term $\Delta u_{it} = u_{it} - u_{it-1}$ as long as $u_i$ is not serially correlated. The same reasoning can be made for the endogenous variables, $NPL_{i\,t-1}$ for instance, for which the possible instruments are $NPL_{i\,t-2}$ or $\Delta NPL_{i\,t-2}$ respectively.

One possible way to incorporate these instruments is to use a fixed effects instrumental variable estimation (two-stage least squares or 2SLS), which leads to the Anderson and Hsiao (1982) difference and levels model. Although it performs poorly, this is a consistent estimation.
In order to improve efficiency, the approach can be extended using longer lags as additional instruments, with the aim of introducing more information. But the longer the lags used by the model, the smaller will be sample size, because observations for which lags are not available are dropped by the sample.

Even if the estimator has the name of Arellano and Bond, the instruments set and the use of GMM that define the difference GMM estimation procedure is originated with Holtz-Eakin, Newey, and Rosen (1988), who find a way to handle the trade-off between efficiency and sample size.
Being **X**, **Y**, and **Z** the N dimension matrixes of the independent variables, the dependent variable, and the instruments, respectively, while **E** is defined as **E** = **Y** – $\beta$**X**, a standard 2SLS would enter the instruments into **Z** in one column:

$$Z_i = \begin{pmatrix} . \\ y_{i1} \\ \vdots \\ y_{i,T-2} \end{pmatrix}$$

"." in the first row represents a missing value, which induces the elimination of that entire row from the dataset.
To overcome this problem, Holtz-Eakin, Newey, and Rosen built instead a series of "GMM-style" instruments by constructing a set of instruments from the second lag of the dependent variable, one for each time period, and by substituting zero for missing observations:

$$Z_i = \begin{pmatrix} 0 & 0 & \cdots & 0 \\ y_{i1} & 0 & \cdots & 0 \\ 0 & y_{i2} & \cdots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \cdots & y_{i.T-2} \end{pmatrix}$$

The inclusion of zeros prevents the loss of additional degrees of freedom, as happens when the 2SLS is applied. Even if this inclusion seems arbitrary, each column of **Z** will be orthogonal to the transformed errors and will represents a set of meaningful moment conditions

$$E\left(\boldsymbol{Z}'\,\widehat{\boldsymbol{E}}\right) = 0 \;\Rightarrow\; \sum_i y_{i,t-2}\;\hat{e}^*_{it} = 0 \;\text{ for each t} \geq 3 \qquad (4)$$

based on the expectations that: $E(\,y_{i,t-2}\,e^*{}_{it}\,) = 0$ where $e^*_{it}$ represents the errors after the first-difference transformation.

At this point, at which the trade-off between sample size and number of lags included has been resolved, it is possible to use all the available lags of the untransformed variables as instruments, where available: for predetermined but not strictly exogenous variables, lag 1 and up are valid; for endogenous variables, lags 2 and up have to be used.

Now, the instruments matrix is

$$Z_i = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & \ldots \\ y_{i1} & 0 & 0 & 0 & 0 & 0 & \ldots \\ 0 & y_{i2} & y_{i1} & 0 & 0 & 0 & \ldots \\ 0 & 0 & 0 & y_{i3} & y_{i2} & y_{i1} & \ldots \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots & \ddots \end{pmatrix}$$

In this setup, there are different numbers of instruments available for each time period and the number of instruments produced will be quadratic in *T*. Although these instruments are the basis for GMM estimation, the model allows the inclusion of other "external" variables treated as standard instruments.

Given these new set of GMM-style instruments, they can be used together with the usual IV-style ones in a 2SLS regression. This would expand the Anderson and Hsiao estimation and would lead

not only to a consistent estimate, but also to greater efficiency. Unfortunately, 2SLS is efficient under homoskedasticity, but after differencing the disturbances into $\Delta u_{it}$ can be correlated with $\Delta y_{i,t-1}$.

The only possible solution is the implementation of feasible GMM, which can directly address the problem by modelling the error structure in a more realistic manner, therefore making it better behaved in practice and more precise asymptotically.

Feasible GMM estimator is equal to

$$\hat{\beta}_{FEGMM} = \left\{ \boldsymbol{X}'\boldsymbol{Z}\left(\boldsymbol{Z}'\widehat{\Omega}\boldsymbol{Z}\right)^{-1}\boldsymbol{Z}'\boldsymbol{X} \right\}^{-1} \boldsymbol{X}'\boldsymbol{Z}\left(\boldsymbol{Z}'\widehat{\Omega}\boldsymbol{Z}\right)^{-1}\boldsymbol{Z}'\boldsymbol{Y} \qquad (5)$$

$$\text{where} \quad \Omega = E(\boldsymbol{E}\boldsymbol{E}'|\boldsymbol{Z})$$

Feasible GMM requires to estimate $\Omega^*$, the covariance matrix of the transformed errors.

As first step, the model requires the choice of **H**, the a priori estimate of $\Omega^*$, based on the assumption that $u_{it}$ are i.i.d. Then, using this assumption, and being $v_i$ the vector of the idiosyncratic errors for individual *i*, **H** is set equal to $I_N \otimes Var(\boldsymbol{v_i^*} \mid \boldsymbol{Z})$.

As second step of feasible GMM estimation, we proxy $\Omega^*$ with the robust estimate $\widehat{\Omega}_i = \widehat{\mathrm{E}}_i\widehat{\mathrm{E}}'_i$ built on the assumption that errors are correlated only within individuals and not across them.

With the choice, the estimation of the classic Arellano and Bond (1991) difference GMM estimator for dynamic panels is complete.

Comparing its performance with the OLS, within-groups, and Anderson-Hsiao estimators, Arellano and Bond find out that difference-GMM exhibits the least bias and variance in the estimation of parameters (Blundell and Bond, 1998).

### *4.2.3 – DIAGNOSTIC TESTS*

A crucial assumption for the validity of the GMM estimates is that the instruments are exogenous. The Sargan test, or Sargan *J* test (Sargan, 1958), for over-identifying restrictions is commonly used in standard estimations, while in the cases in which robust standard errors are used it is replaced by the Hansen *J* statistic (Hansen ,1982), with a similar structure and same null.

The hypothesis being tested is that the instruments as a group are exogenous, and so uncorrelated with some set of residuals. If the associated p-value is such that the null hypothesis cannot be rejected and therefore confirmed statistically, the instrumental variables are considered by this criterion acceptable, healthy, instruments.

The same statistics can be used to verify the validity of subsets of instruments, via a difference in Sargan/Hansen test, commonly known as *C* statistic.

Even if very useful, the Sargan/Hansen test is prone to weakness when applied to finite sample: for example, when the number of instruments is greater than the number of groups, the Sargan test may be weak. In fact, the test actually grows weaker the more moment conditions there are.

Beside the Sargan/Hansen test, Arellano and Bond developed a test to detect serial correlation in the idiosyncratic component of the error term, a phenomenon that can make some lags invalid as instruments. The full disturbance, $e_{it}$ is presumed autocorrelated given the fact that it contains the fixed effects component. This does not represent a problem because the estimator is built in order to eliminate this source of trouble.
On the contrary, if $u_{it}$ are autocorrelated of order 1, then some of the instruments are no longer valid: for instance, $Loans\_growth_{i,t-2}$ is endogenous to $u_{it}$ in the error term in difference, $\Delta e_{it} = u_{it} - u_{it-1}$, becoming a potentially invalid instrument.
Intuitively speaking, the null hypothesis of no first-order serial correlation is usually rejected, while the null of no second-order serial correlation, which detects the serial correlation in level, is not.

## 4.3 – EMPIRICAL RESULTS

The analysis investigates first the effect that lagged NPL ratio, contemporaneous and lagged real GDP growth, lagged capital to asset ratio, lagged government support, and time to resolve insolvency have on banks' lending.

Table 4.3 reports the estimated coefficients and their level of significance of the static panel estimation. By using a fixed effects model, it is possible to remove the effects related to the time invariant component of the error term, and to obtain estimations able to reflect the net effect of the predictors on the dependent variable.

In order to better assess the impact that NPL ratio as on credit growth, the analysis considers three different specifications: in the first one, the regression is run taking into considerations the observations for all the eleven countries included in the sample; in the second one, the effect is measured considering a sample composed only by the so-called *distressed* countries; finally, the third specification considers the observations regarding the *non-distressed* countries.

Afterwards the analysis will present all the differences in the three estimated models, highlighting how the role of NPLs on credit growth is substantially different in the three specifications.

Overall, the fixed effects model is able to explain the development of credit growth in the economies considered quite well, with the exclusion of the third specification, in which the predictive power of the explanatory variables is very low.

In general, the results from the fixed effects estimation confirm the existence of a causal relationship between the NPL ratio, and so the credit quality, and the rate of growth of credit granted by financial institutions to domestic private sector.
From a quantitative point of view,

(i) in specification (1), an increase of 1 per cent in the NPL ratio will lead to a decrease in credit growth of about 0.10 percentage points;
(ii) in specification (2), the same shock in the NPL ratio will be responsible for a decrease in the rate of growth of credit of 0.6 per cent;
(iii) finally, in the third specification, the estimated coefficient of NPL is still negative, but it is no longer statistically significant.

In other words, when the regression uses the full sample of countries or the one including only the *distressed* countries, the hypothesis of a negative causal effect of bad loans on banks' lending behaviour is confirmed by the model. When the sample analysed includes instead just the *non-distressed* countries, the estimation is not considered statistically significant, meaning that the relationship between the stock of NPLs held by banks and the credit growth in countries which are not facing financial difficulties cannot be defined as causal, being simply a correlation.

Then, findings suggest that the relationship between the capital to asset ratio and the credit growth rate is in general not statistically significant, even if negative as expected. Only in specification (1) the t-statistic confirms the causality of the effect. However, the level of significance is low.

The static panel estimation shows further that there exists a positive and statistically significant relationship between the contemporaneous real GDP and credit growth rates, which however is quite obviously expected. In fact, the rate of growth of real GDP represents measures the overall economic performance. According for instance to Calza and others (2003), in European countries there exists a long-run relationship between real GDP growth and lending growth which depend on demand factors but may also capture some supply effects. The macroeconomic environment

and the conditions of the economy in general have a role in determining, on the one hand, the choices of banks in terms of lending and, on the other hand, the demand for credit by firms and households.

Moreover, it is interesting to notice that government support seems to fail its role of encourage banks to increase lending: the relationship between government expense in measures undertaken the prior year to support the financial system is positive, but it is not statistically significant.

Finally, the model assesses whether the inefficiencies of the legal and enforcement system in case of default of the borrower influence banks' lending behaviour: the relationship between the two variable exists, and it is negative and statistically significant in (1), but with a very limited magnitude. In specification (2), the estimated coefficient is positive but lower in absolute terms, as lower is also its associated level of significance.

In the third specification, the variable measuring the time to resolve insolvency is omitted because of multi-collinearity in the data. In order to overcome this problem, the model includes in this third specification a different variable which can approximate the effect of inefficiency in the judicial system, i.e. a variable denoting the time needed to enforce a contract. In this case, the associated coefficient assumes positive value and is statistically significant; however, it is very close to zero, meaning that the impact of this variable is considered almost null.

Table 4.3 – Results: Fixed Effects Model

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| *NPL ratio (t-1)* | -0.978 | *** | -0.572 | *** | 0.165 | |
| | (0.143) | | (0.203) | | (0.854) | |
| *Capital to Assets ratio (t-1)* | -1.025 | * | -4.029 | | -0.844 | |
| | (0.549) | | (1.128) | | (0.627) | |
| *Real GDP growth* | 0.797 | *** | 1.143 | *** | 0.626 | ** |
| | (0.146) | | (0.241) | | (0.308) | |
| *Real GDP growth (t-1)* | 0.367 | ** | 0.756 | ** | 0.132 | |
| | (0.173) | | (0.282) | | (0.189) | |
| *Government Support (t-1)* | 0.01 | | 0.156 | | 0.550 | |
| | (0.271) | | (0.296) | | (1.152) | |
| *Time to Resolve Insolvency* | -0.115 | *** | 0.069 | * | | |
| | (0.033) | | (0.038) | | | |
| *Time to Enforce a Contract* | | | | | 0.117 | *** |
| | | | | | (0.016) | |
| *constant* | -0.043 | | 0.204 | ** | -0.077 | |
| | (0.057) | | (0.095) | | (0.039) | |
| Observations | 110 | | 50 | | 60 | |
| R-squared within | 62.97% | | 78.19% | | 30.08% | |
| R-squared overall | 38.88% | | 69.68% | | 8.47% | |

Note: the table reports the coefficients from the Fixed Effects estimation, with robust standard errors in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Specification (1) includes the observation for all the countries included in the sample; (2) includes instead the observations for the *distressed* countries, and so for Greece, Italy, Ireland, Portugal, and Spain; finally, specification (3) includes the observations for *non-distressed* countries, namely Austria, Belgium, France, Germany, the Netherlands, and Sweden.

As discussed before, the implementation of the static panel estimation leads in this case to some problems in econometric terms.

First, the fixed effects model includes as explanatory variables some regressors which are not strictly exogenous. In details, the real GDP growth rate is correlated with the error term in the regression and it is endogenous; NPL and capital to asset ratio, even if included with a time lag of one period, are not strictly exogenous, meaning that even if predetermined, they may correlate with past realizations of the error term. The violation of the strict exogeneity assumption causes the within-groups estimator to be both bias and inconsistent when applied to finite samples.

Furthermore, static panel data models do not take into consideration any kind of temporal dependency of the dependent variable. However, including some controls for the dynamics of the process may be crucial; the correct incorporation of the time dimension into the specification allows in fact to unravel different relationships between explanatory variables and to better assess their effects on credit growth. Although the estimated coefficient of the lagged dependent variable included as regressor are not meaningful, the inclusion of the dynamic component can highlight new path in behaviours and lead to properly identified causal effects.
However, when the lagged value of the dependent variable is treated as explanatory variable on the right hand side of the equation, the fixed effects model does not maintain the basic acceptable properties. Indeed, when the current value of *y* depends on its own past realizations, the hypothesis of strict exogeneity is violated causing the OLS, the GLS, and the within group estimators to be biased and inconsistent because of the so-called dynamic panel bias (see Section 4.3).
As discussed in details in Section 4.3.2, there exists various techniques to deal with dynamic panel data, but the most efficient one is Arellano-Bond difference GMM model.

So, in order to overcome these problems and to take into considerations the dynamics of credit growth, the second step of the analysis uses the Arellano-Bond estimator to investigate the effects that lagged credit growth together with the usual regressors have on banks' lending.
Table 4.4 reports the results of the Arellano-Bond dynamic panel estimation.

The instruments included in matrix **Z** presented in the previous section are: the lagged value of the dependent variable itself, first period lag of NPL ratio and capital to asset ratio, real GDP growth at time t-1, lagged government support, and time to resolve insolvency.
Among these, the variable measuring real GDP growth is considered endogenous as it may correlate with the error term. Therefore, it is included in the model as *GMM-style* instrument with a time lag of one period. Similarly, lagged credit growth, lagged NPL ratio, and lagged capital to asset ratio, which are predetermined but not strictly exogenous, are treated as *GMM-style* instruments. Finally, the strictly exogenous regressors, such as lagged government support and time to resolve insolvency, are included as *IV-style* standard instruments (see Roodman, 2009).
The model adds then as further exogenous external instrument a dummy variable which assumes value zero in the period before the crisis, value one in the period after the crisis.
As the number of countries included in the sample is not very large, it is necessary to limit the number of instruments. In this sense, the model uses only the first and the second lag of the

endogenous variables as instruments, even if the inclusion of all available lags could leads to more efficient results[4].

Looking at the outcome of the estimation, in all the specifications, the rate of growth of loans granted by MFIs was found to have a high auto-correlation: the coefficient's size of the lagged dependent variable ranges between 0.26 to 0.28, thus suggesting that a shock to credit growth is not likely to be offset by other factors and does have a prolonged effect. In other words, credit growth exhibits a significant degree of persistence. This confirms the hypothesis made before according to which the dynamic panel approach is preferable.

The main result of the analysis regards the role that the stock of NPLs locked in banks' balance sheets has on their choices in terms of lending. It emerges clearly that the level of bad debts that a bank already has significantly affects its willingness to grant new loans to the private sector in the future, at least in *distressed* countries.
Going into details,

(i) in the first specification, when all countries are included in the sample, a 1 percentage point increase in the level of NPLs on total gross loans implies a decrease in credit growth of about 0.4 percentage points.

(ii) When instead only the observations for *distressed* countries are included into the regression, to an increase of 1 per cent in NPL ratio follows a decrease in the rate of growth of credit equal to 0.3 percentage points.

(iii) Finally, when the sample includes just *non-distressed* countries, the effect of the NPL ratio on banks' lending, small and negative, is no longer statistically significant.

This leads to the important conclusions that, in *distressed* countries, where the level of NPLs is remarkably high, the presence of considerable amounts of bad loans not only harm banks' profitability, but affect also their ability or capability to support new investment and adequately finance the private sector. In *non-distressed* countries, which are instead characterized by lower levels of NPLs, this distortive direct effect on credit growth is not confirmed by the empirical analysis.

[4] Roodman (2009) suggests as basic rule of thumb to keep the number of instruments below the number of groups. Because of the limited availability of publicly accessible data relative to credit growth, it is not easy in practice to comply with this theoretical condition.

Looking at the macroeconomic level, as expected, the rise of contemporaneous real GDP growth leads to an improvement in the rate of growth of credit across all considered specifications, as expected. As said before, this finding supports the thesis that the phase of the business cycle and the operating environment matter in determining banks' choices in terms of lending. This is probably due to the fact that, when the real GDP grows, there are both better debt servicing capacities and improved lending opportunities for borrowers.

The lagged government support proves to be positively related to the growth in credit, but also in this case the relationship is not statistically significant. The same can be said about time to resolve insolvency: there is not a significant relationship between the time needed to resolve insolvency in a country and the rate at which banks increase their loans to domestic private sector.

However, when the model is estimated by using difference GMM, the capital to asset ratio plays an active role in determining credit growth. The results show, in fact, that higher levels of capital to asset ratio lead to lower credit growth, confirming the hypothesis that when banks increase their capital to asset ratio depress in turn their lending activity.

The first and the second columns of Table 4.4 report substantially similar results, with the exception of the time to resolve insolvency which is no longer significant in specification (2).
On the contrary, the third column of Table 4.4 reports very different results. When the sample is composed only by *non-distressed* countries, the only explanatory variables which are still considered statistically significant are the lagged dependent variable and the contemporaneous real GDP growth rate.

In order to confirm the validity of the instruments, it is necessary to perform the Sargan/Hansen test for over-identifying restrictions and the Arellano-Bond test for serial correlation.
In all the specification, the null hypothesis of the Sargan and Hansen tests cannot be rejected, and therefore the validation of the instruments is obtained.
Regarding the Arellano-Bond statistics, the hypothesis of no first-order serial correlation has to be rejected, while the second order one has a p-value such that it cannot be rejected. This means that the second lag of $Loans\_growth_{i,t-1}$ can be treated as valid instrument.

Table 4.4 – Results: Difference GMM Model

| | (1) | | (2) | | (3) | |
|---|---|---|---|---|---|---|
| *Loans to non-MFIs (t-1)* | 0.280 | *** | 0.261 | ** | 0.260 | *** |
| | (0.087) | | (0.095) | | (0.062) | |
| *NPL ratio (t-1)* | -0.426 | *** | -0.273 | ** | -0.085 | |
| | (0.137) | | (0.097) | | (1.287) | |
| *Capital to Assets ratio (t-1)* | -2.435 | * | -3.104 | * | -1.258 | |
| | (1.264) | | (1.243) | | (1.137) | |
| *Real GDP growth* | 1.123 | *** | 1.068 | *** | 0.792 | ** |
| | (0.253) | | (0.183) | | (0.299) | |
| *Real GDP growth (t-1)* | 0.096 | | 0.429 | | -0.065 | |
| | (0.115) | | (0.249) | | (0.142) | |
| *Government Support (t-1)* | 0.070 | | -0.030 | | 1.783 | |
| | (0.120) | | (0.176) | | (1.098) | |
| *Time to Resolve Insolvency* | -0.039 | * | 0.009 | | | |
| | (0.022) | | (0.024) | | | |
| *Time to Enforce a Contract* | | | | | 0.002 | |
| | | | | | (0.090) | |
| Observations | 99 | | 45 | | 54 | |
| Arellano-Bond test for AR (1) | 0.012 | | 0.055 | | 0.033 | |
| Arellano-Bond test for AR (2) | 0.489 | | 0.837 | | 0.729 | |

Note: the table reports the coefficients from the Arellano-Bond GMM estimation, with robust standard errors in parentheses. ***, ** and * denote significance at 1%, 5% and 10% levels, respectively. Specification (1) includes the observation for all the countries included in the sample; (2) includes instead the observations for the *distressed* countries, and so for Greece, Italy, Ireland, Portugal, and Spain; finally, specification (3) includes the observations for *non-distressed* countries, namely Austria, Belgium, France, Germany, the Netherlands, and Sweden.

### *4.3.1 – ECONOMIC IMPLICATIONS*

So far the analysis shows that the level of NPLs held by the banking systems of financially distressed countries affects statistically the rate of growth of credit granted to the private sector. However, it is necessary to look at the economic drivers of this relationship and to check the economic impact of this result.

First, an increase in the stock of NPLs has a negative impact on bank lending to private sector because it leads to an increase in asymmetric information and uncertainty about future asset quality. Indeed, when a shock on asset quality occurs, banks face problems in assessing the real value of

its credit portfolio, particularly when the deteriorating assets are covered by collaterals with very illiquid markets. Thus, banks have difficulties in qualifying the effective recovery rate which they can reasonably expect, and this will heavily limit their risk-taking capacity.
In addition, when banks' capital level is close to the regulatory minimum requirement, they prefer keeping constant their assets rather that raising new expensive capital, thus limiting their lending activity.

Looking then at the demand factors, an increase in NPLs is also responsible for an increase in the costs associated with the lending activity. When there is a deterioration in asset quality, banks are indeed forced to charge higher interest rates on new loans in order to cover the losses stemming from the increasing NPLs. Therefore, the higher interest rates depress demand for loans and, as a consequence, prevent the economy to return to higher growth rates.
Moreover, an increase in the levels of non-performing loans can be explained by a problem of unresolved private debt overhangs: there exist a mutually reinforcing feedback loops between bank NPLs and corporates' excessive debt (Aiyar and others, 2015).
On the one hand, companies which are facing problems related with their excessive debt exposure are likely to become insolvent borrowers, generating an asset quality problem for the bank. Indeed, a high private sector indebtedness in a context of weak economic environment continues to reduce firms' ability to service their existing debts, causing NPLs to increase further.
On the other hand, over-indebted companies are reluctant to invest in new projects because most of the returns will be allocated to service the existing debt (Myers, 1977). As a result, this will depress loans demand and thus credit growth, further harming banks' profitability.

For all this reasons, the existence of a negative relationship between NPLs and credit growth, as proved by the empirical model discussed before, is now justified even from an economic point of view.
In conclusion, it is important to remark the need for an efficient and comprehensive NPLs resolution strategy in order to limit the impact that the bad assets have on banks' lending behavior, especially in countries heavily hit by the financial crisis. This becomes crucial notably considering the strong dependence of the European productive sector on bank lending, which has further exacerbated the effects of the financial crisis and prolonged the time needed for a tangible economic recovery.

# CONCLUSION

After having described the phenomenon of deteriorated assets, the thesis focuses in analysing the relationship between the stock of deteriorated loans retained by the banking system and the rate of growth of credit that it grants to private sector.

Since the 2007 financial crisis, on the one hand, a clear decrease in the rate of new loans granted by banks to private counterparty can be observed; on the other hand, NPLs have increase sharply, reaching even levels more than three times higher than the ones reported in the pre-crisis period. The empirical literature confirms the link between these two trends, finding in the increasing stock of NPLs one of the factors driving the low credit growth. Bad loans are responsible of leaving a bad legacy which forces banks to constraint their lending activities to keep risk under control.

The empirical results are in line with those of the examined literature. The dynamic panel estimation conducted with the use of Arellano-Bond GMM model on a sample of eleven European countries leads in fact to the conclusion that the negative relationship between past level of NPL ratio and credit growth not only exist, but it is also statistically significant.

However, this result is not confirmed when the same analysis is conducted by looking only at the data referred to *non-distressed* countries.

Consequently, it is possible to conclude that in countries not severely hit by the crisis, where the NPL ratio is not alarming, the stock of bad loans does not limit the banking system in its role of financial the private sector. On the contrary, in the countries where banks are facing sever asset quality issues, the high NPL ratios harm credit growth by influencing banks' lending behaviour.

These findings have considerable implications. In fact, considering how problem loans have a negative impact not only on banks profitability, but also on credit growth and therefore on the economic recovery in general, a resolution strategy is strongly needed. The implementation of a comprehensive approach able to remove all the factors that prevent the effectively functioning of the secondary market for NPLs has to be a priority in the near future. Banks' willingness to sell can be increased by a higher regulatory pressure and a stricter supervisory guidance (ECB, 2016), while demand for NPLs may improve if governments intervene with measures aimed at making the enforcement proceeding more efficient. Facilitating the development of a secondary market for NPLs has the potential to decrease pressures on credit institutions, thus improving financial stability and inducing banks to grants new loans.

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