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Manipulating loan loss provisions - Qualitative analysis with EMU bank data

Μεταπτυχιακός φοιτητής: Γραμμενίδης Γεώργιος
Αριθμός Μητρώου Φοιτητή: ΜΧΑΝ 1804

Επιβλέπων Καθηγητής: Αντζουλάτος Άγγελος
Τριμελής Επιτροπή: Αντζουλάτος Άγγελος
Τσιριτάκης Εμμανουήλ
Εγγλέζος Νικόλαος

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Ευχαριστίες

Στο σημείο αυτό θα ήθελα να ευχαριστήσω τον επιβλέποντα καθηγητή μου για την υπομονή και τις γνώσεις που μου προσέφερε κατά το διάστημα της συγγραφής αυτού του πονήματος.

Τους καθηγητές του προγράμματος για τις γνώσεις που μας παρείχαν στα δύο αυτά χρόνια.

Τέλος, την Μαρία για την υπομονή της και την βοήθειά της στην επιμέλεια και την Χριστίνα για την συνδρομή της στην αγγλόφωνη επιμέλεια.

Abstract

Every year, banks report provisions for loan losses in their annual balance sheet. Existing literature provides evidence that those provisions are used to alter final statements, and therefore might include different types of information.

This paper covers the universe of financial institutions across the European Monetary Union and re-examines the connection between loan loss provisions and several theories. These include earnings smoothing, signaling effect, and capital management, as these have been analyzed in previous literature. This is achieved through a panel regression model analysis in R.

In addition to previous literature, this paper provides evidence that there is also a connection between loan loss provisions and share price movement, which, as far as the author is concerned, has not been researched yet. By hypothesizing that a rise in share price will result in a decline in provisions, a regression model was used across several different samples from the same pool. Results support previous literature and provide further evidence on existing theories. Although they are not conclusive, they provide evidence that requires further analysis. More specifically, there appears to be a negative correlation between loan loss provisions and price movement, meaning that when the share price gets higher, LLPs are lowered.

Key words: Loan loss provisions, EMU banks, signaling, income smoothing, share price movement, plain regression model analysis, income statement manipulation

Εισαγωγή

Οι ετήσιες οικονομικές καταστάσεις των τραπεζών αναγράφουν ένα ποσό που χαρακτηρίζεται ως ζημίες απομείωσης. Η υπάρχουσα βιβλιογραφία μελετάει και αναλύει την σύνδεση των ζημιών αυτών με διαφορετικούς παράγοντες που μπορεί να κρύβουν επιπρόσθετες πληροφορίες.

Η παρούσα εργασία καλύπτει το σύνολο των Χρηματοπιστωτικών Ιδρυμάτων που ανήκουν στην Ευρωπαϊκή Νομισματική Ένωση και επανεξετάζει τη σύνδεση μεταξύ των ζημιών απομειώσεως και των διαφόρων υποθέσεων, όπως η χειραγώγηση κερδών, η παροχή πληροφοριών και η χειραγώγηση ισολογισμών, όπως έχουν αναλυθεί σε προηγούμενη βιβλιογραφία.

Επιπρόσθετα της προηγούμενης βιβλιογραφίας, αυτή η εργασία παρέχει αποδείξεις για τη σύνδεση που υπάρχει μεταξύ των ζημιών απομειώσεως και της κίνησης της τιμής της μετοχής που, κατά πώς είναι γνωστό στον συγγραφέα δεν έχει μελετηθεί ξανά. Υποθέτοντας ότι η αύξηση της τιμής της μετοχής επηρεάζει αρνητικά τις ζημίες απομειώσεως, ένα μοντέλο παλινδρόμησης εφαρμόστηκε πάνω σε διαφορετικά δείγματα από την ίδια βάση. Τα αποτελέσματα υποστηρίζουν την υπάρχουσα βιβλιογραφία και παρέχουν επιπλέον αποδείξεις και συμπεράσματα. Τα αποτελέσματα αν και δεν είναι καταληκτικά, παρέχουν αποδείξεις για την ύπαρξη σύνδεσης των μεταβλητών που εξετάζονται τόσο των προϋπαρχόντων όσο και των νεοεισαχθέντων. Ειδικότερα φαίνεται να υπάρχει σύνδεση και να επιβεβαιώνεται η υπόθεση που θέλει τις ζημίες απομειώσεως να μειώνονται καθώς αυξάνεται η τιμή της μετοχής.

Λέξεις κλειδιά: Ζημίες απομειώσεως, Τραπεζικό σύστημα ευρωπαϊκής οικονομικής κοινότητας, ζώνη ευρώ, χειραγώγηση ισολογισμών, κίνηση μετοχής, μοντέλο παλινδρόμησης

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1 Banks Balance Sheet Report

1.1 In general

Banks main occupation has always been centered around money, although through the years they got into several other activities such as insurance, real estate and leasing factoring. Banks also earn revenues from fee income that they charge for their products and services, which include wealth management advice, checking account fees, overdraft fees, ATM fees, interest, and fees on credit cards.

The main purpose of banks is to accept deposits from consumers and businesses and invest those funds in loans and securities. In return, they pay a small interest to the deposit accounts and request a higher interest from their borrowers. This spread creates a profit, which the bank can then use to finance other activities, always with a positive spread, hence a profit.

Although this might seem ideal, banks know that whatever precautions they may take, there will still be some loans that will not be paid in full. Of course, most of the times when lending money, some type of collateral is required. In most cases, this collateral is the underlying asset for which the loan is obtained. That is one of the reasons why banks ended up with a lot of real estate in their portfolios during the economic crisis of 2008. Beside the fact that this seemed to be a valuable asset for them, we should not forget that a bank's main and most valuable asset is money. Moreover, most of the times, the underlying asset has a cost representing just a percentage of the loan. In addition to that, the economic downturn resulted in a construction downsize. In that way, banks ended up with a lot of non-performing loans, liquidity problems, and assets that could not be liquified.

Since banks main occupation is money, they tend to have a different balance sheet than a non-financial institution. Their activities can be conducted through their balance sheet and income statement report. Still though, there can be underlying risks that are not visible; for example, if they have operations in other currencies expressed in their base currency, they can bear currency risk which cannot be found in a balance sheet report.

A balance sheet provides a list of assets and liabilities and provides an image of the bank to investors. Assets consist of everything that a bank owns or expects to receive. A balance sheet describes the different usage of money. On the other hand, the liabilities part outlines the obligations to its lenders and owners, hence its financial sources.

The income statement provides an analysis of income and expenses. A simplified balance sheet may look like the following:

Assets	Liabilities and Equity
Cash and cash equivalents • Cash • Deposits with the Central Bank	Deposits
Loans and leases minus Allowance for loan and lease losses	Liabilities to other financial institutions and central bank
Deposits and other short-term investments	Derivatives
Equity assets	Short-term borrowings
Derivatives assets	Long-term borrowings
Other Assets • Premises and equipment • Goodwill • Receivables • Deferred tax credit	Other Net Position

Total Assets = Total Liabilities + Equity

Table 1.1.1

Although this might seem very simplified, the main idea remains the same. Terminology may differ in various countries, mostly due to different accounting standards, and also the means each bank uses in order to value their products.

1.2 Liquidity

Liquidity has to do with the ease in which each financial product can be used for payments or turned into cash. In cases where assets need to be sold in an expedited manner, there may be a price difference resulting in losses for the seller. Low liquidity can result in losses due to expedited selling. It relates to the amount of time the cash is occupied; more long-term investments mean smaller liquidity. Every asset needs to be valued also regarding its liquid state. Besides, in cases of distress, liquidity will make the difference between survival and bankruptcy.

1.3 Assets

Cash on the assets side includes deposits in the bank's accounts as well as a bank's deposits in the central bank. The amount a bank holds aside also contains the mandatory reserve requirements that a bank is obliged to hold, due to regulations from the central bank. The stricter those policies get, the more reserves are required, and hence, the monetary supply shrinks and vice versa. Cash also includes accounts in the central bank. Currently (2020) the central's bank interest rates are negative or zero in an attempt to apply pressure on the banks in order to provide more liquidity and support the market. Cash is the most liquid asset since it is first used every time there is a need to pay or invest.

Cash equivalents include but not limited to deposits in other banks, reverse repos and loans to other banks, as well as Nostro accounts from other financial institutions. Cash equivalents are not that liquid, because most of the times they are engaged in some kind of business transaction, and therefore are blocked by contracts.

Nostro ("ours" in Latin) stands for accounts in other banks, whereas Vostro ("yours" in Latin) stands for accounts with money from other banks.

Loans include every loan the bank has given to its customers and governments as well as leasing and factoring loans. Loans in general are the biggest asset a bank may have. Loans are the least liquid asset since a bank cannot request an early repayment. There are ways to liquify them through other channels such as ABS's (Asset backed securities).

Loan-loss reserves display the amount of money the bank believes will not get paid and so they will be needed in order to cover future losses. This is an estimation made for future losses. This will be discussed in more detail below.

Loans and leases minus Allowance for loan and lease losses are net loans.

Derivatives are market products that are based on an underlying asset, which could be stocks, Foreign Exchange, Bonds, or Commodities. There are two main types of derivatives. Vanilla derivatives are traded using trading platforms and are mostly connected to risk management purposes, whereas exotics derivatives are traded over the

counter (OTC) for speculative reasons. It is usually valued using margin accounts. In this situation when a counterparty wins, the other party loses and vice versa. If its margin account has a profit, then it is shown on the assets side of the balance sheet; otherwise it belongs to liabilities. Since they are marked to market, liquidity risk is low, unless there are private contracts, where the risk of counterparty default is relatively high.

A bank's portfolio is also shown in the assets side, provided there is one. It may contain stocks and/or bonds, both short- and long-term, and in any currency.

In other Assets section, premises and equipment refers to every office building a bank possesses and all the equipment it has, such as computers and offices; all of these oblige into amortization tables about their current value. Goodwill refers to the difference that occurs in acquisitions between the buy price and the book value, whereas intangible assets refer to reputation, software, and intellectual rights.

Finally, deferred tax credit refers to loses from previous years that can be added to future earnings, thus lowering a bank's tax income.

On the asset side, valuation is done either in historical cost or in fair value. Historical cost is the price the bank paid to obtain the asset. Fair value is the price that two counterparties would agree in order to enter into a transaction. It is equal to the present value of an asset's future cash flow.

Through time, fair value tends to differ from historical cost. Each method of valuation could have a huge impact on a bank's balance sheet and financial results. In case of a fair value valuation there could be a huge fluctuation in earnings, resulting in wrong signaling regarding their future perspectives.

The manner in which the valuation is done depends on numerous factors, such as accounting standards and each bank's individual choice. In some cases, there can be a diversification in valuation techniques within the same balance sheet.

1.4 Liabilities

Everything that a bank owes plus what belongs to its owners/stockholders lies on the liabilities side. The source of the money that is being used on the asset side of a balance sheet can be found on the liabilities side.

Deposits take the lion's share of the liabilities and are one of the biggest sources of income for a financial institution, especially nowadays that interest on deposit accounts are nearly 0%. They also have the greatest liquidation risk, like we saw happening during the Greek financial crisis in July 2015, where everyone withdrew their money from the banks, resulting to regulations imposed on daily withdrawals.

Liabilities to other financial institutions and central banks refer to Vostro accounts, loans, and repos. Repos are the most common of the liabilities, whereas liabilities towards central banks are significantly lower, since they tend to have very small interest rate and are also collateralized. This is the opposite in cases where central banks are trying to boost the economy and hence, they lend money to the financial institutions with small, even negative, interest rate in order for them to push them back to the economy with small interest. The positive outcome of the central bank liabilities reflects in three major points: providing liquidity in situations of distress, enhancing earnings or earnings maintenance, and creating positive expectations. All of them add to social welfare by avoiding financial crisis. Liabilities to other financial institutions tend to be short-term (up to one year), which means that in cases of non-roll-over a bank has little time to find new sources of income, which creates liquidity risk.

Repos (Repurchase agreement) and CDs (certificate of deposit) are considered to be short-term borrowings that have a maturity up to one year.

Long-term funding is done either by loans or by issuing bonds.

Derivatives fair value that result into paper losses are accounted for in the liabilities side.

Net worth or shareholder's equity consists of common and preferred shares, differences between initial share price in case they are overvalued, and reserves. Essential is whatever is left after every liability has been covered. Their liquidation risk is zero since banks do not need to return that money to investors. It is a residual item calculated when subtracting liabilities from assets.

Both, net worth as well as deposits are valued on their initial un-amortized cost.

Common stock is a form of ownership of a certain portion of the company whereas premium stocks are a form of lending. If a bank's stock price is overvalued, it means that extra value from its official IPO has been created. The difference between market value and nominal value is recorded in its net position.

Reserves depend on numerous factors, such as bank's strategic planning, general economy, and laws and regulations. Banks create reserves to cover for potential losses from non-performing loans and operations.

Other comprehensive income consists of sources of income other than the ones mentioned already, such as the difference in value of already obtained bonds.

1.5 Cash Flows Priority

Cash flow priority refers to the order in which every lender will get paid.

In normal stable periods priority is divided into three main categories. The first category with the highest priority contains depositors, financial institutions, and debt owners. Regardless of its profitability, a bank owes the obligation to return capital and pay interest according to the finance terms.

The second category contains preferred share owners since they have a priority over share dividends and will collect it when there are profits.

Finally, there is the third category with common shareholders. Here, the uncertainty for dividend income is even greater since they come last in priority. Even if there are profits left after the premium shareholders have been paid, it is not certain that they will be distributed to common shareholders.

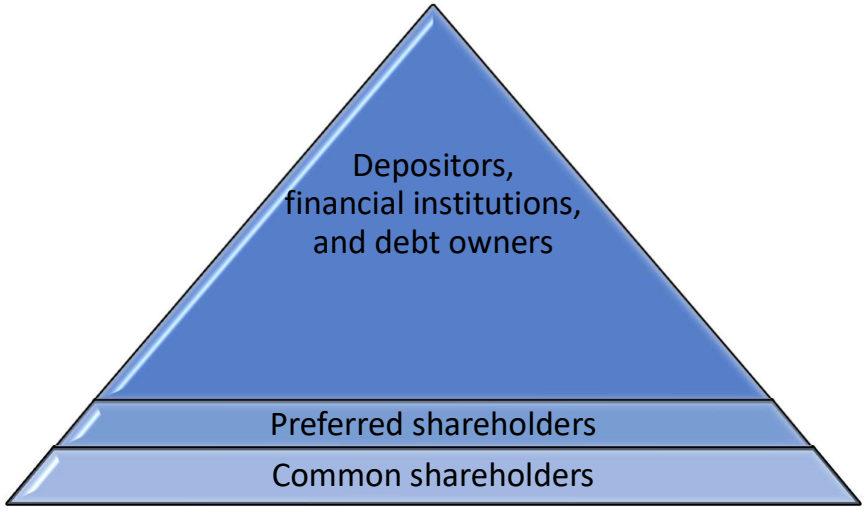

Figure 1.5.1

Priority changes in case of bankruptcy. First are the obligations to the central bank followed by obligations to other financial institutions. Then, there are guaranteed deposits and simple deposits. In cases of default, deposits in most countries are also guaranteed up to an amount from an organization created specifically for that purpose (in Greece there is the Hellenic Deposit and Investment Guarantee Fund (TEKE) that covers deposits up to 100k and investments up to 30k). After that, market funding and sub-ordinated loans follow. Last are the owners with premium stocks, since this is a form of loan, and finally the common stock owners.

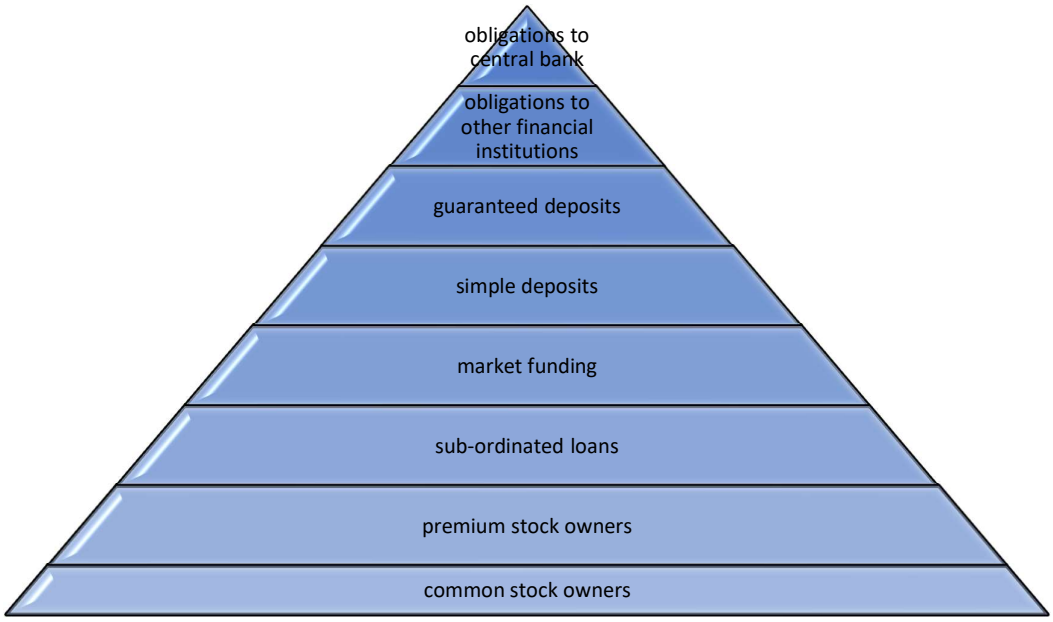

Figure 1.5.2

Other than this certain priority list, there might be liabilities with certain legal rights that could alter the route of repayment. Such can be found in contingent convertible bonds (CoCos).

Lower priority means greater risk of losses in case of default. That is one of the reasons why investors monitor closely the progress of the bank in order to short their positions and avoid great losses in case of potential bankruptcy. Information along with the know how is the key to analyze a balance sheet and realize potential dangers. By shorting positions and withdrawing money the bankruptcy is enhanced. Sometimes even a speculation can result in a vicious cycle of self-fulfilling expectations.

1.6 Off-Balance Sheet (OBS)

Off-balance sheet (OBS) items are a term for items that do not appear on a bank's balance sheet report. Off-balance sheet items are typically those not owned by the bank or that form a direct obligation of the bank. For example, when loans are securitized and sold off as investments, the secured debt is often kept off the bank's books. An operating lease is one of the most common off-balance sheet items.

Contingent liabilities such as derivatives, open credit lines and credit default swaps are being recorded there. OBS involve a potential risk, which, if it occurred, it could result in great losses. Their existence only affects expectations motives and future decisions of everyone involved in the debt and ownership of the bank.

1.7 Income Statement and Statement of Cash Flows

The income statement provides an analysis of income and expenses of the balance sheet items. Both positive and negative cash flows are produced from both sides of the balance sheet. They consist mostly of interest, commissions, and overvalue/undervalue.

On the income statement cash flows appear in groups and are shown as follows:

	Net interest income • *interest income* • *interest expense*
+	**Net non-interest income** • *commisions on different bank activities* • *overvalue*
=	**Total Operating Income**
-	*Other expenses* • *General Administrative expenses* • *Salaries* • *Power Plant and Equipment* • *Depreciation* • *Other*
=	**Earnings before loan loss provisions and predictions**
-	*loan loss provisions and predictions*
=	**Earnings before taxes (EBT)**
-	*Taxes*
=	**Net income after tax**

Table 1.7.1

Terminology might differ between financial organizations mainly because of differences in regional financial reporting standards, however, the main idea remains the same.

Cash flows mostly consist of commissions and interest. Since loans are the biggest asset, they also are the main source of interest income.

Interest can also be obtained from liabilities that due to other financial institutions and deposits in central bank. In some cases, depending on the financial conditions and policies, central banks might have zero or negative interest rates. Liabilities towards other financial institutions create interest expenses.

Other interest earning sources on the asset side are interest from bonds, profit share, and capital gains from both stocks and bonds.

On the liabilities side of the balance sheet, income can occur from fees on deposits as well as earnings from derivatives, due to their mark to market. Expenses come from interest that are to be paid for deposits plus liabilities towards other financial institutions and external funding.

Non-interest income consists mainly of commissions, overvalue, and interbank dealing transactions.

In case of negative earnings before taxes, the taxes amount is not paid on that year. It will get paid when the financial institution has positive earnings. In times of financial distress that amount piles up each year. This is known as deferred tax assets. When EBT turns positive it will have to get paid, lowering net income. While it exists, it holds a significant risk. If, for some reason, tax rate gets lowered in the meantime, the existing tax liabilities from previous years will be lower, hence the difference will have to appear as losses on the balance sheet.

Other expenses include, but are not limited to, salaries, social securities, depreciations, general operating and legal expenses, etc.

Loan loss provisions refer to losses from loans and other assets that are valued at their depreciated cost, whereas LLPs cover for expected losses from off-balance sheet exposures like guarantees and open credit lines.

2 LLPs – Loan Loss Provisions

LLPs appear on the income statement report and refer to the amount of money a bank holds, which is expected to cover losses from non-performing exposures (NPE's).

On the balance sheet they appear as allowances for credit losses that are extracted from total loans, hence lowering the total net asset. They are extracted from EBT affecting the net income; it appears as realized losses and constitutes a non-cash expense.

As stated on the income statement, LLPs are an expectation, which lowers earnings, and when it gets bigger than net income, it could lead to negative earnings before taxes. EBT lower net position and if they overcome it, they will lead to bankruptcy.

Also, if EBT are negative they will result in deferred taxation that will be added on the asset side of the balance sheet.

Since LLPs appear as a prediction, they can be used to alter future income since it is an estimated value which seems that it cannot be properly calculated. Although there are a few taxation rules on how to calculate LLPs, there is still room for further alterations. This is one of the reasons why LLPs forecast and reporting are of great significance and why they may be connected to other not so simple and virtuous reasons.

LLPs are difficult to calculate by an external analyst and only guesses can be made. The amount of LLPs reported means that a financial institution acknowledges loan losses at a certain amount. This means that they expect losses on future earnings, hence reducing them, which leads in motives for the manipulation of the number of LLPs stated. Of course, this has a negative effect on investors and the authorities since they do not know the risks and the exact financial situation, which is hidden from the management. Since LLPs are at the management's discretion, ethical dilemmas arise along with agency problem, among other things.

Another problem derives from the different variations in the term of non-performing loans between countries worldwide. Different economies have different explanations on what a non-performing loan is. The problem gets more significant if we also take into account differences in taxation and accountancy regulations among different countries.

LLPs can be calculated by multiplying (Probability of Default) * (% Losses in case of Default) * (Exposure at Risk)

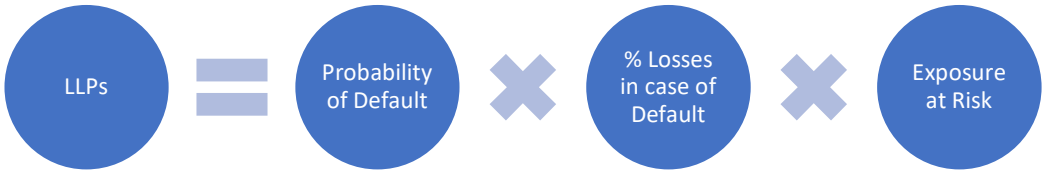

Figure 2.1

The key in calculating LLPs is to determine the time a loan will be considered as non-performing. The simplest way is to deal with it when it appears, meaning that a loan will be considered as non-productive the moment its payments are stopped or delayed. In that case the bank knows the total amount to be lost and guesses the percentage to be retrieved. Both ways, the loan gets characterized as non-performing and it is accounted for at the balance sheet as allowances for credit losses.

Another way of calculating loans that will default is to compare historical data and create models with similar loans. By taking into consideration many different factors that relate not only to the loan itself but also to the general economy and expectations, assumptions can be made on the amount of loans that will probably default. Modeling calculations carry great risks since they use statistical analysis and do not cover for extreme situations. Worst case scenarios can always be made, but that is not something to keep doing with financial planning. Modeling technique, although it is straight logical and can provide a simple to handle result, discloses several factors that need to be taken into consideration. For example, a bankruptcy of a big company, which has no direct connection with a particular bank, would result in a domino bankruptcy effect affecting many smaller companies that have direct connection with that particular bank, in many different countries and, in some cases, in different financial sectors. It is like a reverse butterfly effect, where a major event can result in many smaller problems. One should always keep in mind that the more the LLPs the less the earnings and profit; if no records of LLPs are made, the EBT would be greater than they really are.

From the very beginning, each loan gets assessed on its possible potential loss. This first assessment is calculated and valued in the loan in advance. LLPs refer to losses greater than what was first expected.

Besides already known non-performing loans, loan loss provisions calculation covers the possibility of other loans to default. These are broken down into categories depending on whether there are impairments or not, and get analyzed for possible future default risk by taking into consideration different key factors. Some of these factors have to do with the company itself, whereas others have to do with more general financial and economic conditions. Calculating possible future losses from loans is not an easy and simple task to perform.

Loans that are not expected to be obtained are being deleted from the balance sheet report. This does not mean that the financial institution will not try to recover as much as possible, through other means.

2.1 LLPs Manipulation

Since LLPs consist of provisions, anyone could calculate them at their will. If a financial institution prefers to recognize losses in advance, they can lower that year's earnings in favor of future earnings. If they prefer to hide losses in the current year, their future earnings will be lowered. In any case, loan losses will appear one way or another; the only thing that can be controlled is when they will be announced. Both cases are hiding the truth of the exact earnings, thus the manipulation. In certain cases, in order to avoid accepting losses, financial institutions tend to re-loan bad debtors so that they can continue payments. That money of course is not expected to get paid; this just provides time until losses are recorded. These practices are known as ever-greening of loans, forbearance lending and zombie lending.

Manipulating earnings through loan losses can be done for several reasons.

Some of them are:

- Earnings smoothing
- Pressure to keep up with competitors and strategic planning
- Satisfaction of analysts and/or investors' expectations
- Taxation motives
- Compliance with regulations
- Signaling effect
- Other management motives

➢ Earnings smoothing

In this case, main target is to avoid fluctuations in each year's earnings. When earnings are expected to be high, LLPs are also high and vice versa. This results in stable earnings every year. Although this consists of a manipulation technique, it does not affect the general picture about a bank's position and future prospects. Needless to mention that low volatility on earnings is a positive sign for future and current long-term investors since it lowers the possibility of bankruptcy. Market value increases, investors are satisfied, management seems to work properly, everyone is happy.

➢ Pressure to keep up with competitors and strategic planning

By manipulating earnings, a bank can keep up with its competitors and avoid showing a bad year. As mentioned earlier, this would keep its market price stable, thus its lending rate stable or even better. In order to keep earnings stable and in accordance with competitors, they could result in applying ever-greening techniques. If they accept loan losses, they are subjected to further potential losses by not providing a second chance to companies to get back on track in cases of financial distress. In this case, by hiding loan

losses and supporting zombie loans, they get people's acceptance since they seem to support the economy and everything that comes with it.

- Satisfaction of analysts and/or investors' expectations

In order to achieve earnings and deliver dividends, and of course for the management to maintain its position, everything needs to seem in order. If, for any reason, one year's earnings are not as analysts expect, this could result in massive share-selling orders causing the share price to drop. To avoid such stressful situations, the management will probably prefer to manipulate loan loss provisions.

Besides, if a bank reports too many possible loan losses, this could arise questions regarding the sustainability of the organization, resulting in an uncertain outcome.

- Taxation motives

As mentioned earlier, higher LLPs lead to lower EBT, hence lower taxes to be paid on that specific time. By avoiding taxes payment, its liquidity will be improved as well. Of course, different taxation rules around the globe provide different results and alter the motives.

- Compliance with regulations

Basil III has increased capital adequacy ratio to 13% from 8% and up to 18% for systemic banks. This means that more reserves need to be available. Following the same logic, low LLPs lead to higher earnings, thus greater net worth, and greater possibility to comply with regulations. Also, generating greater net position leaves room for faster expansion and growth.

- Signaling effect

This is a speculation left to be proven. The idea is that banks communicate with investors and try to manipulate market situations through LLPs announcements. For example, high LLPs may be a sign of a transparent management that is not afraid to say things as they are. It will be dealt with later in more detail and in greater analysis.

- Other management motives

Management is appointed for a short amount of time, usually four to eight years. This means that their salaries and bonuses depend on how good their results will be. Their motives for providing high earnings most of the times overcome the company's future.

Motivation varies between different reasons, some of them are for company growth while others are more short-term and aim to provide a stable company with sustainable future. Whatever the case is, the motivation behind LLPs manipulation is not always obvious and therefore, the analysis of a financial institution is difficult to perform.

The manipulation of LLPs affects both the management and the regulatory authorities. In certain occasions, it complies with the ulterior motives of both participants whereas, in other occasions, it puts them in opposing sides. Besides them, there are also investors and market analysts that expect certain outcomes from a bank in different financial occasions and are getting skeptical in cases the announced results are not the ones they expected.

There seems to be a fine line in what the LLPs should be, that will be in accordance with everyone's expectations and will not raise any further doubts.

Regulatory authorities aim to prevent banks from a potential bankruptcy and therefore a general financial crisis. Management aim to achieve their goals and profit the most during their tenure and investors and market analyst analyze most of the facts they can in order to find the most sustainable investments. The most certain thing is that banks do not provide a truth and honest earnings outcome; hence their actual financial condition is difficult to be estimated.

3 Existing Literature

The existing literature on loan loss provisions for financial institutions consists of a few papers that examine the connection between loan loss provisions and a number of variables, depending on the hypothesis they examine. In general, one major regression model is observed and is similar in every analysis.

The dependent variable on every occasion is Loan loss provisions scaled by either Total assets or Total loans. In fact, ten out of twelve times, scaling to total assets was used.

The independent variables that are found almost every time consist of the change in Non-performing loans, in order to control for a connection of loan loss provisions to the change of NPLs. A rise in NPLs is expected to create a rise in LLPs meaning a positive correlation.

Earnings before interest taxes and provisions is used as an indication of earnings smoothing. If a rise in EBTP results in a rise in LLPs, then there is earnings smoothing.

Total loans to assets is used in order to control for the importance of loans in a bank's portfolio. If a positive correlation with LLPs is observed, then loans are supposed to be of greater importance in a bank's portfolio, and vice versa.

Difference in loans (also known as loan growth rate) can provide an indication of the allocation of new loans. For example, if loan growth results from expansion of investment opportunities, then a negative correlation to LLPs is expected; otherwise, if it indicates deteriorating of the underwriter quality, a rise of LLPs is expected.

Difference in GDP is a measure of market development. If the general economy or market cap improves, then NPLs would be lower, hence LLPs would be lessened. All of them are used in order to control for their role and behavior in the change of loan loss provisions. Besides them, there is always a variable to measure the capitalization size. These variables are usually scaled accordingly with the same scale that was used for the dependent variable.

$$\left(\frac{LLP_{(i,t)}}{TA_{(i,t)}}\right) = \beta_0 + \beta_1\left(\frac{\Delta NPL_{(i,t)}}{LoansOutstanding_{(i,t)}}\right) + \beta_2\left(\frac{EBTP_{(i,t)}}{TA_{(i,t)}}\right) + \beta_3\left(\frac{TL_{(i,t)}}{TA_{(i,t)}}\right) + \beta_4\left(\frac{\Delta LOANS_{(i,t)}}{LOANS_{(i,t)}}\right) + \beta_5\,(\%\Delta GDP_{(i,t)}) + \beta_6\left(\frac{CAPITAL_{(i,t)}}{RWA_{(i,t)}}\right) + \varepsilon_{(i,t)} \quad (3.1)$$

On top of that, different variables and dummy variables are added in order to control for a number of different conditions. Most papers focus their search on a major event like the regulatory entry of Basil II (Bouvatier et al. 2014 and Fonseca & Gonzalez 2008) or the financial crisis of 2007(El Sood, Heba Abou 2012).

3.1 Base model

Ahmed, Takeda & Thomas (1999) created, based on previous reports, the base regression that would be the cornerstone of future reports; through LLPs they used capital adequacy to control for capital management, earnings before taxes and provisions to control for earnings manipulation and future pre-loan loss earnings to investigate for signaling effects.

The turning point on which they focused their research was the 1990's change in capital adequacy regulations. In fact, the prementioned capital requirements limited the use of loan loss reserves as regulatory capital, since loan loss reserves do not count as part of Tier I or primary capital but as part of Total capital up to 1.25% of risk weighted assets.

They used a sample of 113 bank holding companies with annual data available over the period 1986-1995. In order to be included in the sample, a bank holding company should have financial data available and consolidated financial statements filed with the Federal Reserve, price and return data available on the CRSP tape, and finally, geographical loan composition data available from the Thompson Bank Directory or Moody's Bank and Finance manuals.

They exploit the 1990'schange in capital adequacy regulations to construct more powerful tests of capital and earnings management effects on bank LLPs. Overall, they find evidence that LLPs reflect meaningful changes in the expected quality of banks' loan portfolios; capital management is an important determinant of LLPs; earnings management is not an important determinant of LLPs; and the desire to signal private information to outsiders is not an important determinant of LLPs.

Ahmed, Takeda & Thomas (1999) tested their sample of data for capital and earnings management as well as signaling future earnings and market value hypotheses. The most important changes in the capital regulations at the time were the elimination of loan loss reserves from Tier I capital and the limitation on the use of loan loss reserves in meeting total capital requirements.

In order to control the capital management hypothesis, they used the ratio of actual regulatory capital (primary or Tier I capital) before loan loss reserves to the minimum required regulatory capital, earnings before taxes and LLPs/average total assets and a dummy variable, which equals one in the new capital regime, and zero in the old regime. They concluded that the coefficient on the capital variable in the new regime is significantly negative. In the old capital regime, LLPs affected primary capital and total capital in the same way. However, this is not true in the new capital regime, where increases in LLPs are most valuable to a bank with insufficient total capital when its Tier II capital limits have not been reached.

They hypothesize that the relation between loan loss provisions and capital will be less negative in the new regime relative to the old regime; the relation between LLPs and capital will be less negative for banks with loan loss reserves exceeding 1.25% of risk-weighted assets relative to other banks, because, for these banks, increasing loan loss

provisions provides minimal capital benefits. Also, the higher the cost of violating capital constraints, the more likely it is that banks will manage capital via loan loss provisions.

Earnings management was tested through the hypothesis that the relation between loan loss provisions and earnings (before loan loss provisions) will be more positive in the new capital regime than in the old regime. A positive relation between EBTP and LLPs would be expected to provide evidence on smoothing via LLPs. The estimated coefficient on EBTP is positive but not significant at conventional levels in the old regime. The estimated coefficient on the earnings and regime interaction variable is negative which is inconsistent with the smoothing hypothesis.

LLPs are positively related to one-year ahead changes in earnings (before LLPs) and discretionary LLPs will be positively valued by the stock market. Those were the main arguments of Signaling future earnings and signaling market value hypotheses. The coefficient on the one-year ahead change in earnings is negative and significantly different from zero at the 1% level, which is inconsistent with the signaling hypothesis.

Based on the valuation approach as in Beaver and Engel (1996), they regress market value of equity on LLPs, the discretionary component of LLPs, NPLs, and EBTP. The estimated coefficient on discretionary LLPs is positive and significant in the valuation regression. If the explanatory variable of total provisions changes into non-discretionary portion of the LLPs, then the coefficient on the discretionary component of the provision becomes negative. This suggests that an increase in the discretionary component of the LLP has a negative impact on equity which is opposite to the positive impact on equity suggested by the signaling hypothesis.

3.2 Accounting constraints

Balla and Rose, (2015), focused on LLPs, accounting constraints and bank ownership structure between privately and publicly held banks. The 1998 SunTrust decision by the securities and Exchange Commission (SEC) indicated stricter enforcement of accounting priorities relative to supervisory priorities, but at first directly affected only publicly-held banks that fall under the SEC's purview.

By requiring a stricter adherence to accounting rules on the part of banks subject to SEC oversight, the SEC SunTrust action constraints the ability of publicly held banks to use loan loss management countercyclically during times of positive earnings to either manage earnings or prudentially increase loan loss reserves as a precaution against future downturns. Privately-held banks are not subject to SEC oversight, so their loan loss management need not have been affected. However, if bank supervisors rapidly incorporated the requirements of the SEC action into the rules as applied to all banks, then privately-held banks may also have weakened the relationship between earnings and provisions.

They tested the short- and long-term implications of the 1998 SEC action on provisioning policies of US banks, for both publicly-held and privately-held banks, and banks stratified by size.

They assume that in the short term after the SEC action, the relationship between pre-provision earnings and LLPs for publicly-held banks weakened relative to that for privately-held banks, implying that the SEC action placed more binding constraints on publicly-held banks than on privately-held banks. Furthermore, the SEC action did not impose binding constraints on privately-held banks in the short-term and they predicted that the coefficient estimate should be negative for publicly-held banks, and should be lower for publicly held banks than for privately held banks.

Also, in the short term after the SEC action, the relationship between pre-provision earnings and LLPs was unaffected for privately-held banks predicting a non-significant coefficient. This implies that, in the short term, the SEC action did not impose binding constraints on privately-held banks.

The second hypothesis states that in the long term after the SEC action, the relationship between pre-provision earnings and loan loss provisions weakened for both publicly-held banks and privately-held banks. This is consistent with bank supervisors incorporating the requirements of the SEC action into the rules as applied to all banks, such that the relationship between earnings and provisions weakened for both publicly-held and privately-held banks.

The third hypothesis states that in both the short term and long term after the SEC action, the level of loan loss reserves fell for publicly-held banks relative to privately-held banks. This is consistent with there being a period following the SEC action in which publicly-held banks faced more binding constraints against provisioning than privately-held banks, resulting in the levels of loan loss reserves falling for publicly-held banks relative to privately-held banks. Even if bank supervisors later incorporated the requirements of the SEC action into the rules as applied to all banks such that both publicly-held and privately-held banks subsequently faced similar provisioning constraints, the difference in the level of reserves would persist.

Results on the first two hypothesis reached the expectations but vary when split into clusters. Regarding the third hypothesis, they expected, and got, a negative coefficient significant only for small banks (<10b) in the short-term.

Their data derive primarily from banking regulatory databases about USA banks both private and publicly-held. The final dataset includes over 640.000 bank-quarter observations from 13.916 banks. There are two sample periods, short-term sample period includes eight quarters before and eight quarters after the fourth quarter of 1998 and long-term sample period begins in the first quarter of 1992 and ends in the fourth quarter of 2013.

On the short-term for publicly-held banks, the average level of provisions increased for publicly-held banks following the SEC action, but did not significantly change for privately-held banks, also they do not appear to have managed earnings following the SEC action as expected. During the sample period, small publicly-held banks had on

average higher provisions than small privately-held banks, whereas a lack of earnings management for large publicly-held banks before or after the SEC action is observed. Privately-held Banks continued to manage earnings after the SEC action and both types of banks, managed earnings through loan loss provisioning prior to the SEC action.

Over the long term, earnings management weakened for both publicly-held and privately-held banks following the SEC action as expected. Although earnings management lessened, a positive relationship between earnings and provisioning remained. The relationship between earnings and provisioning weakened more for publicly-held banks. In the long term privately-held banks continued to manage earnings through provisioning after the SEC action. Earnings management was present in publicly-held banks on the long-term, prior to the SEC action, but following that, there is no evidence of earnings management. There is no evidence of earnings management among small publicly-held banks after the action, and no significant change in the relationship between earnings and provisioning following the SEC action for big publicly-held banks. Small publicly-held banks went from countercyclical provisioning before the SEC action, to procyclical provisioning afterwards. Large privately-held banks managed earnings prior to the SEC action but ceased doing so after. Finally, prior to the SEC action the largest banks provisioned procyclicality, rather than managing earnings through countercyclical provisioning. Following the SEC action, the largest banks appear to have stopped provisioning procyclicality.

Bushman, R.M. & Williams, C.D., 2012, explore consequences of discretionary LLPs for the role of accounting information in supporting discipline of bank risk-taking. They investigate the economic consequences of loan loss provisioning regimes, including smoothing, on banks' risk-taking behavior.

They find that discretionary, forward-looking provisioning can be associated with either enhanced or diminished discipline of bank risk-taking, depending on the specific nature of the forward-looking orientation embedded in provisioning practices.

Loan loss provisions are chosen as a key accounting choice that directly influences the volatility and cyclicality of bank earnings.

The first measure is smoothing, defined as the coefficient from a regression of loan loss provisions on contemporaneous earnings, after controlling for non-discretionary determinants of loan loss provisions. Higher sensitivity of current provisions to current period earnings realizations is interpreted as greater discretionary smoothing. The idea is that smoothing allows for a buildup in reserves when earnings are high and current losses are low, and a reserve draw down in future periods when earnings are low and current loan losses are high. It is the same conceptual idea as it was stated in earlier literature.

The second measure uses a future outcome variable to isolate the extent to which explicit forward-looking information is reflected in current loan provisioning within a country. This captures the extent to which current loan provisions explicitly anticipate future loan portfolio deterioration.

Discipline over risk-taking is examined using two approaches. The first approach estimates the impact of the two measures of forward-looking provisioning on the relation between changes in asset volatility and changes in bank leverage. The analysis posits that outside discipline of risk-taking will impose pressure on banks to decrease leverage in response to increases in risk. The analysis finds that the sensitivity of leverage to changes in asset volatility is lower in high smoothing regimes relative to low smoothing regimes. The second approach investigates relations between provisioning and bank risk-shifting. The analysis examines the relative strength of these competitive forces, providing evidence that banks in high smoothing regimes exhibit more risk-shifting relative to banks in low smoothing countries, while the opposite holds with respect to the explicit forward-looking metric.

The dependent variable is loan loss provision scaled by lagged total loans. Based on the regression model of Barth et al. (2006) supplemented with variables from other sources, they control for Regulations on capital adequacy in order to measure stringency of capital requirements in each country. This controls for Basel Pillar I Supervisory power that bank regulators have over bank operations, serving as a control for Basel Pillar II Private-sector monitoring of banks, to control for the extent to which bank regulations in a country foster accurate information disclosure, empower private-sector oversight of banks, and create incentives for private agents to exert corporate control over banks. Properties of the general contracting environment as an assessment of the efficiency and integrity of the country's legal system.

The sample period is 1995-2006 with bank financial data coming from Bankscope and Datastream. Firstly, in order to estimate country-level measures of forward-looking provisioning, they use all banks in a country, both private and public. Banks are required to have all necessary bank-level financial data and country-level data of at least three years as well as, more than five billion in total assets. The results sample consists of 55.236 bank year observations over 27 different countries. Secondly, in order to examine the relation between provisioning practices and risk discipline, they require banks to have available equity market data to estimate changes in the implied market value of banks' assets, the volatility of bank's assets and the value of the deposit insurance put option. This procedure resulted in a sample of 3.091 bank-year observations across 27 countries.

Smoothing is captured by the coefficient on earnings before taxes and loan loss provisions and picks up the extent to which banks record loss provisions based solely on the level of earnings without reference to information about the loan portfolio.

Results show a positive and significant coefficient indicating that on average banks around the world smooth earnings via loan loss provisions. The second measure of forward-looking discretion is the coefficient on the subsequent period change in non-performing loans. This captures the extent to which current provisions explicitly anticipate future deteriorations in the performance of the loan portfolio. Results show a positive coefficient indicating that on average, banks anticipate future deteriorations in the performance of the loan portfolio in their current loss provisions.

Smoothing and Forward-NPL are uncorrelated with bank supervisory power regulations on capital adequacy and judicial efficiency of the legal system, while Smoothing is negatively correlated with Private.

The hypothesis states that capital should increase with risk. This is measured through the face value of debt, the market value of bank assets, and the change in the volatility of bank assets. Results demonstrate that the impact of discretionary loan provisioning on risk discipline depends on precisely how discretion in manifested in loss provisioning behavior.

Results on loan loss provisioning and risk-taking behavior-risk shifting indicate that a bank can shift risk onto its deposit insurer by increasing the risk of its assets without simultaneously increasing its capital adequately to cushion the risk increase. To measure this, they used the change in the fair deposit insurance premium. Their results show how distinct aspects of loan provisioning regimes balance the competing inter-play of incentives to increase risk against risk discipline imposed by outsiders.

Finally, loan provisioning, poor performance, and risk-shifting behavior hypothesis state that gains to banks' shareholders from risk-shifting should be higher as banks move closer to violating regulatory capital requirements. Risk-shifting is most significant in the 7-10% balance sheet capital range, although there is modest evidence of risk-shifting in both the partition below 7% and the partition above 10%. For capital greater than 10%, the coefficients of Smoothing and Forward-NPL interactions are not statistically different from zero, indicating that loan provisioning does not impact risk-shifting in this range. For the lower capital ranges, the smoothing interaction is positive and significant, indicating that smoothing exacerbates risk-shifting in both ranges. Similarly, Forward-NPL reduces risk-shifting in both the low capital partitions.

Performance is measured through ROE. Poor performers have strong-incentives to risk-shift since their management has nothing to lose.

3.3 Ownership structure

Bouvatier, Vincent, Laetitia Lepetit and Frank Strobel, 2014 examine whether differences in ownership concentration can explain differences in the level of earnings management, and whether the regulatory environment plays a role in potentially disciplining such corporate behavior. Banks with a high level of ownership concentration (one or two controlling owners) could use discretionary LLP to smooth their income. Such income smoothing behavior should, however, be less prominent for banks with a dispersed ownership structure, or banks located in countries with stronger regulatory controls. This is achieved by asking in what degree ownership concentration and/or the regulatory environment has an impact on the level of earnings management and income smoothing.

To investigate the effect of ownership concentration on earnings management, they used a firm-level data set on the ownership structure of banking firms. They used a sophisticated clustering approach based on hierarchical agglomerative clustering (HAC).

They considered three ownership measures in the construction of clusters of banks with similar ownership characteristics: the percentage held by the largest shareholder, the percentage held by the second-largest shareholder and a Herfindahl index computed for a bank's ownership distribution.

In order to examine the role of ownership concentration in income smoothing through loan loss provisions 3 clusters were created. Cluster 1 with low ownership concentration (less than 50%), cluster 2 with medium ownership concentration and cluster 3 with high ownership concentration (>70%).

In the original regression they added a dummy variable which equals 1 if the bank does not have a majority owner and 0 otherwise, a dummy variable which equals 1 if the bank is in cluster k and 0 otherwise.

The final sample of 873 commercial banks derives from an original sample of 1389 active European commercial banks for at least some of the period 2004-2009. It included the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the UK.

The results state that European commercial banks use discretionary loan loss provisions to smooth their income; capital management is not a significant determinant of loan loss provisioning practices for European banks; the coefficient of the variable loans to total assets is also significant and positive, capturing the risk of default for the overall credit portfolio; the loan growth rate and the impact of non-traditional activities were not significant; the significant and negative coefficient for the GDP growth rate indicates that macroeconomic conditions are relevant, representing the cyclical behavior of LLPs and the coefficient of the lagged dependent variable is significant positive, indicating that banks do adjust loan loss provisions gradually to recognize potential losses against loans.

Finally, they observe that at 10% level, banks without a majority shareholder behave overall differently as compared those with such a majority shareholder in the way they use loan loss provisions to smooth their income. These banks display a lower level of income smoothing behavior than banks with a majority shareholder. Also, banks with a low level of ownership concentration do not seem to display income smoothing behavior.

In order to examine the role of regulatory environment, the regulatory index was entered; this is expected to be significant and negative if stronger supervisory regimes can restrain the entrenchment behavior of insiders. Banks in countries with stronger supervisory regimes perform less income smoothing through LLP as compared to those in the countries with the strongest supervisory regimes, showing no income smoothing through LLP at all. Banks in countries with higher quality of external audits are less engaged in income smoothing.

3.4 LLPs and signaling

Curcio, Domenico and Iftekhar Hasan, 2015 examine the use of LLPs in managing earnings and regulatory capital ratios and in signaling managers' private information concerning a bank's future earnings between Euro area banks versus non-Euro area credit institutions.

The European area is split in two groups of countries based on whether their currency is euro or not. Subsequently, the subtracted data cover two different timeframes, one before and one after the 2007 crisis.

Data derives from Thomson's (Bureau van Dijk) Bankscope database and are drawn from the period 1996-2006. The group of EA countries that have euro consists of 11 countries and 218 banks whereas the non-EA group consists of 19 countries and 273 banks. In both cases only commercial banks have been taken into consideration and extreme values where removed.

In order to study the influence of the financial crisis of 2007 data covered 2007-2010 and the sample consisted of 195 total banks, 117 from the EA countries and 78 from countries that don't use the Euro currency.

A modified regression model was created based on the cross-sectional model used by Ahmed, Takeda and Thomas (1999), Anandarajan, Hasan and McCarthy (2007), and Leventis, Dimitropoulos and Anandarajan (2011), in order to check for regulatory capital management, Income smoothing and signaling. They provided two sets of results for the two periods examined. No distinction is made between private and publicly traded banks. The dependent variable is LLPs to total Assets at time t for the bank i.

Results state that no evidence of banks' pro-cyclical behavior is found and for both groups the coefficient of the ratio of NPLs to total assets is positive and significant, confirming the direct relation between LLPs and the deterioration in the sample banks' credit portfolio quality. The estimated sensibility of LLPs to the amount of customer loans is positive and significant for both groups, confirming the prudent behavior by bank managers, also the ratio of earnings before taxes and LLPs to total assets is positively associated with bank LLPs and is significant at the 1% level for the EA group of banks, thus strongly supporting the income smoothing hypothesis, whereas it is positive but not statistically significant for the non-EA credit institutions.

The capital management hypothesis for the EA banks is not confirmed, whereas the coefficient TRC is positive and significant for non-EA intermediaries, meaning that non-EA credit institutions use LLPs to manage their capital ratios. The variable TRC takes the value of the total regulatory capital ratio minus 8 and divided by 8 when observations for bank are in the first quartile of the total capital ratio and 0 otherwise.

If poorly capitalized banks are less willing to make LLPs to increase their regulatory capital endowment, a positive correlation was expected. Non-EA banks appear to use LLPs as a tool to convey information about their future earnings to the market, whereas the coefficient is negative and significant for EA credit institutions. EA banks are less risk-taking than non-EA intermediaries, since EA banks are characterized by a significantly lower the number of LLPs to total Assets as compared to non-EA banks. As to the discretionary management hypotheses, there is evidence that EA banks do use LLPs

to smooth their income, whereas non-EA intermediaries do not. Contrary to EA banks, non-EA intermediaries appear to be involved in capital management and signaling practices via LLPs.

During the period 2007-2010, bank LLPs became cyclical in EA banks and non-EA banks have LLPs positively associated with the amount of NPLs in the credit portfolio. Also, EA banks seem to be more concerned about the quality of their loan portfolio, as shown by the coefficients tested and by the fact that not only they do not use LLPs to manage capital ratios or to convey information about their future performance to the market, but they also do not use LLPs to stabilize their income. Finally, the income smoothing hypothesis is supported for non-EA banks and they appear to be no longer involved in capital management and signaling activities.

3.5 Income smoothing through LLPs

El Sood, Heba Abou, 2012 investigate whether loan loss provisions of US bank holding companies are affected by income smoothing incentives during the period 2001-2009. They also look into the income smoothing behavior through loan loss provisions before and after the financial crisis.

He makes the assumptions that Earnings is positively associated with subsequent year loan loss provisions and that the association if any, between earnings and subsequent year loan loss provisions is negative in recessionary periods and positive for more profitable bank holding companies. Moreover, the association -if any- between the change in earnings and loan loss provisions differs for banks below the target capital ratio relative to those above the target capital ratio.

In order to control for the pre-crisis boom and crisis period hypotheses he examined the association between earnings and subsequent year loan loss provisions is less pronounced during financial crisis period than during the pre-crisis boom.

In order to control for these hypotheses a multivariable regression model was used based on prior literature where the dependent variable was loan loss provisions to total assets.

The sample consisted of US bank holding companies for the period 2001-2009. The data were collected from regulatory reports filed with the IS Federal Reserve Bank. Market data pertaining to equity returns are obtained from the center for research in security prices. The final sample consists of 878 bank holding companies and 4,689 bank year observations.

The correlations between the dependent variable and all independent variables are significant under conventional levels. There is a positive correlation between loan loss provisions and each of the components of tier 1 capital ratio, as well as a positive correlation between each of the generic risk measures. A positive correlation between loan growth and the risk weighted assets component is observed, whereas loan growth is negatively correlated with the tier 1 capital component.

The empirical results show that accelerating loan loss provisions for income smoothing purposes, is less pronounced during the crisis period of 2007-2009 than during the pre-crisis boom of 2002-2006 and the association between regulatory capital and loan loss provisioning is more pronounced during the financial crisis period than during the pre-crisis boom.

Overall, he finds evidence that loan loss provisions are significantly affected by income smoothing incentives and the effect of income smoothing on bank loan loss provisions is amplified when banks hit the regulatory minimum target and are more profitable.

Also, banks have income smoothing incentives to delay the provisioning process during recessionary periods giving rise to procyclicality concerns. Also, internally set capital targets are more significant triggers of capital management and income smoothing than the regulatory-set minimum ratios

During the pre-crisis boom period, banks tend to accelerate provisioning to smooth income downward, whereas during the financial crisis period, this association is less pronounced.

Fonseca, A.R. & González, F., 2008, study the determinants of income smoothing by management of loan-loss provisions in banks globally. Their results indicate that neither income smoothing nor different income smoothing between publicly and non-publicly traded banks is stable across countries. Overall, the results support the usefulness of the regulations contained in Basel II.

The primary hypothesis is that the more efficient bank regulation and supervision proves to be in limiting bank risk, the fewer the incentives for bank managers to smooth bank earnings. Income smoothing improves the risk perception of a bank for its investors, regulators, and supervisors. There may also be managerial self-interest to smooth earnings.

The risk-management hypothesis emphasizes supervisor's interest in reducing procyclicality of LLP and capital. It assumes that banks and regulators define a specific level of protection against credit losses and banks set aside loan-loss reserves according to the value of expected losses and raise capital according to unexpected losses.

Bank balance sheet and income statement data from Fitch-IBCA Ltd. BankScope Database were acquired for banks in 40 countries during 1995-2002 resulting in 3.221 bank-year observations.

A regression model was used, based on the generalized method of moments estimators developed for dynamic models of panel data by Arellano and Bond (1991). A dependent variable loan loss provisions normalized by the total bank assets was used.

Several dummy variables were used, based on control models from La Porta et al. (1998) and Barth et al. (2001), to measure for investor protection, accounting quality, bank regulation and supervision, financial Structure and development.

Final results on the complete sample indicate income smoothing statistically significant in all estimations. Different patterns of income smoothing across countries are observed:

A positive relation between LLP and bank earnings in 13 countries is observed (Brazil, Chile, Denmark, Egypt, Italy, Kenya, Korea, Peru, Philippines, Portugal, Spain, Sweden, and Venezuela).

In Chile, Kenya, and Spain, income smoothing is detected only in publicly traded banks but not in non-publicly traded banks.

In Colombia, Greece, Malaysia, Pakistan, Thailand, and the UK, results contradict the income smoothing hypothesis, with negatively related LLP and EBT.

Publicly traded banks engage in income smoothing more than non-publicly traded banks in Chile, Colombia, Egypt, Kenya, Peru, Portugal, Spain, and Thailand.

In Greece and Italy, publicly traded banks smooth income less than non-publicly traded banks.

Legal variables measuring investors protection have a negative influence on bank income smoothing, which indicates that the greater the degree of law enforcement, the more investor protection reduces income smoothing.

There is indication that stronger minority shareholder protection and legal enforcement have a positive effect on the amount of LLP. Better accounting disclosure, stricter regulations on bank activities, stricter official supervision, and more private monitoring reduce the use of LLP to smooth earnings.

Official and private supervision is effective in reducing bank risk, thereby dampening incentives for managers to smooth income to reduce the volatility of bank income. Lower risks of banks that target the credit and deposit markets reduce incentives to smooth earnings.

The exogenous components of market orientation and development of the financial system are positively associated with bank income smoothing. Greater income smoothing in market-oriented and more developed financial systems is consistent with the idea that bank managers have incentives to report more stable profits, the more external users of financial statements there are.

Finally, results highlight the limited economic significance of political economy variables for LLP. For instance, an increase in the coefficient of the market orientation of the financial system and the coefficient that measures the financial development would result in an enhanced relation between EBT and LLP.

Shen, Chung-Hua and Hsiang-Lin Chih, 2005 address three issues related to the earnings management of banks across 48 countries. Firstly, they control to see if earnings management exists in all 48 countries and secondly, they search for the incentives of banks to manage earnings and finally the reason why earnings management vary across countries.

By using a sample of financial institutions of 48 countries worldwide and a multiple regression model modified to control for their needs, they find that the distributions of a bank's net income are half-normally distributed for more than two-thirds of the countries in the sample, suggesting the possibility of earnings management. Bank earnings management is common and exists for nearly all the sample countries regardless the measures. There is also a wide variation in the extent of the earnings management across countries that appears to be strongly driven by the elements of prospect theory.

Lastly, they conclude that, in order to weaken banks' incentives to manage earnings and thus improve the reliability of financial reports, stringent accounting disclosure requirements appear to be more effective than developing strong anti-director rights.

3.6 LLPs through audit and regulations

Drew Dahl 2013 compares loan loss provisions in the banking industry, across categories of banks that vary by how they conduct external audits. He examines the evolution of loan loss accounting across banks that differ categorically by external auditing practices.

Dependent variables are loan loss provisions relative to nonaccrual loans and total loans. The ratio of provisions to nonaccrual loans is intended to reflect potential losses associated with impairment. The ratio of provisions to loans is used in order to incorporate potential losses that are established by management over and above amounts determined by analyses of individual loans and loss history or are not individually identifiable.

The sample consists of 75,505 observations, during 1995-2009, from affiliated banks with assets less than $500 million. The chosen banks fall into three categories based on audit practices, external audit of a bank conducted at the bank level, external audit of a bank conducted at the holding company level, and no external audit. The sample was limited to banks that are affiliated with multi-bank holding companies. Three main sub-samples were created based on size, equity capital ratio, and loan types. Those were separated further resulting in 21 total sub-samples. The overall sample of 75,505 observations was used to analyze convergence in the ratio of provisions to loans. A smaller sample of 54,168 observations was used to analyze convergence in the ratio of provisions to nonaccrual loans.

A partial adjustment model was used. For small banks results indicate convergence across all categories of banks in establishing target ratios of provisions to nonaccrual loans. Divergence in target levels of provisions to loans is more readily apparent. For big banks convergence exists across all categories. These results suggest that diversity in provisioning decreases with size. Banks concentrating in commercial loans and consumer loans show convergence, whereas banks concentrating in real estate loans show convergence for the ratio of provisions to nonaccrual loans but not for the ratio of provisions to loans. Highly capitalized banks show convergence in both cases and relatively undercapitalized banks show convergence in the ratio of provisions to nonaccrual loans and divergence in the ratio of provisions to loans.

Results indicate that unaudited banks have lower target ratios of provisions to loans than audited banks, in several sub-samples. Divergence is observed at a varying degree across different definitions of provisions and different sub-samples. Convergence in targeted levels of provisions to non-accrual loans is greater than convergence in targeted levels of provisions for loan losses to loans.

Laeven, L. & Majnoni, G., 2003, examine if the regulation of loan loss reserves should be an integral part of bank capital regulation and if it is likely that a distinct treatment of loan loss reserves may affect the procyclical features of capital regulation. Their work analyzes the cyclical patterns of bank loan loss provisions followed by large commercial banks in different geographical areas of the world.

They suggest that a reconciliation of the different views about banks capital requirements could be envisioned by considering a partition of regulatory capital based not only on seniority considerations, but also on risk management considerations.

By assuming that loan loss provisions are negatively associated with bank's earnings and GDP growth, as well as negatively related to loan growth, they hypothesize that a bank shows imprudent loan loss provisioning behavior susceptible to have procyclical effect on the bank's capital.

They used a standardized form of the regression model normalized by total assets and balance sheet information from bankscope for the period 1988-1999. This period was chosen because it captures both the economic slowdown in the USA of the early 1990s and the following upswing in the mid and late 1990s, as well as at least one business cycle for other countries.

They expected positive coefficients on earnings, loan growth and GDP growth in order for their hypothesis of prudent loan loss provisioning to be valid.

Overall, they find a positive and significant relationship between the ratio of loan loss provisions and bank earnings, suggesting that banks have followed an income-smoothing pattern on average. On the contrary, the real loan growth rate had a negative coefficient, meaning that banks appear to have increased the amount of provisions during periods of positive profits, but, at the same time, they have been less prudent during periods of rapid credit growth. GDP growth also had a negative coefficient.

With the use of a dummy variable, they concluded that banks make statistically significantly higher provisions when they incur losses as compared to when they generate a positive level of income before provisions and tax.

After splitting the sample into regions, they show that banks in all regions except Asia smooth their income over time. Also, for all the five regions, banks with negative income make more provisions than banks with positive income. Further analysis revealed that banks are slow in adjusting to their optimal path of provisioning over a multi-year horizon.

Finally, banks in the USA, Japan, and Asia, provision less during high GDP growth, suggesting an undesirable anti-business cyclical behavior of provisioning.

Allison Nicoletti 2017 used a sample of commercial US banks filing annual Call reports between 1997 and 2005 with positive total assets in his report, to examine whether bank regulators and external auditors have conflicting effects on loan loss provision timeliness.

His first two hypotheses examined the effect of regulators and auditors individually in the relative absence of a conflict. He examined the effect of greater regulatory scrutiny at unaudited banks, as well as the effect of an audit when regulatory scrutiny is lower. An assumption in these predictions is that any conflict between regulators and auditors is likely to be weaker in the presence of lower regulatory scrutiny since there is no observation of the effect of an audit in the complete absence of regulatory scrutiny given that all banks are regulated. The first hypothesis states that in unaudited banks, LLPs timelines is not different for banks subject to greater regulatory scrutiny compared to lower regulatory scrutiny. The second one is that in banks subject to lower regulatory scrutiny, LLP timelines is not different for audited banks compared to unaudited banks.

The second set of hypotheses examines the effect of regulators and auditors on LLP timelines when any conflict is more likely to be present. This is summarized in the hypotheses that in audited banks, LLP timeliness is not different for banks subject to greater regulatory scrutiny as compared to lower regulatory scrutiny and that in banks subject to greater regulatory scrutiny, LLP timeliness is not different for audited banks as compared to unaudited banks.

Based on the basic regression model, he used several variables to control for the type of audit each bank used and the state they are regulated. Then, he used his equation separately for each of the four subsamples he created. There were four different variations based on whether the bank is unaudited or audited and whether the bank is located in a lenient state or in a strict state.

By using national banks as a control group, because they are examined solely by the OCC, he came up with the result that greater regulatory scrutiny and an external audit are positively associated with loan loss provision timeliness in the relative absence of a conflict between regulators and auditors. Results are also consistent with a conflict between regulators and auditors, with the auditor influence dominating that of the regulator.

Firstly, greater regulatory scrutiny and audits are each positively associated with timeliness when any conflict between the two groups is expected to be relatively absent. Secondly, the results indicate that regulators and auditors' conflict over loan loss provisions timeliness. Specifically, they show that auditors constrain LLP timeliness in the presence of a conflict, because audited banks attain a similar level of timeliness regardless of the extent of regulatory scrutiny.

Kathleen Andries, John Gallemore, Martin Jacob, 2016 examine the role of the corporate tax system in the stability of the financial sector through its treatment of loan losses.

They analyzed a sample from 2001-2013 for 44 countries and hypothesize that allowing banks to claim a tax deduction for loan loss provisions should encourage them to recognize provisions, meaning that loan loss provisions are positively associated with the corporate income tax rate when general loan loss provisions can be deducted for tax purposes. Since managers have more discretion over general LLPs which are not tied to a specific borrower or loan, provisions may be sensitive to tax incentives when general provisions are tax deductible.

Their second hypothesis was that the extent to which future and current loan portfolio deteriorations are incorporated into the loan loss provision is increasing in the corporate income tax rate when general loan loss provisions can be deducted for tax purposes. This is based on the fact that when banks are allowed to deduct loan loss provisions for tax purposes, they may be timelier in recognizing provisions for expected future and current loan losses in order to accelerate the tax deduction.

Finally, they hypothesize that loan portfolio risk is positively associated with the corporate income tax rate when general loan loss provisions can be deducted for tax purposes. This is based on the idea that the corporate tax system can lead to higher current period LLPs by encouraging greater loan risk-taking. This can occur if the bank decides to increase the risk of the loan portfolio, knowing that it can deduct the expected loss immediately, rather than waiting for the loan to be charged off.

As expected, they find evidence that banks' loan loss provisions are increasing in the corporate tax rate when the provisions are tax deductible. In fact, a one percentage point increase in the corporate tax rate increases provisions by 4.9% of the sample average, or $5 million based on the median bank assets. Furthermore, this effect seems to be driven by the corporate tax system encouraging timelier loan loss recognition.

They also conclude that the corporate tax system can act as a substitute for strong banking regulators in encouraging banks to increase their loan loss provisions. Finally, when testing for US banks, they find evidence that the rules regarding the tax deductibility of loan loss provisions influence bank size choices in the U.S.

Overall, their study suggests that taxation can lead to timelier loan loss recognition and hence a more transparent banking system.

4 Regression Analysis

4.1 Variables of Existing Literature

The following table presents the main explanatory variables, their expected sign and the economic logic for it.

Name	Symbol	Expected sign	Reasoning
$\left(\frac{\Delta NPL_{i,t}}{LoansOutstanding_{i,t}}\right)$	ΔNPL	(+)	A rise in NPLs would require more provisions to be made.
$\left(\frac{EBTP_{i,t}}{TA_{i,t}}\right)$	$EBTP_{(i,t)}$	(+)	Also seen as NI/TA. A positive sign is consistent with income smoothing; the higher the profits, the higher the LLPs hence the lower the profits after provisioning.
$\left(\frac{EBTP_{i,t+1} - EBTP_{i,t}}{[TA_{i,t+1} + TA_{i,t}]/2}\right)$	$\text{SIGNAL}_{(i,t)}$	(+)	Proxies for expected profits used as an indication for signaling. A positive sign in next periods EBTP (that were not known at the time) is consistent with signaling effect.
$\left(\frac{CAPITAL_{i,t}}{TA_{i,t}}\right)$	$\text{CAPITAL}_{(i,t)}$	(-)	The higher the capital, the lower the need to manipulate/underestimate LLPs and overestimate profits. Positive correlation, would indicate that there is capital management through LLPs. That would imply that rise of capital does not derive from healthy investment opportunities but the refinancing of bad ones.
$\left(\frac{RWA_{i,t}}{TA_{i,t}}\right)$	$\text{RWA}_{(i,t)}$	(+)	Same as before, if a rise in LLPs results from the rise of RWA it would imply an attempt to control for capital management and agency problem, all else equals.
$\left(\frac{TIER1CAP_{i,t} - LLP_{i,t}}{TA_{i,t}}\right)$	$\text{T1CAP}_{(i,t)}$	(+)	The level of tier 1 capital adjusted for the allowance for loan losses and deflated by Total Assets.
$\left(\frac{T1CAP_{i,t}}{RWA_{i,t}}\right)$	$\text{T1CA}PR_{(i,t)}$	(+)	Tier 1 Capital Ratio is used as a more accurate approach to earnings since LLPs derive from tier 1 capital.
$\left(\frac{GDP_{i,t+1} - GDP_{i,t}}{GDP_{i,t}}\right)$	$\%\Delta\text{GDP}_{(i,t)}$	(-)	Or total market capitalization of a country's stock market as a % of GDP, a measure of market development. If the general economy or market cap improves, then NPLs would be lower, hence LLPs would be lessened.
$\left(\frac{\Delta LOANS_{(i,t)}}{LOANS_{(i,t)}}\right)$	$\text{LGROWTH}_{(i,t)}$	(-)	A negative sign would indicate that loan growth results from expansion of investment opportunities
		(+)	A positive sign indicates deteriorating of the underwriter quality and a rise of LLPs.
$TAXRATE_{i,t}$	$\text{TAXRATE}_{(i,t)}$	(+)	A positive sign to corporate income tax rate is expected when LLPs can be deducted for tax purposes.

$\left(\frac{NCO_{i,t}}{TA_{i,t}}\right)$	$\mathrm{NCOTASSETS}_{(i,t)}$	(+)	NCO is the amount of money that is not expected to be recovered from a loan. A positive sign is consistent with a rise in LLPs.
$\left(\frac{TL_{i,t}}{TA_{i,t}}\right)$	$\mathrm{LOANS}_{(i,t)}$		The importance of loans in a bank's overall portfolio of assets. If a positive correlation with LLPs is observed then loans are supposed to be of greater importance in a bank's portfolio and vice versa.
$StDev(TA_{i,t})$	$\Delta\mathrm{SDA}_{(i,t)}$		Implied Standard Deviation of bank Asset values. A measure of bank risk shifting to control for a connection between LLPs and assets.
$Log(TA_{i,t})$	$\mathrm{SIZE}_{(i,t)}$		As the natural logarithm of total Assets in order to differentiate the sample by bank size.
	$\mathrm{OWN}_{(i,t)}$		The results of ownership concentration can be observed through the major shareholders percentage and the number of major shareholders.

Table 4.1.1

In addition, several papers have used the following dummy variables to account for time-invariable bank and country characteristics.

Symbol	Description
REG	Used to control for a specific region.
PUBLIC	To distinguish between publicly and privately held banks.
MERGER	To control for banks that were merged during the sample period.
AUDIT	To distinguish between internally audited banks and independently audited.
BIG4AUDIT	To examine for differences regarding the audit firm, if it is one of the big 4 or not.

Table 4.1.2

4.2 Equation to be Estimated

In addition to previous studies, I look for a connection between LLPs and market share price, where I expect a negative correlation between LLPs and percentage share price movement. A negative sign would be connected with negative expectations and that low earnings immediately affect the share price. A positive sign would be consistent with signaling and smoothing hypotheses. A positive share price movement would mean that investors have positive expectations for the near future, hence LLPs are expected to be lowered.

Share price movement will be controlled with the percentage difference of the share price between two periods.

$$SPRICE = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}\% \tag{4.2.1}$$

Liu, Ryan & Wahlen, (1997) and Blose, (2001) has studied the correlation between market reaction and discretionary LLPs. In this paper I am looking for a correlation between stocks' share price movement and LLPs around the time they are announced.

Therefore, my regression model would be as follows:

$$\left(\frac{LLP_{(i,t)}}{TA_{(i,t)}}\right) = \beta_0 + \beta_1\, SIGNAL_{(i,t)} + \beta_2\, EBTP_{(i,t)} + \beta_3\, LOANS_{(i,t)} + \beta_4\, LGROWTH_{(i,t)} + \beta_5\, \%\Delta GDP_{(i,t)} + \beta_6\, CAPITAL_{(i,t)} + \beta_7\, \Delta NPL_{(i,t)} + \beta_8\, SPRICE_{\,(i,t)} + \varepsilon_{(i,t)} \tag{4.2.2}$$

For robustness checks I have split the sample once by country size (into two sub samples based on GDP), and by bank size (based on total assets) and checked for possible differences. I did not expect to find anything different than the original sample since all of the financial institutions involved are subjected into the same EU regulations.

4.3 Data and Econometric issues

Time-series data was collected from a Bloomberg terminal. It included 121 financial institutes across the 17 countries of the European monetary union. Final data consisted of 5566 time-series observations. It included quarterly data from 2009 to the second quarter of 2020. Institutions with very few data were excluded from the sample.

The countries that were involved are Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Lithuania, Malta, Netherlands, Portugal, Slovakia, Slovenia and Spain.

For sensitivity check, I also removed every row that was not complete from data and rerun the regression. That resulted in 1225 observations within an unbalanced panel and an adj. R^2 of 0,23 for the fixed effects model, far smaller than the previous one of 0,38.

Five estimators were used for the analysis: Pooled OLS, between, first differences, fixed effects or within and random estimator. Lagrange multiplier test for random vs OLS and fixed vs OLS, as well as Hausman test were used in order to control for the best suited model. In accordance to that I also conducted a Breusch-Pagan Lagrange Multiplier for random effects for balanced and unbalanced panels. In every case I ended up with the fixed effects model being the best scenario (except one), so I tested for heteroskedasticity which was not present; I also included a robust covariance matrix estimation (sandwich estimator) and tested for time-fixed effects model with a pFtest.

Using Breusch-Pagan LM test for cross-sectional dependence in panels and Pasaran CD test for cross-sectional dependence in panels I tested for cross-sectional dependence/contemporaneous correlation. According to Baltagi, cross-sectional dependence is a problem in macro panels with long time series. This is not much of a problem in micro panels (few years and large number of cases). The null hypothesis in the B-P/LM and Pasaran CD tests of independence is that residuals across entities are not correlated. B-P/LM and Pasaran CD (cross-sectional dependence) tests are used to test whether the residuals are correlated across entities. Cross-sectional dependence can lead to bias in tests results (also called contemporaneous correlation).

The serial correlation tests apply to macro panels with long time series. This is not a problem in micro panels (with very few years). The null is that there is no serial correlation.

5 Results

5.1 Summary Statistics

Plain statistics for the basic model:

Variable	Mean	Median	Min	Max
LLPs	0,0029	0,0014	-1,8165	0,1373
SIGNAL	-0,0002	0,0000	-0,8877	0,0420
EBTP	0,0042	0,0030	-1,8164	0,1344
LOANS	0,6584	0,6968	0,0000	36,9588
LGROWTH	-0,5798	0,0000	-534,3214	1,0000
%ΔGDP	0,0168	0.0211	-0,2139	0,2588
CAPITAL	0,4139	0.3920	0,0000	42,4336
ΔNPL	-0,0346	0,0000	-79,0000	0,2954
SPRICE	0,1380	0,0000	-96,0000	528,0000

Table 5.1. 1

5.2 Results – At a glance

The table below represents a correlation of the best model between the main sample and the sensitivity analysis. The first column addresses the independent variables and the second column illustrates the expected sign. Third column has the results of the main sample and the rest show the sensitivity test results. Size refers to total assets and Country size is determined through GDP. The first number is the estimated coefficient – red if it is negative, and in the parenthesis is the p-value – green where there is 1% statistical significance.

		Main Sample	Big Size	Small Size	Big Country	Small Country	Data Only Sample
$SPRICE_{(i,t)}$	(-)	-0,000 (0,00)	-0,000 (0,00)	-0,000 (0,12)	-0,000 (0,41)	-0,000 (0,00)	-0,000 (0,00)
$EBTP_{(i,t)}$	(+)	0,463 (0,00)	0,473 (0,00)	0,342 (0,01)	0,487 (0,00)	0,493 (0,00)	0,477 (0,00)
$SIGNAL_{(i,t)}$	(+)	0,011 (0,08)	0,132 (0,00)	0,011 (0,26)	0,437 (0,00)	0,004 (0,60)	0,013 (0,05)
$CAPITAL_{(i,t)}$	(-)	-0,002 (0,00)	-0,000 (0,59)	-0,007 (0,01)	0,001 (0,32)	0,007 (0,04)	-0,001 (0,75)
$LOANS_{(i,t)}$	(+)	0,003 (0,00)	-0,005 (0,00)	0,015 (0,00)	-0,000 (0,67)	0,018 (0,00)	0,001 (0,52)
$\Delta NPL_{(i,t)}$	(+)	-0,002 (0,79)	-0,004 (0,47)	0,002 (0,87)	0,018 (0,00)	-0,010 (0,33)	-0,001 (0,82)
$LGROWTH_{(i,t)}$	(-)	0,000 (0,83)	0,000 (0,39)	-0,000 (0,84)	-0,001 (0,00)	0,001 (0,67)	0,000 (0,87)
$\%\Delta GDP_{(i,t)}$	(-)	-0,030 (0,00)	-0,052 (0,00)	-0,038 (0,00)	-0,002 (0,70)	-0,033 (0,00)	-0,031 (0,00)
Model Used		Random effects	Random effects	Pooled OLS	Fixed effects	Pooled OLS	Fixed effects
# Banks		44	49	45	62	32	94
# Observations		1225	953	272	765	460	1225
Adj. R^2		0,38	0,60	0,11	0,56	0,47	0,23

Table 5.2. 1

5.3 Results – Discussion

Share price is correlated to LLPs

First, we observe that the newly added variable *SPRICE* is negatively correlated in every sample and statistically significant in the main sample. This is consistent with the previously stated hypothesis that LLPs affect negatively the share price since they imply lower future EBTP.

When controlling for the new share price variable $(SPRICE_{(i,t)})$ results indicate a negative correlation. Only the samples of small sized banks and big countries failed to reach statistical significance. Negative correlation means that investors translate a rise in LLPs to fewer earnings which results share prices to drop. The fact that this does not seem to occur in small banks and banks from big countries could be because of differences in ownership. On the one hand, in small banks there might be few basic owners that are not affected by announcements probably because of inside information. On the other hand, banks from big countries are keener to have big shareholders like hedge funds that do not react solely on one announcement such as LLPs.

In the main sample we observe that independent variables *CAPITAL* and *%ΔGDP* have negative signs as expected and are statistically significant. The lack of capital management could be because of the regulations that were applied during the examination period since it followed the ’08 depression.

LOANS and *EBTP* also reacted as expected with positive signs and statistical significance. There is presence of income smoothing through future earnings.

The variables for *SIGNAL*, *ΔNPL* and *LGROWTH* failed to reach statistical significance in the main sample.

Sensitivity analysis on the big sized banks sample revealed that there is presence of the signaling hypothesis since *SIGNAL* is positively correlated and statistically significant. Capital management lost its significance and *LOANS* are negatively correlated meaning that loans are a smaller fraction of total assets for big banks.

Small sized banks failed to reach statistical significance in every variable except *LOANS* and *%ΔGDP*. Loans appear to be of greater importance for small banks than they were for big banks.

Banks from big countries as well as small sized banks failed to reach statistical significance on the SPRICE variable. Besides that, there is evidence of income smoothing and signaling effect that is also observed in the sample of big banks. *ΔNPL* and *LGROWTH* reacted as expected and reached significance. This is the only sample that those two variables reached statistical significance. A negative sign in *LGROWTH* would indicate that loan growth results from expansion of investment opportunities meaning that banks in big countries overcame the depression of ’08 faster and managed to expand in profitable investments. Also, in this sample we observe that NPLs are negatively correlated to LLPs. It is also worth mentioning that LLPs in banks from big countries do not seem to be affected by the general economy since *%ΔGDP* failed to reach statistical significance.

Small countries sample provides evidence of income smoothing and a negative correlation between *SPRICE* and LLPs. Loans appear to take the lion’s share when it comes to total assets and a negative correlation with statistical significance is observed for the *%ΔGDP* as expected.

The sample that had only rows with complete data was calculated as an extra control sample to the main one. Besides changes in the statistical significance of *CAPITAL* and *LOANS*, is in accordance to the main sample.

The results are mostly consistent with expectations.

There appears to be manipulation of LLPs for signaling purposes

Future pre loan loss earnings ($SIGNAL_{(i,t)}$) was used as an indication for signaling. A positive correlation that implies signaling is present in every sample but reached statistical significance only in the samples from big countries and the one with big sized banks. This indicates that signaling as a technique can be found in markets and banks that might have a more a more disperse ownership structure.

LLPs are used for income smoothing

Earnings before Interest Taxes and LLPs to Total Assets ($EBTP_{(i,t)}$) was used as an indication of income smoothing. Every sample provided evidence that there is both a positive correlation and statistical significance, meaning that there is strong evidence of income smoothing through LLPs. Only small sized banks sample failed to reach statistical significance.

Loans play an important role in a bank's portfolio

Loans ($LOANS_{(i,t)}$) appear to be of great importance in a bank's portfolio in the main sample and the samples of small sized banks and banks from small countries. In those cases, loan portfolio seems to take up a significant part of total assets. Big sized banks and banks from big countries seem to have a more diversified portfolio. Only the sample of banks from big countries failed to reach statistical significance.

Loan growth results from investment opportunities but is statistically insignificant

Loan growth $(LGROWTH_{(i,t)})$ had a negative correlation in small sized banks and banks from big countries, indicating that loan growth results from expansion of investment opportunities. Positive correlation was observed only when testing big sized FIs and small country sample. However, it failed to reach statistical significance in every sample except the big country sample.

A country's economy enhances LLPs

The rise in a country's GDP ($\%\Delta GDP$) has a negative correlation to LLPs as expected on every occasion and is statistically significant besides the sample that controlled for banks of big countries.

Overall, no capital management seems to be present

Capital management through LLPs $(CAPITAL_{(i,t)})$ has a negative correlation to LLPS in the main sample and statistical significance meaning that it does not exist. The rest of the sub-samples failed to reach statistical significance.

ΔNPLs failed to reach statistical significance

NPLs $(\Delta NPL_{(i,t)})$ failed to reach statistical significance in every sample but the one with banks from big countries. Only in that sample there seems to be a positive correlation between NPLs and LLPs as expected.

A negative correlation is observed when testing banks of small countries, big sized banks and in the main model. Although statistically insignificant this could be due to the fact that several measures were taken to support small FIs after the crisis of '08, resulting in a negative correlation between LLPs and NPLs.

6 Conclusion

This paper covers the universe of financial institutions across the European Monetary Union and re-examines the connection between loan loss provisions and several theories. These include earnings smoothing, signaling effect, and capital management, as these have been analyzed in previous literature. This is achieved through a panel regression model analysis in R.

In addition to previous literature, this paper provides evidence that there is a connection between loan loss provisions and share price movement. We concluded that there is a negative correlation between LLPs and share price movement meaning that LLPs affect the share price since they imply lower future EBTP and are therefore interpreted as future losses by investors.

Further research could be required in order to control share price movement with independent variables such as the amount of external support from the ECB or the IMF after 2007 on the countries, or maybe control different fractions such as big size FIs from big countries and big size FIs from small countries. There should also be an analysis on the decade before the ’08 depression to control for potential differences. A comparison among different locations e.g. USA or Asia could be also a subject for future studies.

7 Appendix

7.1 Primary model and robustness checks

Data consisted of 121 financial institutions across the 17 countries of the European monetary Union as of July 2020. The basic model that was used as it is described on the paper was:

$$\left(\frac{LLP_{(i,t)}}{TA_{(i,t)}}\right) = \beta_0 + \beta_1 \,\text{SIGNAL}_{(i,t)} + \beta_2 \, EBTP_{(i,t)} + \beta_3 \,\text{LOANS}_{(i,t)} + \beta_4 \,\text{LGROWTH}_{(i,t)} + \beta_5 \,\%\Delta\text{GDP}_{(i,t)} + \beta_6 \,\text{CAPITAL}_{(i,t)} + \beta_7 \, \Delta NPL_{(i,t)} + \beta_8 \,\text{SPRICE}_{\,(i,t)} + \varepsilon_{(i,t)} \quad (7.1.1)$$

Data were obtained from Bloomberg; first table analysis was done in Excel and regressions were made with RStudio as mentioned in appendix 2.

7.1.1. Primary Model

My first original model data resulted in:

Plain Statistics

Variable	Mean	Median	Min	Max
LLPs	0,0029	0,0014	-1,8165	0,1373
SIGNAL	-0,0002	0,0000	-0,8877	0,0420
EBTP	0,0042	0,0030	-1,8164	0,1344
LOANS	0,6584	0,6968	0,0000	36,9588
LGROWTH	-0,5798	0,0000	-534,3214	1,0000
%ΔGDP	0,0168	0.0211	-0,2139	0,2588
CAPITAL	0,4139	0.3920	0,0000	42,4336
ΔNPL	-0,0346	0,0000	-79,0000	0,2954
SPRICE	0,1380	0,0000	-96,0000	528,0000

On a 1% confidence level across different estimators the following results occurred:

				a = 0,01	99%	0,01
Column1	**Pooled OLS regression**	**Between**	**Fixed effects or within estimator**	**First differences**	**Random effects**	**time.Fixed effects**
intercept	-0,001	0,000		0,000	0,000	
Pr(>|t|)	0,041	0,886		0,963	0,381	
SIGNAL	0,011	0,056	0,010	0,008	0,010	0,011
Pr(>|t|)	0,065	0,550	0,108	0,140	0,089	0,081
EBTP	0,512	0,602	0,466	0,467	0,491	0,463
Pr(>|t|)	0,000	0,000	0,000	0,000	0,000	0,000
LOANS	0,005	0,002	0,003	0,002	0,004	0,003
Pr(>|t|)	0,000	0,480	0,001	0,204	0,000	0,000
LGROWTH	0,000	-0,002	0,000	0,000	0,000	0,000
Pr(>|t|)	0,979	0,306	0,842	0,867	0,934	0,827
%ΔGDP	-0,037	-0,040	-0,028	-0,003	-0,032	-0,030
Pr(>|t|)	0,000	0,055	0,000	0,695	0,000	0,000
CAPITAL	-0,004	-0,001	-0,002	-0,002	-0,003	-0,002
Pr(>|t|)	0,000	0,605	0,006	0,346	0,000	0,003
ΔNPL	0,000	0,078	-0,001	0,001	-0,001	-0,002
Pr(>|t|)	0,990	0,273	0,805	0,870	0,897	0,796
SPRICE	0,000	0,000	0,000	0,000	0,000	0,000
Pr(>|t|)	0,000	0,016	0,000	0,515	0,000	0,000
Total Sum of Squares	0,06261	0,0006	0,0473	0,06649	0,0541	0,04734
SSR	0,03475	0,0001	0,0315	0,05062	0,0330	0,03028
# Banks	44	44	44	44	44	44
# Periods	1-46	1-46	1-46	1-46	1-46	1-46
# Observations	1.225	1.225	1.225	1.225	1.225	1.225

R-Squared	0,44505	0,8176	0,3344	0,23863	0,3900		0,36037
Adj. R-Squared	0,4414	0,7759	0,30548	0,23343	0,38596	0..30593	
p-value	2,22E-16	8,17E-11	2,22E-16	2,22E-16	2,22E-16		2,22E-16

Pr(>|t|) = Two-tail p-values test the hypothesis that each coefficient is different from 0. To reject this, the p-value has to be lower than 0.01 (99%, you could choose also an alpha of 0.10), if this is the case then you can say that the variable has a significant influence on your dependent variable (y).

First, we shall introduce several tests/diagnostics that were also made and finally the previous table will be analyzed in further detail.

Hausman test for fixed versus random effects model	p-value = 0,733	USE RANDOM EFFECTS MODEL BECAUSE ONE OF THE TESTS IS INCONSISTANT

Lagrange Multiplier test for random effects VS OLS	p-value = 6,735e-11	WE CANNOT REJECT THE NULL AND CONCLUDE THAT RANDOM EFFECTS MODEL IS BETTER THAN OLS

Lagrange Multiplier test for fixed effects VS OLS	p-value = 9,655e-09	WE CANNOT REJECT THE NULL AND CONCLUDE THAT FIXED EFFECTS MODEL IS BETTER THAN OLS

Testing time-fixed effects. The null is that no time-fixed effects needed		WE REJECT NULL HYPOTHESIS - TIME-FIXED EFFECTS NEEDED
pFtest(fixed.time, fixed)	p-value = 0,4425	

Breusch-Pagan Lagrange Multiplier for random effects. Null is no panel effect	p-value = 6,735E-11	WE CANNOT REJECT NULL - NO PANEL EFFECT

Breusch-Pagan LM test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value = 5,067E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE
Pesaran CD test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value = 0,2851	WE REJECT NULL - CROSS-SECTIONAL DEPENDENCE

Breusch-Godfrey/Wooldridge test for serial correlation in panel models	p-value = 2,836E-09	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE IS NOT SERIAL CORRELATION

Breusch-Pagan test for heteroskedasticity. The null hypothesis for the Breusch-Pagan test is homoskedasticity.	p-value < 2,2e-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE HOMOSKEDASTICITY

In the following pages I present results of various regression analyses on different data clusters. Results are being discussed in the main text.

Firstly, I excluded time series with no complete data resulting in a smaller sample with unbalanced panel data. Secondly, I split the sample into two categories according to bank size and country size. Bank size was determined by their equity capital and country size by GDP.

7.1.2 Results from the data sample with complete data rows.

Variable	Mean	Median	Min	Max
LLPs	0,0027	0,0013	-0,0299	0,1373
SIGNAL	-0,0007	0,0000	-0,8877	0,0380
EBTP	0,0037	0,0028	-0,0408	0,1344
LOANS	0,6513	0,6631	0,0325	36,9588
LGROWTH	-0,4482	0,0002	-534,3214	0,9985
%ΔGDP	0,0088	0,0151	-0,1039	0,2588
CAPITAL	0,4298	0,3957	0,0508	42,4336
ΔNPL	-0,0141	0,0000	-16,7826	0,2954
SPRICE	-2,6780	-1,5810	-96,4360	224,0380

				a = 0,01	99%	0,01
Column1	**Pooled OLS regression**	**Between**	**Fixed effects or within estimator**	**First differences**	**Random effects**	**time.Fixed effects**
intercept	0,001	0,001		0,000	0,001	
Pr(>|t|)	0,041	0,323		0,844	0,175	
SIGNAL	0,011	0,001	0,013	0,008	0,011	0,013
Pr(>|t|)	0,066	0,951	0,052	0,266	0,061	0,053
EBTP	0,512	0,518	0,477	0,508	0,506	0,480
Pr(>|t|)	0,000	0,000	0,000	0,000	0,000	0,000
LOANS	0,005	0,006	0,001	0,002	0,004	0,002
Pr(>|t|)	0,000	0,001	0,527	0,438	0,000	0,422
LGROWTH	0,000	0,000	0,000	0,000	0,000	0,000

Pr(>|t|)	0,978	0,920	0,874	0,870	0,994	0,901
%ΔGDP	0,037	0,070	0,031	0,001	0,035	0,049
Pr(>|t|)	0,000	0,000	0,000	0,912	0,000	0,000
CAPITAL	- 0,004	- 0,004	- 0,001	- 0,001	- 0,003	- 0,001
Pr(>|t|)	0,000	0,003	0,753	0,555	0,000	0,632
ΔNPL	- 0,000	0,007	- 0,001	0,001	- 0,000	- 0,001
Pr(>|t|)	0,990	0,816	0,827	0,873	0,948	0,854
SPRICE	- 0,000	- 0,000	- 0,000	- 0,000	- 0,000	- 0,000
Pr(>|t|)	0,000	0,176	0,001	0,792	0,000	0,001
Total Sum of Squares	0,06262	0,0018	0,0412	0,06531	0,0515	0,04118
SSR	0,03475	0,0006	0,0290	0,04942	0,0319	0,02704
# Banks	94	94	94	94	94	94
# Periods	2-26	2-26	2-26	2-26	2-26	2-26
# Observations	1.225	1.225	1.225	1.225	1.225	1.225
R-Squared	0,44506	0,6739	0,2955	0,24327	0,3801	0,34346
Adj. R-Squared	0,44141	0,6432	0,23217	0,23787	0,37599	0,26812
p-value	2,22E-16	2,22E-16	2,22E-16	2,22E-16	2,22E-16	2,22E-16
theta (λ)						

Hausman test for fixed versus random effects model	p-value = 1,644E-16	USE FIXED EFFECTS MODEL BECAUSE ONE OF THE TESTS IS INCONSISTANT

Lagrange Multiplier test for random effects VS OLS	p-value < 2,2E-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT RANDOM EFFECTS MODEL IS BETTER THAN OLS

Lagrange Multiplier test for fixed effects VS OLS	p-value = 4,005E-11	WE CANNOT REJECT THE NULL AND CONCLUDE THAT FIXED EFFECTS MODEL IS BETTER THAN OLS

Testing time-fixed effects. The null is that no time-fixed effects needed		WE CANNOT REJECT NULL HYPOTHESIS - NO TIME-FIXED EFFECTS NEEDED
pFtest(fixed.time, fixed)	p-value = 2.194E-7	
Lagrange Multiplier Test - time effects (Breusch-Pagan) for unbalanced panels. Plmtest	p-value = 1,375E-12	WE CANNOT REJECT NULL HYPOTHESIS - NO TIME-FIXED EFFECTS NEEDED

Breusch-Pagan Lagrange Multiplier for random effects. Null is no panel effect	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO PANEL EFFECT

Breusch-Pagan LM test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE
Pesaran CD test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE

Breusch-Godfrey/Wooldridge test for serial correlation in panel models. Alternative hypothesis: serial correlation in idiosyncratic errors	p-value = 1,438E-14	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE IS NOT SERIAL CORRELATION

Breusch-Pagan test for heteroskedasticity. The null hypothesis for the Breusch-Pagan test is homoskedasticity.	p-value < 2,2e-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE HOMOSKEDASTICITY

7.1.3 Results from the sample that includes big sized financial institutions

Variable	Mean	Median	Min	Max
LLPs	0,0028	0,0010	-0,0299	0,0873
SIGNAL	0,0001	0,0000	-0,0334	0,0420
EBTP	0,0043	0,0025	-0,0645	0,1344
LOANS	0,6101	0,6463	0,0131	36,9588
LGROWTH	-0,1360	0,0000	-272,6902	0,9985
%ΔGDP	0,0132	0,0205	-0,1039	0,2588
CAPITAL	0,4299	0,3996	0,0238	42,4336
ΔNPL	-0,0004	0,0000	-0,7107	0,1885
SPRICE	-1,2910	-1,4220	-96,4360	224,0380

				a = 0,01	99%	0,01
Column1	**Pooled OLS regression**	**Between**	**Fixed effects or within estimator**	**First differences**	**Random effects**	**time.Fixed effects**
intercept	0,000	0,000		- 0,000	0,000	
Pr(>|t|)	0,139	0,520		0,797	0,082	
SIGNAL	0,206	5,196	0,149	0,081	0,190	0,132
Pr(>|t|)	0,000	0,002	0,004	0,055	0,000	0,009
EBTP	0,540	0,255	0,470	0,536	0,527	0,473
Pr(>|t|)	0,000	0,039	0,000	0,000	0,000	0,000
LOANS	0,002	0,002	- 0,005	0,001	0,001	- 0,005
Pr(>|t|)	0,004	0,164	0,001	0,576	0,292	0,002
LGROWTH	0,000	- 0,001	0,000	0,000	0,000	0,000

Pr(>|t|)	0,551	0,780	0,472	0,390	0,609	0,396
%ΔGDP	- 0,038	- 0,058	- 0,030	- 0,001	- 0,036	- 0,052
Pr(>|t|)	0,000	0,003	0,000	0,810	0,000	0,000
CAPITAL	- 0,001	- 0,001	0,005	- 0,001	- 0,000	0,005
Pr(>|t|)	0,024	0,549	0,000	0,725	0,592	0,001
ΔNPL	- 0,004	0,009	- 0,004	- 0,005	- 0,004	- 0,004
Pr(>|t|)	0,466	0,893	0,416	0,314	0,496	0,477
SPRICE	- 0,000	- 0,000	- 0,000	- 0,000	- 0,000	- 0,000
Pr(>|t|)	0,000	0,008	0,000	0,021	0,000	0,000
Total Sum of Squares	0,04030	0,0012	0,0225	0,02846	0,0314	0,02247
SSR	0,01352	0,0001	0,0109	0,01324	0,0123	0,00968
# Banks	49	49	49	49	49	49
# Periods	3-26	3-26	3-26	3-26	3-26	3-26
# Observations	953	953	953	953	953	953
R-Squared	0,6646	0,9456	0,5130	0,53490	0,6095	0,56921
Adj. R-Squared	0,66176	0,9347	0,48253	0,53075	0,60614	0,52914
p-value	2,22E-16	2,22E-16	2,22E-16	2,22E-16	2,22E-16	2,22E-16

Hausman test for fixed versus random effects model	p-value = 0.08999	USE RANDOM EFFECTS MODEL BECAUSE ONE OF THE TESTS IS INCONSISTANT

Lagrange Multiplier test for random effects VS OLS	p-value < 2,2E-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT RANDOM EFFECTS MODEL IS BETTER THAN OLS

Lagrange Multiplier test for fixed effects VS OLS	p-value < 2,2E-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT FIXED EFFECTS MODEL IS BETTER THAN OLS

Testing time-fixed effects. The null is that no time-fixed effects needed		WE CANNOT REJECT NULL HYPOTHESIS - NO TIME-FIXED EFFECTS NEEDED
pFtest(fixed.time, fixed)	p-value = 2,458E-12	
Lagrange Multiplier Test - time effects (Breusch-Pagan) for unbalanced panels. Plmtest	p-value = 6,148E-16	WE CANNOT REJECT NULL HYPOTHESIS - NO TIME-FIXED EFFECTS NEEDED

Breusch-Pagan Lagrange Multiplier for random effects. Null is no panel effect	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO PANEL EFFECT

Breusch-Pagan LM test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE
Pesaran CD test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE

Breusch-Godfrey/Wooldridge test for serial correlation in panel models. Alternative hypothesis: serial correlation in idiosyncratic errors	p-value < 2,2E-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE IS NOT SERIAL CORRELATION

Breusch-Pagan test for heteroskedasticity. The null hypothesis for the Breusch-Pagan test is homoskedasticity.	p-value < 2,2e-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE HOMOSKEDASTICITY

7.1.4 Results from the sample that includes small sized financial institutions

Variable	Mean	Median	Min	Max
LLPs	0,0030	0,0019	-1,8165	0,1373
SIGNAL	-0,0007	0,0000	-0,8877	0,0180
EBTP	0,0040	0,0048	-1,8164	0,0231
LOANS	0,7065	0,7340	0,0077	1,5469
LGROWTH	-1,0091	0,0000	-534,3214	0,9797
%ΔGDP	0,0192	0,0211	-0,2139	0,2588
CAPITAL	0,3994	0,3790	0,0334	0,9995
ΔNPL	-0,0773	0,0000	-79,2287	0,2954
SPRICE	1,8520	0,0000	-93,3330	528,1700

				a = 0,01	99%	0,01
Column1	**Pooled OLS regression**	**Between**	**Fixed effects or within estimator**	**First differences**	**Random effects**	**time.Fixed effects**
intercept	- 0,006	- 0,001		0,000	- 0,006	
Pr(>|t|)	0,010	0,828		0,980	0,009	
SIGNAL	0,011	0,009	0,006	0,008	0,011	0,013
Pr(>|t|)	0,266	0,601	0,611	0,594	0,265	0,266
EBTP	0,342	0,200	0,675	0,522	0,342	0,231
Pr(>|t|)	0,017	0,209	0,006	0,048	0,016	0,383
LOANS	0,015	0,010	0,021	0,011	0,015	0,021
Pr(>|t|)	0,000	0,026	0,001	0,410	0,000	0,002
LGROWTH	- 0,000	0,000	0,000	- 0,000	- 0,000	0,000

Pr(>|t|)	0,841	0,927	0,814	0,759	0,841	0,700
%ΔGDP	- 0,038	- 0,084	- 0,018	0,001	- 0,038	- 0,006
Pr(>|t|)	0,009	0,012	0,354	0,975	0,008	0,821
CAPITAL	- 0,007	- 0,007	- 0,000	0,005	- 0,007	0,001
Pr(>|t|)	0,012	0,022	0,979	0,592	0,011	0,943
ΔNPL	0,002	- 0,002	- 0,004	0,005	0,002	- 0,007
Pr(>|t|)	0,871	0,955	0,789	0,752	0,871	0,664
SPRICE	- 0,000	- 0,000	- 0,000	0,000	- 0,000	- 0,000
Pr(>|t|)	0,121	0,599	0,317	0,430	0,119	0,158
Total Sum of Squares	0,02232	0,0006	0,0187	0,03685	0,0223	0,01871
SSR	0,01915	0,0004	0,0169	0,03568	0,0191	0,01380
# Banks	45	45	45	45	45	45
# Periods	2-26	2-26	2-26	2-26	2-26	2-26
# Observations	272	272	272	272	272	272
R-Squared	0,14194	0,3925	0,0981	0,03184	0,1419	0,26209
Adj. R-Squared	0,11584	0,2575	-0,11602	-0,00369	0,11584	-0,030789
p-value	2,36E-06	1,31E-02	3,46E-03	5,21E-01	7,06E-07	1,11E-03

Hausman test for fixed versus random effects model	p-value = 0,3454	ONE OF THE TESTS IS INCONSISTANT

Lagrange Multiplier test for random effects VS OLS	p-value = 0,4659	WE REJECT THE NULL AND CONCLUDE THAT OLS MODEL IS BETTER THAN RANDOM EFFECTS MODEL

Lagrange Multiplier test for fixed effects VS OLS	p-value = 0,9418	WE REJECT THE NULL AND CONCLUDE THAT OLS MODEL IS BETTER THAN FIXED EFFECTS MODEL

Testing time-fixed effects. The null is that no time-fixed effects needed		WE REJECT NULL HYPOTHESIS - TIME-FIXED EFFECTS NEEDED
pFtest(fixed.time, fixed)	p-value = 0,02202	
Lagrange Multiplier Test - time effects (Breusch-Pagan) for unbalanced panels. Plmtest	p-value = 0,4655	WE REJECT NULL HYPOTHESIS - TIME-FIXED EFFECTS NEEDED

Breusch-Pagan Lagrange Multiplier for random effects. Null is no panel effect	p-value = 0,4659	WE REJECT NULL - PANEL EFFECT

Breusch-Pagan LM test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE
Pesaran CD test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value = 5,511E-07	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE

Breusch-Godfrey/Wooldridge test for serial correlation in panel models. Alternative hypothesis: serial correlation in idiosyncratic errors	p-value = 0,0008904	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE IS NOT SERIAL CORRELATION

Breusch-Pagan test for heteroskedasticity. The null hypothesis for the Breusch-Pagan test is homoskedasticity.	p-value < 2,2e-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE HOMOSKEDASTICITY

7.1.5 Results from the sample that includes financial institutions from small sized countries

Variable	Mean	Median	Min	Max
LLPs	0,0028	0,0015	-1,8165	0,1373
SIGNAL	-0,0006	0,0000	-0,8877	0,0420
EBTP	0,0045	0,0031	-1,8164	0,1344
LOANS	0,6623	0,6789	0,0857	1,1137
LGROWTH	-0,1139	0,0000	-106,2607	0,9851
%ΔGDP	0,0244	0,0291	-0,2139	0,2588
CAPITAL	0,3310	0,3173	0,0334	0,9995
ΔNPL	-0,0010	0,0000	-0,4907	0,2543
SPRICE	0,0678	0,0000	-96,4359	528,1700

				a = 0,01	99%	0,01
Column1	**Pooled OLS regression**	**Between**	**Fixed effects or within estimator**	**First differences**	**Random effects**	**time.Fixed effects**
intercept	- 0,013	- 0,006		- 0,000	- 0,013	
Pr(>|t|)	0,000	0,098		0,951	0,000	
SIGNAL	0,004	- 0,008	0,011	0,007	0,004	0,010
Pr(>|t|)	0,605	0,524	0,272	0,532	0,615	0,280
EBTP	0,493	0,556	0,387	0,483	0,485	0,413
Pr(>|t|)	0,000	0,000	0,000	0,000	0,000	0,000
LOANS	0,018	0,009	0,026	0,016	0,018	0,023
Pr(>|t|)	0,000	0,025	0,000	0,147	0,000	0,000
LGROWTH	0,001	0,001	0,001	0,000	0,001	0,001

Pr(>|t|)	0,677	0,953	0,684	0,777	0,674	0,660
%ΔGDP	- 0,033	- 0,044	- 0,026	- 0,001	- 0,032	- 0,040
Pr(>|t|)	0,000	0,098	0,003	0,942	0,000	0,000
CAPITAL	0,007	0,004	0,018	0,014	0,008	0,017
Pr(>|t|)	0,044	0,449	0,000	0,269	0,017	0,006
ΔNPL	- 0,010	- 0,002	- 0,013	- 0,008	- 0,010	- 0,011
Pr(>|t|)	0,336	0,959	0,213	0,435	0,317	0,304
SPRICE	- 0,000	- 0,000	- 0,000	0,000	- 0,000	- 0,000
Pr(>|t|)	0,006	0,282	0,009	0,952	0,006	0,052
Total Sum of Squares	0,04991	0,0012	0,0326	0,04846	0,0460	0,03256
SSR	0,02567	0,0001	0,0231	0,04329	0,0251	0,02107
# Banks	32	32	32	32	32	32
# Periods	2-26	2-26	2-26	2-26	2-26	2-26
# Observations	460	460	460	460	460	460
R-Squared	0,48553	0,8897	0,2917	0,10681	0,4536	0,35295
Adj. R-Squared	0,47641	0,8514	0,22595	0,08975	0,44389	0,24811
p-value	2,22E-16	2,88E-09	2,22E-16	1,15E-07	2,22E-16	2,22E-16

Hausman test for fixed versus random effects model	p-value = 0,004223	ONE OF THE TESTS IS INCONSISTANT

Lagrange Multiplier test for random effects VS OLS	p-value = 0,05405	WE REJECT THE NULL AND CONCLUDE THAT OLS MODEL IS BETTER THAN RANDOM EFFECTS MODEL

Lagrange Multiplier test for fixed effects VS OLS	p-value = 0,03578	WE REJECT THE NULL AND CONCLUDE THAT OLS MODEL IS BETTER THAN FIXED EFFECTS MODEL

Testing time-fixed effects. The null is that no time-fixed effects needed		WE REJECT NULL HYPOTHESIS - TIME-FIXED EFFECTS NEEDED
pFtest(fixed.time, fixed)	p-value = 0,06108	
Lagrange Multiplier Test - time effects (Breusch-Pagan) for unbalanced panels. Plmtest	p-value = 0,04854	WE REJECT NULL HYPOTHESIS - TIME-FIXED EFFECTS NEEDED

Breusch-Pagan Lagrange Multiplier for random effects. Null is no panel effect	p-value = 0,05405	WE REJECT NULL - PANEL EFFECT EXISTS

Breusch-Pagan LM test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE
Pesaran CD test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value = 4,959E-12	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE

Breusch-Godfrey/Wooldridge test for serial correlation in panel models. Alternative hypothesis: serial correlation in idiosyncratic errors	p-value = 0,0001559	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE IS NOT SERIAL CORRELATION

Breusch-Pagan test for heteroskedasticity. The null hypothesis for the Breusch-Pagan test is homoskedasticity.	p-value < 2,2e-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE HOMOSKEDASTICITY

7.1.6 Results from the sample that includes financial institutions from big sized countries

Variable	Mean	Median	Min	Max
LLPs	0,0030	0,0013	-0,0299	0,0691
SIGNAL	0,0000	0,0000	-0,0192	0,0190
EBTP	0,0040	0,0029	-0,0377	0,0984
LOANS	0,6576	0,7122	0,0077	36,9588
LGROWTH	-0,8427	0,0000	-534,3214	0,9985
%ΔGDP	0,0118	0,0169	-0,0412	0,0480
CAPITAL	0,4615	0,4301	0,0238	42,4336
ΔNPL	-0,0489	0,0000	-79,2287	0,2954
SPRICE	0,1815	-0,0688	-59,2239	198,7672

				a = 0,01	99%	0,01
Column1	**Pooled OLS regression**	**Between**	**Fixed effects or within estimator**	**First differences**	**Random effects**	**time.Fixed effects**
intercept	- 0,000	- 0,000		0,000	- 0,000	
Pr(>|t|)	0,163	0,959		0,298	0,136	
SIGNAL	0,133	- 0,613	0,437	0,856	0,380	0,363
Pr(>|t|)	0,244	0,810	0,000	0,000	0,000	0,000
EBTP	0,256	0,242	0,487	0,843	0,442	0,497
Pr(>|t|)	0,000	0,093	0,000	0,000	0,000	0,000
LOANS	0,003	0,006	- 0,000	0,000	0,002	- 0,001
Pr(>|t|)	0,000	0,004	0,674	0,950	0,002	0,535
LGROWTH	- 0,001	0,002	- 0,001	- 0,001	- 0,001	- 0,001

Pr(>|t|)	0,003	0,505	0,000	0,000	0,001	0,000
%ΔGDP	- 0,009	- 0,103	- 0,002	- 0,003	- 0,004	- 0,017
Pr(>|t|)	0,051	0,066	0,704	0,642	0,308	0,132
CAPITAL	- 0,002	- 0,004	0,001	- 0,000	- 0,001	0,001
Pr(>|t|)	0,000	0,016	0,323	0,711	0,025	0,250
ΔNPL	0,019	- 0,067	0,018	0,021	0,018	0,019
Pr(>|t|)	0,003	0,520	0,000	0,000	0,001	0,000
SPRICE	- 0,000	- 0,000	- 0,000	- 0,000	- 0,000	- 0,000
Pr(>|t|)	0,111	0,520	0,410	0,201	0,382	0,382
Total Sum of Squares	0,01135	0,0006	0,0086	0,01681	0,0095	0,00862
SSR	0,00572	0,0004	0,0034	0,00468	0,0041	0,00304
# Banks	62	62	62	65	62	62
# Periods	3-26	3-26	3-26	3-26	3-26	3-26
# Observations	765	765	765	765	765	765
R-Squared	0,49564	0,3389	0,6058	0,72155	0,5714	0,64693
Adj. R-Squared	0,49031	0,2391	0,56664	0,71834	0,56691	0,59739
p-value	2,22E-16	3,22E-03	2,22E-16	2,22E-16	2,22E-16	2,22E-16

Hausman test for fixed versus random effects model	p-value = 0,0001637	USE FIXED EFFECTS MODEL BECAUSE ONE OF THE TESTS IS INCONSISTANT

Lagrange Multiplier test for random effects VS OLS	p-value < 2,2E-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT RANDOM EFFECTS MODEL IS BETTER THAN OLS

Lagrange Multiplier test for fixed effects VS OLS	p-value < 2,2E-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT FIXED EFFECTS MODEL IS BETTER THAN OLS

Testing time-fixed effects. The null is that no time-fixed effects needed		WE CANNOT REJECT NULL HYPOTHESIS - NO TIME-FIXED EFFECTS NEEDED
pFtest(fixed.time, fixed)	p-value = 6,52E-07	
Lagrange Multiplier Test - time effects (Breusch-Pagan) for unbalanced panels. Plmtest	p-value = 0,005847	WE CANNOT REJECT NULL HYPOTHESIS - NO TIME-FIXED EFFECTS NEEDED

Breusch-Pagan Lagrange Multiplier for random effects. Null is no panel effect	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO PANEL EFFECT

Breusch-Pagan LM test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE
Pesaran CD test for cross-sectional dependence in panels. Alternative hypothesis: cross-sectional dependence	p-value < 2,2E-16	WE CANNOT REJECT NULL - NO CROSS-SECTIONAL DEPENDENCE

Breusch-Godfrey/Wooldridge test for serial correlation in panel models. Alternative hypothesis: serial correlation in idiosyncratic errors	p-value = 1,701E-06	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE IS NOT SERIAL CORRELATION

Breusch-Pagan test for heteroskedasticity. The null hypothesis for the Breusch-Pagan test is homoskedasticity.	p-value < 2,2e-16	WE CANNOT REJECT THE NULL AND CONCLUDE THAT THERE HOMOSKEDASTICITY

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