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NPL securitization and bank performance: evidence from the "BCC NPLs 2022" transaction

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Summary

INTRODUCTION

The purpose of this thesis is to explore a financial technique that is becoming increasingly popular: the securitization of non-performing loans.
The phenomenon of NPLs has assumed significant proportions, adversely affecting banks' liquidity, capital and ability to provide credit. The direct consequence is the impact on the whole banking sector and the entire Italian economy. In a situation where defaulting debtors and thus NPLs continue to accumulate, their disposal becomes a necessary, if not indispensable, technique.
Among the many alternatives, the study focuses on the securitization technique, which represents a transformative tool capable of lightening bank balance sheets and reviving the credit cycle. In this context, the "BCC NPLs 2022" transaction is an example of how such a mechanism can be implemented, offering valuable insights for the understanding of this complex issue.

The purpose of this thesis is to empirically analyze the consequences of securitization on the bank balance sheet, to identify the tangibility of the benefits of this type of operation and comparing them with the associated costs. Is it really worth securitizing loans, or are the associated costs too onerous? Therefore, what is the trade-off between advantages and disadvantages of securitization?

The first chapter presents an overview of the NPLs market, starting with an introduction on credit risk and moving on to the definition of non-performing loans and their regulation. This is followed by an exposition of the main valuation methods and ratios related to impaired loans.

In addition, the same chapter presents an in-depth look at the history and evolution of NPLs over time in both the European and Italian markets, concluding with the main determinants and consequences of impaired loans.

The second chapter becomes more specific, presenting the main alternatives and resolutions to the NPLs' problem, and first exposing potential credit management methodologies divided by category. After that, it moves on to the technique chosen in our analysis: the securitization. The chapter continues with its definition and regulation, with an exposition of the stages of the process and the possible risks/success factors associated with it.
In addition, in this section I will expose the impact that securitization is expected to have on bank performance, in order to have a theoretical introduction to the analysis of the third chapter.
Finally, the chapter concludes with a description of the current European and Italian context, with an in-depth look at an instrument that has proven to be fundamental for transactions in Italy, i.e., the "*Garanzia Cartolarizzazione Sofferenze*" (GACS).

The third and final chapter focuses instead on the analysis of the phenomenon and bank financial statements. First, I will present the goal of the analysis, that is, the comparison of bank balance sheets before and after the implementation of a securitization strategy to identify its effects on bank performance.
Next, I will focus on the transaction under study, the BCC NPLs 2022, and the characteristics of the portfolio transferred. The analysis is divided into three parts. The first part aims to study, at the aggregate level, the impact of the BCC NPLs 2022 phenomenon on the ROE of the banks that participated in the operation; through a fixed-effects panel regression analysis, the relationship between the stock of NPLs and ROE results is examined, for three years (2020-2021-2022), that is, before and after the implementation of the strategy. The second part of the analysis becomes more specific, introducing the selected bank, Banca Valsabbina. The 2021 financial statement of that bank will be studied in detail, from its asset composition and capital structure to the

calculation of the key NPLs Ratio, with the aim of identifying the starting context and pre-transaction values.

In a second part, the same analysis is repeated for the 2022 post-transaction financial statement, this time with an in-depth look at liquidity and the costs the bank incurred during the year.

Finally, the last part extends the analysis; the NPL Ratio, ROE, ROA, Cash & Cash Equivalents, and Operating Costs of Banca Valsabbina from 2017 to 2022 are examined. This additional level of detail provides a comprehensive overview of these variables taken into consideration to analyze the evolution of profitability factors in relevant years for Banca Valsabbina's securitizations, i.e., before, during, and after the implementation of the 2018-2021 de-risking plan.

CHAPTER 1

NON-PERFORMING LOANS: OVERVIEW

1.1 Banking activities and credit risk

Article 10 of the “Testo Unico Bancario” (TUB, Legislative Decree No. 385 of September 1, 1993) defines banking as "the collection of savings from the public and the granting of credit." Thus, the provision of credit represents one of the core activities of the banking institution. Lending determines a relationship between two parties: debtor and creditor. If the borrower is financially healthy and meets the agreed-upon payment terms, then the loan is termed "performing"; therefore, the relationship is set up as physiologically stable.

However, during the financial life of the loan, the borrower may face difficulties in repaying the lender, and this leads to the emergence of the default probability.

The bank, in the exercise of its credit intermediation activities, is consequently subject to the risk of default arising from the financed borrowers. This risk is referred as "Credit Risk," or the risk of total or partial loss of the related receivables. The analysis of credit risk makes possible to assess and estimate precisely how dangerous bank exposures are and how likely they are to become non-performing or impaired. Many factors can influence credit risk; we can group them into two main categories:

A) *Internal factors:* these variables are related to the debtor's capital and financial characteristics, such as its financial strength, but also to the debtor's ability to manage its business;

B) *External factors:* variables related to the macroeconomic environment, economic trends, and volatility of financial markets.

The quantification of credit risk is based on the determination of the so-called "risk-weighted asset." For this measurement, the Basel Accords (particularly I and II) [1] identify two main approaches: the standardized methodology and the IRB methodology.

1. *Standardized approach:* methodology based on standardized weighting coefficients prepared by the Supervisory Authorities or rating assessments from external agencies. These coefficients vary according to the type of debtor, its activity, and credit rating. The objective is to reflect the probability of the debtor's default. Schematically, the standard approach defines the capital requirement as follows:

$$Capital\ Requirement = RWA * 8\%$$

Where:

- RWA represents the product of the weighting ratio and exposure;
- The 8% represents the minimum solvency ratio[2] of banking institutions, according to the Basel I principle (maintained by subsequent ones).

[1] The "*Basel Accords* "are guidelines, drawn up by the Basel Committee, consisting of the G10 regulators (currently eleven countries) plus Luxembourg with the aim of pursuing monetary and financial stability. The subject matter covered by these accords concerns the capital requirements of banks and represents a particular form through which the Committee acts. The requirements are set in the expectation that individual national authorities will be able to draw up operational arrangements that take into account the realities of individual states. Although the Committee has no regulatory powers of its own, it succeeds in making its work effective because participating countries are implicitly obliged and non-participating countries comply with what becomes a de facto regulatory benchmark. This process facilitates the move towards the adoption of shared approaches and standards;

[2] *The solvency ratio* determines the minimum amount of capital that banks must hold in relation to their total credit risk-weighted assets.

The standard weighting coefficients, in general, are as follows:

	AAA	AAA-	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	Lower	Without Rating	Expired
Corporate	20%					50%			100%						150%				100%	150%
Sovereign States	0%					50%			50%			100%						150%	100%	
Banks	20%					50%						100%						150%	100%	
Banks country of origin	20%					50%			50%			100%						150%	100%	
Retail (private and PMI)	75%																			150%
Mortgages and residential	35%																			100%
Commercial mortgages	From 100% to 50% at the option of the National Authorities																			150%

Table 1 – Standard weighting coefficients for rating and type of debtor

2. *Internal Rating Based approach*: The first methodology includes elements of standardization required and imposed by the Supervisory Authorities. For this reason, the Basel Committee has provided for more advanced risk measurement systems; Internal Rating Based (IRB). This approach is intended for larger banks and institutions capable of implementing internal rating methodologies and requires prior approval from the Bank of Italy.

In this case, the general formula for estimating the capital requirement is as follows:

$$Capital\ Requirement = EAD * f(PD, EAD, LGD, M) * 8\%$$

Where:

- EAD (Exposure at Default): expected amount of loss to which the bank could be exposed if the borrower defaults;
- PD (Probability of Default): The probability that an individual will default and fail to meet the repayment deadlines for a debt. Each borrower is associated with a rating class, and each rating class is associated with a probability of default, which consists of a value between 0 and 1. The higher the probability of default, the greater the risk the bank assumes;
- LGD (Loss Given Default): is the ratio of loss incurred in default to the amount outstanding at the time of default. In turn, LGD is a function of four variables:

(i) percentage of the loan recovered, (ii) the financial cost associated with the recovery time, (iii) the recovery time, and (iv) the administrative costs associated;

- M (Maturity): the remaining life of the loan.

In addition, the IRB system is configured into two sub-methodologies: Foundation and Advanced. The difference is that in the former, PD is estimated by the bank while the other parameters are provided by the Supervisory Authority. In the latter instead, all parameters are estimated internally by the bank.

Credit risk is one of the main threats to banking business and related crises. Thus, banking is subject to in-depth analysis by supervisors, lending institutions and extensive regulation.

1.2. NPL's definition and regulation

Non-Performing Loans fit right into this context. When the collection of a loan becomes risky and borrowers are no longer able to meet their obligations, the danger is that credit goes through a process of gradual deterioration. The Bank of Italy defines Non-Performing Loans (hereafter "NPLs") as "*exposures to borrowers who, due to a deterioration in their economic and financial situation, are unable to meet all or part of their contractual obligations*". However, the commonly used expression "impaired credit" is based on different definitions. From an accounting perspective, IAS 39[3] defines NPE as "impaired exposure". In contrast, from a regulatory perspective, Article 178 of Regulation (EU) No. 575/2013[4] considers NPE as "exposures in default."

[3] As of January 1, 2018, it was replaced by IFRS9;

[4] *Regulation (EU) No. 575/2013* is also referred to as CRR, or Capital Requirement Regulation.

To overcome the problems arising from this diversity, the EBA has formulated a uniform definition of "impaired exposure" ("NPE"). According to paragraph 145 of Annex V of the *EBA's Technical Implementing Rules on Supervisory Reporting*, "Impaired exposures are those that meet one or both of the following criteria:

(i) material exposures more than 90 days past due;
(ii) it is considered unlikely that the debtor will meet its credit obligations in full without the enforcement of collateral, regardless of the existence of overdue amounts or the number of days in arrears."

NPLs are a major problem for banking institutions, as they could erode their profitability and capital strength. To avoid this, banks must hold reserves to cover the risk of loss of non-performing loans.

Due to the danger they pose to institutions and more generally to the entire economy, a series of regulations, decrees and mechanisms have followed over time to best regulate this crucial category of loans and promote the resolution of NPLs in an efficient and sustainable manner. First and foremost, the establishment of a Single Supervisory Mechanism (SMM) became necessary in 2014. This institution is responsible for directly supervising "significant banks"[5] of Eurozone countries.

Furthermore, the ECB has focused on Non-Performing Exposures through the Asset Quality Review[6]. In light of this, in March 2017, the ECB published "*Guidelines for Banks on Impaired Loans*" to enable significant banks to better manage their impaired

[5] The Banking Supervision Guide (ECB, November 2014) defines a bank as *significant* if it meets one of these conditions: (i) the total value of assets exceeds €30 billion, or unless the value of assets is less than €5 billion, exceeds 20% of national GDP, (ii) It is one of the three most significant credit institutions in a member state, (iii) It receives direct assistance from the European Stability Mechanism, (iv) The value of assets exceeds €5 billion and the ratio of cross-border assets in more than one other participating member state to total assets is more than 20% or the ratio of cross-border liabilities in more than one other participating member state to total assets is more than 20%;

[6] The term *AQR (Asset Quality Review)* refers to the review of the quality of balance sheet assets of the principal credit institutions with the aim of verifying and assessing their quality and strength.

loans. The aim was to develop a strategy to be adopted for non-performing exposures, as well as to define a proper operational plan.

Later, on July 11, 2017, the European Council approved an action plan with the goal of reducing the stock of impaired exposures and, jointly, preventing their future occurrence. These goals could have been achieved through enhanced banking supervision, a general restructuring of the banking system, and most importantly, the development of secondary markets to market impaired exposures.

In January 2018, the Bank of Italy published the "*Guidelines for Italian Less Significant Banks on the Management of Impaired Loans*," which was a note that added additional provisions, to also regulate Less Significant Institutions (LSIs). The objective was to ensure the proper management of impaired exposures even in cases of smaller institutions, adapting and modifying the principles dictated by the ECB to the greater simplicity of the LSI organizational structure.

On June 30, 2019, the guidelines dictated by the EBA enter into effect. The differences with those of the ECB mainly concerned their coverage: these rules extended their scope to any credit institution operating in the Eurozone, without any distinction between significant and non-significant institutions. In addition, the EBA introduced a 5% benchmark, above which banks should establish an action plan aimed at reducing NPEs.

In March 2023, the IASB[7] published an Exposure Draft ("ED") with the aim of amending the accounting standards IFRS 9 and 7. The main issues addressed by the draft include:

- The introduction of a new category of loans, the so-called "Difficult to Repay" ("DRT") loans, with significant risk of default;
- The change in the definition of non-performing loans to include all loans with a significant risk of default;

[7] *International Accounting Standards Board.*

- The introduction of a new approach for assessing expected losses for secured loans[8];
- The introduction of new disclosure requirements for non-performing loans and DRTs.

The proposed changes are still under consultation and are likely to be adopted internationally between 2024 and 2025.

1.3. NPL' s classification

Bank of Italy Circular No. 272 of July 30, 2008 (File "*Matrice dei Conti*"), in line with what the EBA has already specified, defines three classes of impaired loans:

1) *Bad Loans:* are cash and "off-balance sheet" credit exposures to entities considered to be in a state of insolvency or comparable situations (even if not judicially ascertained). The following are excluded from this category: (i) exposures to local authorities in a state of financial distress, (ii) loans purchased from third parties having as their main debtors non-performing borrowers, (iii) exposures classifiable as "non-performing exposures with forbearance measures[9]";

[8] *Secured loans* are defined as all loans backed by specific collateral from the debtor and/or third parties, whether real (lien, pledge, and mortgage) or personal (mainly, surety and endorsement), in favor of the bank;

[9] In the articles 157 and 176 of the ITS (Implementing Technical Standards), the EBA has introduced the category of "*forbearance*," i.e., exposures, impaired or performing, that are subject to concessions, i.e., modification of contractual terms in favor of the troubled party. A distinction should therefore be made between "non-performing exposures with forbearance measures," in which are included not only non-performing, probable default and past due exposures, but also restructurings carried out for the purpose of liquidation, and "Forborne performing exposures," which are no longer classified as impaired, although they are subject to a concession.

2) *Unlikely To Pay ("UTP"):* exposures for which the bank assesses that the borrower is unlikely to meet its contractual obligations in full (principal and/or interest) without recourse to actions such as the enforcement of collateral. For loans to be classified as UTP, it is sufficient that there is evidence to suggest that the debtor is at risk of default;

3) *Past Due*: are exposures that have been past due or in excess of credit limits for more than 90 days. Such loans, as of the reporting date, are classified as past due or overdrawn and can refer to either the borrower or the individual transaction. The threshold of past due on exposure is set at 5%.

Thus, there are three variables taken into account in the classification: (i) the maturity of the loan, (ii) the credit quality of the borrower, and (iii) the loan's probability.

The classification of NPLs is a critical process for the proper assessment of banks' financial and capital position, so that the credit risk arising from holding impaired loans can be quantified. In addition, being able to identify and classify the type of exposure allows for the proper application of prudential supervisory rules, such as the aforementioned EU Regulation No. 575/2013, which requires reserves to be set aside to cover the risk arising from NPLs. Ultimately, classifying and recognizing these categories allows for proper attention to be given to the most dangerous loans and enables banking institutions to develop effective strategies for managing the positions.

Another key distinction is that between gross and net values. Gross impaired loans represent the amount that the borrower must repay to the bank, while net impaired loans refer to an estimate that the bank makes of the actual loan recovery forecasts. Hence, net amounts are equivalent to the difference between gross impaired loans and the book value adjustments recognized in the income statement to cover expected losses. Therefore, net exposures are an indicator of potential future losses under worst-case scenarios than expected. Commonly, when analyzing the riskiness of bank customers, it is preferable to refer to gross values, which do not consider any provisions to cover expected losses.

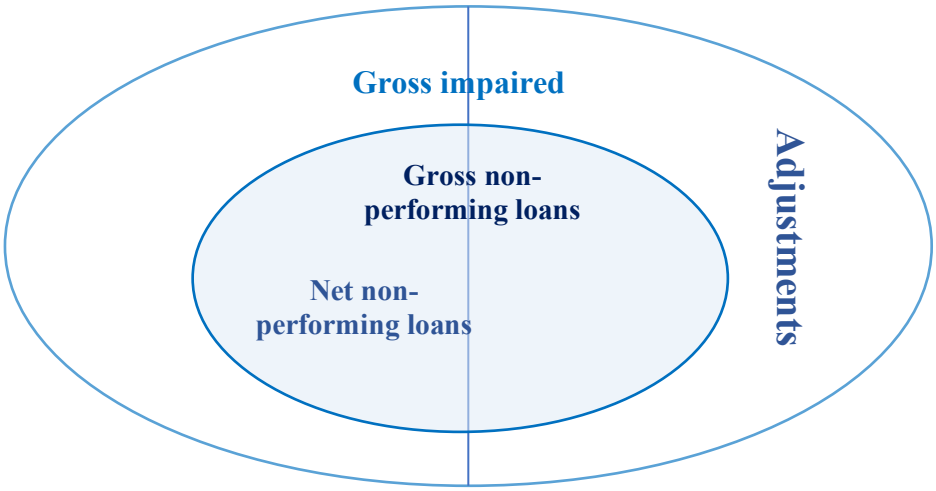


Figure 1 – Source: re-elaboration of "*Credit quality. A guide to data published by the Bank of Italy",* D. Briscolini, P. Maddaloni, G.Nuzzo, F.Rinaldi.

1.3.1. Valuation

A very important issue in the identification and strategic management of non-performing loans is their valuation.
As we mentioned earlier, the valuation of loans is based on an in-depth analysis of various components such as:

- *Characteristics of the considered credit:* type, maturity, presence of collateral, size;
- *The debtor*: his financial capacity, his creditworthiness, his assets situation;
- *The possibility of debt recovery:* as the amount that is realistically recoverable from the debtor out of the whole amount;
- *The economic context:* the macroeconomic situation and/or growth prospects.

The non-performing market, despite the huge volumes traded, cannot be considered an efficient financial market, as it should be characterized by transparency, liquidity, low

transaction costs, numerous and independent players and the absence of barriers to entry as well as to exit. Given the complexity of such a market, prices cannot be formulated rationally and immediately as in an efficient market.
Therefore, prices are formed on the basis of empirical evaluations following analyses of traded receivables and their collateral.

The main methodology for determining the value of NPLs is that of discounting future cash flows, which identifies the value of the loans as the sum of the expected cash flows, discounted at a rate that is consistent with the investor's expected unlevered return, net of recovery costs. The formula will be as follows:

$$V = \sum (Cash\ flow_{t=0} + \ldots + Cash\ flow_{t=n}) * \frac{1}{(1+i)^t}$$

Analyzing the formula, we note the necessity of determining two components: discount rate and expected net flows.

Determination of the discount rate

The computation of the correct discount rate does not use classical methodologies in line with other discounting models. For example, it is not possible to apply the Capital Asset Pricing Model[10], as the market for non-performing loans is not liquid and transparent and it is therefore not possible to estimate a beta coefficient of variability.
Therefore, the discount rate depends on the investors' target return and is influenced by (i) the perceived country risk at the time of valuation, (ii) the type of loans, (iii) and the perceived uncertainty in the cash flows.

[10] The *Capital Asset Pricing Model* ('CAPM') is a theoretical model for calculating the equilibrium price of a financial asset. It states that the expected return on an asset is a linear function of the risk-free return and the systematic risk of the asset, multiplied by the market risk premium.

Regarding the country-specific risk component, Italy moves in line with the spread of Italian and German government bonds.

Continuing with the type of credit, it is not possible to quantify exactly the premium required for credit categories, but it is possible to identify a hierarchy of riskiness. In detail, we consider:

- Guarantee (secured credit - unsecured);
- Debtor (private individual - company);
- Type of secured asset (residential - commercial - office - industrial);
- Asset condition (finished - under construction - building plot);
- Geographical location of the debtor and the asset (north - center - south);
- Evaluation type (analytical - statistical).

In most cases, however, portfolios are made up of different types of loans. In this case, either a single rate can be used, taking into account the complexity of the portfolio, or a multiple rate model.

Finally, regarding the determination of the risk premium, the degree of 'aggressiveness' used in the creation of the flow forecast models is considered, as well as the degree of processing intensity of the portfolio prior to assignment by the originator bank.

Other relevant factors that could affect the price are related to the legal and contractual structure of the transaction:

- Contractual provisions on representations and warranties of the seller, which affect the perceived risk and consequently the discount rate;
- Time and method of price payment;
- Legal/fiscal structure of credit transfer;

- Additional and possible conditions with the potential to create an economic advantage/disadvantage for one or both parties;
- Servicing contracts and consequent remuneration;
- Pre-emption and/or option rights on other portfolios;
- Access to special forms of guarantees or financing (e.g. GACS[11]).

The main limitations of the credit valuation process are related to purely subjective assumptions and information asymmetry between the parties.
In fact, what often happens is that in an auction process on the same portfolio buyers arrive at different valuations, which can differ by more than 30% between each other.

For non-performing loans, uncertainty is associated not only with the discount rate, but also with future cash flows and the time at which the amounts are expected to be received, as default is very likely or has already occurred.
In order to determine the flows, various models are used to forecast the expected net collections from the loans and the relative collection times: the choice of model depends on the type of loan and the information available.

In this context, we need to consider a number of aspects. First of all, a distinction must be made between loans secured by collateral, typically a mortgage or pledge, of an asset with a market value: in this case, the model will be based on the lowest value between the value of the pledged asset, the amount of that collateral, and the value of the loan. The rationale behind this valuation is the compulsory recovery of the loan, through which the valuer envisages, in some cases, the possibility of recovering it through an out-of-court settlement.

Secondly, as we have anticipated, a relevant distinction for the choice of model concerns the type and nature of the debtor.

[11] For further specifications see paragraph 2.2.7.

If the debtor is a corporation or entrepreneur and there is a going concern, the value of the loan could be estimated through forecasting models based on business plans. Another element to be considered is whether the debtor is subject to bankruptcy proceedings; recourse to procedures such as composition with creditors, bankruptcy, compulsory administrative liquidation and extraordinary administration are likely to affect the timing and chances of debt recovery.

In addition, the choice must always take into account the information available on the debtor, the loan and any collateral. Such information comes from public sources (land registers and court registries), debtor's creditworthiness analyses, contractual documentation and asset surveys on the debtor and guarantors.

The forecast model uses all the relevant information available to determine a plausible collection estimate and its corresponding timing. Such models can be divided into three types:

1. Forecasting models based on judicial recovery;
2. Forecasting models based on repayment flows or enterprise value;
3. Statistical prediction models.

Forecasting models based on judicial recovery

This first category uses various elements for evaluation, including:

(i) *Gross Book Value* (or "GBV")[12] analysis to determine the composition over time of principal and interest, in order to cover the guarantees;

[12] "*Gross Book Value*" (GBV) is the value of a loan before value adjustments and is equal to the discounted loan amount.

(ii) Analysis of existing collateral and associated risks, particularly for judicial mortgages;

(iii) Analysis of potential collateral: possibility of registering a judicial mortgage on free real estate (i.e. free of mortgages);

(iv) Valuation of (actual or potential) collateralized assets;

(v) Analysis of other debts contributing to the same assets (e.g. if there are several mortgages) to determine the share of collection relevant to the claim;

(vi) Analysis of executive or insolvency proceedings to estimate collection times and/or costs of the proceedings.

More specifically, the property values used in this first model can be derived from numerous sources, such as from court-appointed expert valuations (*"CTU"*), from the last unsuccessful auction value or value judicially set for the auction yet to be held, or even from valuations carried out by an expert appointed by the valuer during the flow valuation process (in this case we have so-called "*desk valuations*" if they are valuations carried out on a purely documentary basis or "*drive-by valuations*" if the valuations depend on an external visit to the property).

For defaulted loans, the collection estimate is generally equal to a percentage of GBV, since it is rare for the valuation model to lead to flow forecasts equal to or higher than the nominal value of the loan; this results from the lowering of the value of assets that is generated in a judicial sale process (e.g. between 0-20% less for real estate in large cities, between 60-80% less for building land in suburban areas etc.).

In addition, the model must also include the costs of maintaining the secured asset and the costs of recovery, such as legal fees, costs of sale and costs of managing the loan portfolio (so-called servicing costs).

Forecast models based on repayment flows or enterprise value

This model is used when the borrower, despite being in default, is able to generate income and cash flows.
These flows are estimated by the valuer for a time horizon of 3-5 years, as suggested by the ECB in "*Guidelines for banks on non-performing loans*".
If the borrower is a company, the same forecasting methodologies are used as for financial data, such as the Discounted Cash Flow model, which is based on the sum of discounted expected cash flow and their terminal value (also calculated on a forward-looking basis).
In other words, the valuators make a forecast of the flows available for debt repayment to which the terminal value is then added, which represents the flow obtainable from the sale of the going concern or the potential ability to refinance the debt.
When the debtor is a physical person, the methodologies will be simplified and will be based on the financial and income information available to the valuer.
The difference with evaluations of performing companies is the focus on certain peculiarities, such as:

- ✓ The legal framework in which we are operating;
- ✓ The quality and completeness of the information;
- ✓ The positioning of the evaluated loan with respect to other liabilities, taking into account payment priorities;
- ✓ The risk assessment of the forecast realization must be carried out more conservatively for the various assumptions than the risk assessment for performing companies.

Statistical prediction models

This third model is used when the number of loans to be evaluated does not allow for a detailed forecasting model of the expected flows; in such cases, a statistical approach must be used.

Such a model can be applied either to the entire portfolio or to a portion of it: the valuer can use a sample, segmenting the portfolio by classes of amount and selecting, for example, 100% of the positions in the highest class, 50% of the second, and so on.

Almost always, this model is applied to the valuation of granular[13] unsecured loan portfolios to individuals, since in these cases analytical valuation of individual loans is impossible and insignificant.
The valuation of these types of portfolios is conducted using assumptions based on the analysis of time series of loans with similar characteristics.
After having historical collections for loans of the same type, the valuer may use two approaches:

A) Recovery curve approach

For the development of the curves, data on collection and bad debt transition are needed for a fairly long-time horizon (usually 7-10 years). The basic assumption is that each year of transition to bad debt generates a recovery flow over time following a recurring curve. The curve that is determined is used to forecast the flows receivable, after verification within a certain confidence interval.

Below, in Table 2, we can see an example of recovery curves:

[13] A "*Granular"* portfolio is a portfolio composed of a large number of small loans rather than a few large loans.

	Year of Default	Default + 1	Default + 2	Default + 3	Default + 4	Default + 5	Default + 6	Default + 7	Default + 8	Default + 9	Default + 10	Total
Vintage t-10	3.22%	6.54%	7.44%	3.99%	1.54%	4.78%	2.76%	1.88%	0.30%	0.10%	0.00%	32.55%
Vintage t-9	4.01%	6.00%	7.88%	4.09%	1.09%	5.23%	2.60%	2..1%	0.25%	0.05%		33.30%
Vintage t-8	2.99%	6.08%	8.21%	4.32%	1.00%	3.99%	2.84%	1.75%	1.00%			31.88%
Vintage t-7	3.15%	7.00%	8.30%	3.78%	1.30%	4.21%	3.01%	1.90%				32.65%
Vintage t-6	3.00%	6.43%	8.23%	3.22%	1.43%	5.35%	2.98%					30.64%
Vintage t-5	2.91%	5.43%	7.99%	4.67%	1.22%	4.89%						27.11%
Vintage t-4	3.09%	5.20%	7.50%	4.02%	1.87%							21.68%
Vintage t-3	3.06%	6.09%	6.99%	3.85%								19.98%
Vintage t-2	2.67%	7.32%	9.00%									18.99%
Vintage t-1	2.98%	6.66%										9.64%
Vintage t0	3.08%											3.08%
Total	**3.11%**	**6.28%**	**7.95%**	**3.99%**	**1.35%**	**4.74%**	**2.78%**	**1.91%**	**0.52%**	**0.08%**	**0.00%**	**32.69%**
Cumulative	**3.11%**	**9.38%**	**17.33%**	**21.32%**	**22.67%**	**27.41%**	**30.19%**	**32.10%**	**32.61%**	**32.69%**	**32.69%**	

Table 2: Example of recovery curve. Source: "*Non Performing Loans-NPL",* Fondazione Nazionale dei Commercialisti (FNC)

The model works as follows: if, for example, the last 10 vintages of transition to non-performing have generated collections of 3.11% of face value in the first year, 6.28% in the second year, up to an average of 32.69%, the assumption is that all non-performing vintages will behave similarly. Therefore, the prediction is that loans with one year's seniority that have already generated 3.08% collections, will generate, for example, in 9 years the difference between 32.69% and 3.08%, or 29.61% and so on.

B) Comparative Approach

The comparative approach is based on the simple assumption that similar loans with similar characteristics result in similar collection probabilities. The procedure used is as follows: (i) selection of parameters and collection of historical and current data of similar credits, (ii) comparative analysis by means of statistical techniques and machine learning to identify patterns and correlations, (iii) eventual use of benchmark models, (iv) estimation of collections and consequent valuations for the credits subject to valuation.

1.3.2. Main NPL's ratios

Different types of ratios are typically used to conclude the assessment and measure the quality of a financial institution's loan portfolio.
These ratios are useful for several reasons: (i) they allow investors to assess the risk and potential return of investments in banking institutions, (ii) they allow regulators[14] to supervise and monitor the health of institutions, and (iii) they help bank managers to understand which are the problem areas in the impaired loan portfolio.
More generally, these ratios provide a snapshot of the condition of NPLs in banking institutions; the proper identification and assessment of exposures forms the basis for the development of a sound strategy to improve the composition of loan portfolios.
In the following, we will review the main metrics used in the valuation of impaired loans.

1. Gross and Net NPL Ratio

The first two metrics we will look at are the Gross and Net NPLs Ratios. The former is a key factor indicating credit quality and default risk for a bank's loan portfolio, serving as crucial metrics of this assessment. Each ratio has its distinct contribution to credit risk assessment but they both yield different outcomes.

The Gross NPL Ratio is calculated as the ratio of total non-performing loans to total loans disbursed by the bank:

$$Gross\ NPL\ Ratio\ = \left(\frac{\text{Total NPLs}}{\text{Total Loans}}\right) \times\ 100$$

[14] The term "*regulators*" refers to the bodies and authorities responsible for supervising financial institutions. In Italy, the main regulators of NPLs are the Bank of Italy, CONSOB and the Ministry of Economy and Finance ("MEF").

Such ratio provides a straightforward presentation of the amount of losses among a bank's loans, without taking into account the provisions or reserves the bank has already made to cover potential losses.

The Net NPL Ratio, on the other hand, provides a cleaner view of the situation of non-performing, taking into account the loss provisions that the bank has set aside as provisions for expected losses on these loans. In other words, this ratio represents the non-performing loans net of loan provisions, divided by total loans taken out:

$$Net\ NPL\ Ratio\ = \left(\frac{\text{Total NPLs}\ -\ \text{Provision for Losses on Loans}}{\text{Total Loans}}\right) \times\ 100$$

This ratio can be further detailed in sub-categories such as: Net Bad Loans / Total Loans, Net UTP / Total Loans and Net Past Due / Total Loans, which allow for the analysis of specific types of risk exposure in relation to the entire loan portfolio.

The Gross NPL Ratio helps analysts and investors assess the percentage of problem loans in a bank's portfolio, offering an indication of overall credit risk. However, it does not consider actions taken by the bank to mitigate this risk, while the Net NPL Ratio, taking into account loss provisions, provides a more accurate measure of the credit risk to which the bank is actually exposed. A high Net NPL Ratio, despite high loss provisions, may indicate that the bank is facing significant challenges in managing non-performing loans. In any case, such ratios are essential for banks' financial planning.

2. Coverage Ratio

This ratio offers a direct measure of the adequacy of loan loss provisions relative to the size of the non-performing loans, thus providing a meaningful indication of the financial resilience of the institution in facing defaulted loans.

The Coverage Ratio is calculated by dividing loan loss provisions (also known as bad debt provisions) by total non-performing loans. The result is often expressed as a percentage:

$$Coverage\ Ratio\ = \left(\frac{\text{Provisions for Losses on Loans}}{\text{Total NPLs}}\right) \times 100$$

A high Coverage Ratio indicates that the bank has set aside sufficient reserves to cover anticipated losses on non-performing loans, suggesting prudent credit risk management and a strong balance sheet position.

Conversely, a low ratio may signal that the bank does not have adequate reserves to address potential losses, exposing it to greater financial risks. In financial stress scenarios, inadequate coverage may lead to liquidity problems or, in the most severe cases, jeopardize the institution's solvency.

3. Texas Ratio

Originally developed during the Texas banking crisis in the 1980s, this ratio provides a measure of the credit risk a bank faces by comparing the value of its non-performing loans and other impaired assets with the capital available to cover potential losses.

The Texas Ratio is calculated by dividing the sum of non-performing loans and impaired assets (such as properties acquired through foreclosure) by the bank's total capital, which includes Tier 1 capital and loan loss reserves:

$$Texas\ Ratio\ = \left(\frac{\text{NPLs}\ +\ \text{Impaired Assets}}{\text{Tier 1 Capital}\ +\ \text{Reserves for Losses on Loans}}\right)$$

A high value suggests that the bank has a high level of problematic loans relative to its capital, indicating potential solvency problems and an increased risk of failure.

4. Loan Loss Provisions to NPLs

The output resulting from this ratio indicates how well the bank is able to absorb losses from non-performing loans.
The calculation is as follows:

$$Loan\ Loss\ Provisions\ to\ NPLs\ = \left(\frac{\text{Provisions for Losses on Loans}}{\text{Total NPLs}}\right) \times 100$$

A high ratio suggests that the bank has set aside sufficient (or more than sufficient) capital to cover expected losses from non-performing loans. This is often interpreted as a sign of prudence and strong risk management, as it indicates that the bank is well prepared to handle potential losses without negatively impacting its core capital.

5. Cost to Income Ratio

It measures the operating efficiency of a bank or other financial institution by comparing operating costs with net revenues. The calculation is done by dividing total operating costs by net revenues, with the result expressed as a percentage:

$$Cost\ to\ Income\ Ratio\ = \left(\frac{\text{Total Operating Costs}}{\text{Net income}}\right) \times 100$$

A low Cost to Income Ratio indicates that the bank is operating efficiently, managing to generate revenues significantly in excess of operating costs. Conversely, a high value suggests operational inefficiencies, with costs absorbing a significant portion of revenues. This Ratio is used in the NPL valuation because these types of loans reduce the bank's net revenues as defaulted loans generate lower interest margins. In addition, the management of non-performing loans requires significant resources, including debt

collection activities, negotiation of debt restructuring plans, and collateral management. These additional costs may increase the bank's total operating costs, further worsening the Cost to Income Ratio.

6. Forbearance Ratio

The last ratio we list is the Forbearance Ratio, which is calculated as the ratio of the total balance of loans subject to leniency measures to the total balance of all loans disbursed by the bank:

$$Forbearance\ Ratio\ = \left(\frac{\text{Outstanding Loans in Forbearance}}{\text{Total Loans}}\right) \times 100$$

A high Forbearance Ratio may indicate that a significant number of borrowers are experiencing financial difficulties, requiring modifications to their loan agreements to avoid defaults. Although forbearance may help prevent immediate credit losses, a high ratio may also signal potential problems in the loan portfolio that may materialize in the future.

1.3.3. Capital adequacy and related ratios

Other ratios that are crucial in this context are the ratios that measure capital adequacy. Capital adequacy is a fundamental aspect of financial stability, as it ensures that the bank can absorb potential credit shocks and maintain its lending capacity.

The key metric for knowing a bank's capital and understanding its capitalization system is the “Tier 1” capital of the bank: according to the Basel Accords, capital can be divided into two classes: *Tier 1 capital*, which represents the “main tier”, or the primary component of a bank's capital; *Tier 2 capital* or “supplementary tier”, which consists of

some additional elements to Tier 1; and finally *Tier 3 capital*, which comprises various capital instruments not included in the first two classes.

Tier 1, also called "core capital" or primary quality capital, is the core of bank capital. It consists of:

- Paid-up capital;
- Retained Earnings and Reserves, excluding Goodwill;
- Ordinary shares;
- Preferred shares;
- Some innovative capital instruments[15].

On the other hand, own-shares, operating losses, goodwill and intangible assets are excluded from Tier 1.
Tier 1 goes beyond the purely accounting notion of equity; instead, it seeks to approximate the concept of the cash flows' present value that the bank will be able to generate over time; in a sense, Tier 1 capital represents what would be the fair value[16] of the bank net of the present value of debt capital from *risk-weighted assets* ("RWA")[17].

Core capital is then classified into:

- *Core Tier 1:* the highest quality capital of the bank, which includes only common stock, retained earnings and reserves net of goodwill. The amount of core capital must be no less than 85% of the entire Tier 1 capital;

[15] Some *innovative instruments* are also included in the Tier 1 count, but in an increasingly smaller percentage. To prevent this capital from being made less solid by these instruments, the Basel Committee decides to limit their inclusion to 15%. If, instead, we exclude them from the count, we get the *"Tangible Common Equity" (TCE);*

[16] or equilibrium price;

[17] *Risk-weighted assets* are a set of assets held by the bank and weighted according to their credit risk.

- *Hybrid Tier 1*: consisting only of preferred securities, with a maximum amount not exceeding 15% of the entire core capital.

Tier 2 or "Tier 2 capital", has an increasing level of seniority and includes valuation reserves and innovative capital and hybrid instruments. It also can be broken down into two:

- *Upper Tier 2:* bonds with a maturity of more than 10 years that can be used to cover losses from the institution's operations;

- *Lower Tier 2:* bonds with a duration of more than 5 years.

Tier 3, on the other hand, is the one with the highest seniority and includes bonds with a maturity of more than 2 years, which cannot be used to cover the institution's operating losses. They allow, however, the suspension of payment of principal and interest in cases where book equity falls below legal limits.
In order to understand how robust and adequate the capital of the financial institution is, there are additional summary indicators that allow an immediate analysis of the stability of the bank's balance sheet.

The first we can mention is the *Total Capital Ratio*, which simply compares the bank's total capital with its risk-worthy assets, without distinguishing between capital of better or worse quality:

$$Total\ Capital\ Ratio = \frac{\text{Total Capital}}{\text{RWA}}$$

Going into more detail, we find the *Tier 1 capital ratio*; it relates only the equity capital part of the bank to total risk-weighted assets:

$$Tier\ 1\ Capital\ Ratio = \frac{\text{Tier 1 capital}}{\text{RWA}}$$

Reaching the highest degree of specificity, we obtain perhaps the most important and widespread indicator, the *Common Equity Tier 1 Ratio* ("CET 1"), which is issued by banks quarterly, semi-annually and annually. This ratio is also assessed by supervisory bodies and focuses on the core components of Tier 1 capital, i.e. common equity, compared again to their credit risk-weighted exposures:

$$CET\ 1 = \frac{\text{Common Equity}}{\text{RWA}}$$

There are also two types of CET1, the "*transitional*" (or "*phase-in*") and the "*fully loaded*" one. This distinction results from the changes introduced by the various Basel Accords issued over time: the "transitional" CET1 also includes financial instruments that will no longer be allowed when fully loaded; the "fully loaded" one, on the other hand, incorporates in the calculation only the rules expected when fully loaded.

The ECB, for the above indicators, has introduced minimum holding thresholds as part of the prudential and supervisory mechanism for financial institutions:

- For Total Capital Ratio: 4.5% of RWA;
- For Tier 1 Capital Ratio: 6.0% of RWA;
- For CET 1 Ratio: 4.5% of RWA.

The Basel standards set global minimum requirements, but each national supervisory authority, such as the Bank of Italy, may decide to apply more stringent capital requirements based on its own assessment of country-specific risks and economic conditions.

The ratios we have reviewed, and in particular the thresholds above, are key to ensuring that banks have adequate and sufficient reserves to cover any losses and to ensure the stability of the financial system, even in cases of economic shocks. In addition, minimum capital adequacy requirements greatly reduce the risk of failure of institutions; the higher

the ratios, the better the bank will be able to remain operational in the event of a crisis, protect customer deposits, and ensure transparency in the banking sector.

1.4. History and evolution of NPLs over time

NPLs have always existed, but they have become increasingly important during the major crises of the 21st century. The stock of impaired exposures has grown in size to slowly become a systemic risk to the global financial system. The financial crisis of 2008 and the sovereign debt crisis of 2010-2011 led to a sharp deterioration of bank balance sheets and, more importantly, led to a significant increase in the number of defaulted loans due to the economic recession that followed the crisis.

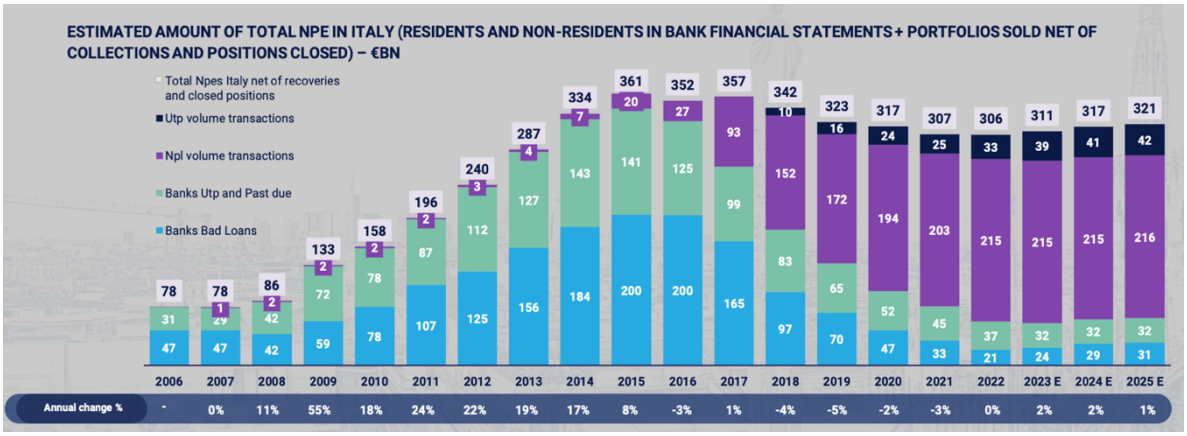


Chart 1 – Source: "*Market Watch NPLs, NPL transaction market and servicing industry*", forecast 2023-2025, Ifis Bank

As shown in the graph, the stock of total NPEs in Italy increased by 55% annually between 2008 and 2009, and by 24% between 2019 and 2011. The amount of NPEs followed a dizzying upward trend from 2007 to 2015, when it reached its peak. This increase results from the financial disruptions that first the world and then Italy have faced over the years: crisis breeds recession, recession breeds poverty and the financial capacity

of the citizen decreases. Therefore, the debtor finds it difficult to meet its obligations; loans, from performing, become impaired.

The composition of the amount of NPEs has also changed over time. As we can see, during the first years analyzed by Banca Ifis, the percentage between UTPs and NPLs was almost equivalent. Since 2013, however, we can observe a preponderance of non-performing over unlikely-to-pay; this could mean that UTPs have remained unpaid resulting in a change of classification to NPLs.

Another important information we derive from this graph is the significant increase in non-performing loans and UTPs sold (purple and blue color, respectively): a trend that is also expected in the future (2024E-2025E). In fact, from 2014 onward, banks began selling their portfolios of NPEs: this propensity increased exponentially from 2016 to 2017. We can see how the amount of NPLs and UTPs decreases over the years as a result of the increase in sales. This phenomenon was spurred by the GACS scheme, introduced in 2016 to help banks deal with the phenomenon of impaired loans. The GACS[18] ("*Garanzie sulla cartolarizzazione delle sofferenze"*) are guarantees that the state gives to facilitate the disposal of non-performing loans and incentivize their sale and thus their removal from the balance sheets of financial institutions. Indeed, the introduction of this instrument granted the formation of a thriving secondary market and the reduction of NPLs stock, as can be seen from the graph.
At the time of the introduction of the GACS scheme, NPLs were becoming a significant problem for banks; impaired loans amounted to nearly one-fifth of total loans after recessions.

The stock of NPEs in Italy is estimated to have declined from €361 billion in 2015 to €306 billion in 2022, although projected increases in new impaired in 2023E-2024E-2025E could lead to a new increase.

[18] See paragraph 2.2.7.

Instead, in the following graph we can see how impaired loans have affected total loans over time. This statistic reflects the impact of impaired loans on the balance sheets of banking groups:

Bad debts: proportion on total loans
(percentage values)

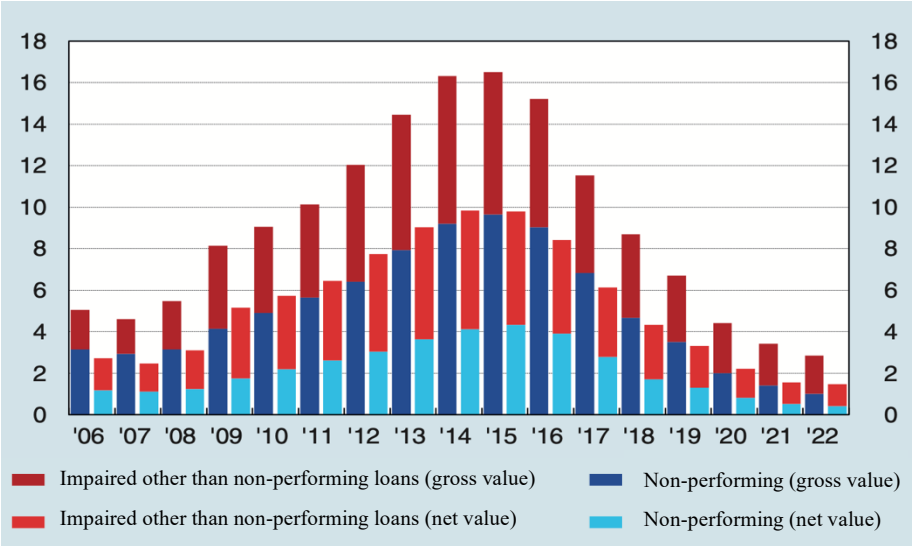


Chart 2 – Source: "*Financial Stability Report 1 / 2023"*, Italian Central Bank

In 2006/2007/2008, gross impaired loans (taking into account both nonperforming and other types of impaired loans) accounted for about 5% of the total value of loans, while net impaired loans accounted for about 2%. The percentage rose sharply from 2008 to 2009, exceeding 16% in 2015.

These results identify the growing severity of the non-performing problem, which has increasingly affected banks' balance sheets. In subsequent years, however, the proportion has decreased, once again because of the new disposal systems that are slowly lifting the situation. The year 2022 ended with a still fairly high proportion of bad debts, as we can observe from Chart 3:

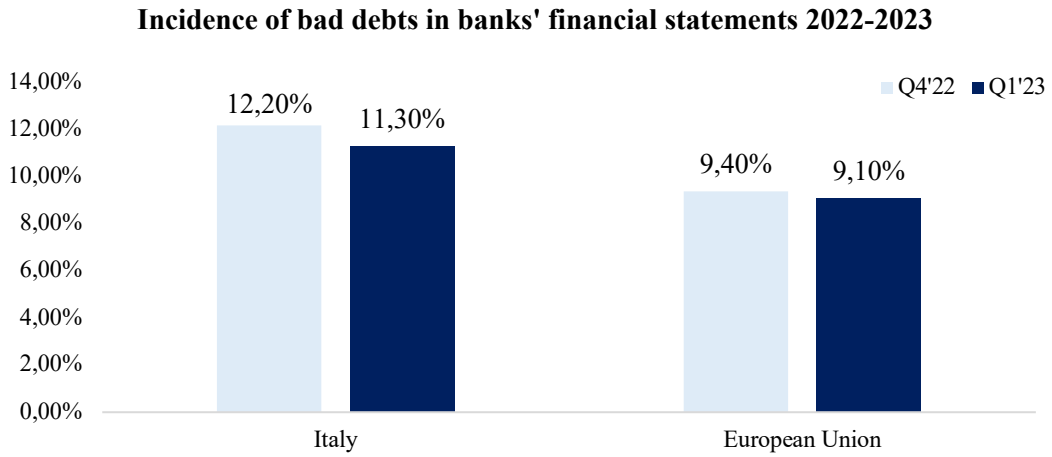


Chart 3 – Source: Re-elaboration of "*Market Watch NPLs, NPL transaction market and servicing industry*", forecast 2023-2025, Ifis Bank

This graph compares the European and Italian situations and the change between the last quartile in 2022 and the first quartile in 2023. At the end of 2022, the proportion of impaired loans was still high; although in 2023 the situation seems to be improving, the proportion of exposures to the total remains at 11.30%, compared to 12.20% in the fourth quartile 2022.

Another important information we can glean from this data is the comparison with the European Union: Italy shows a higher risk than the European average, standing at 9.10% at the beginning of 2023. Despite this, Italy is in a favorable position compared to other European countries.

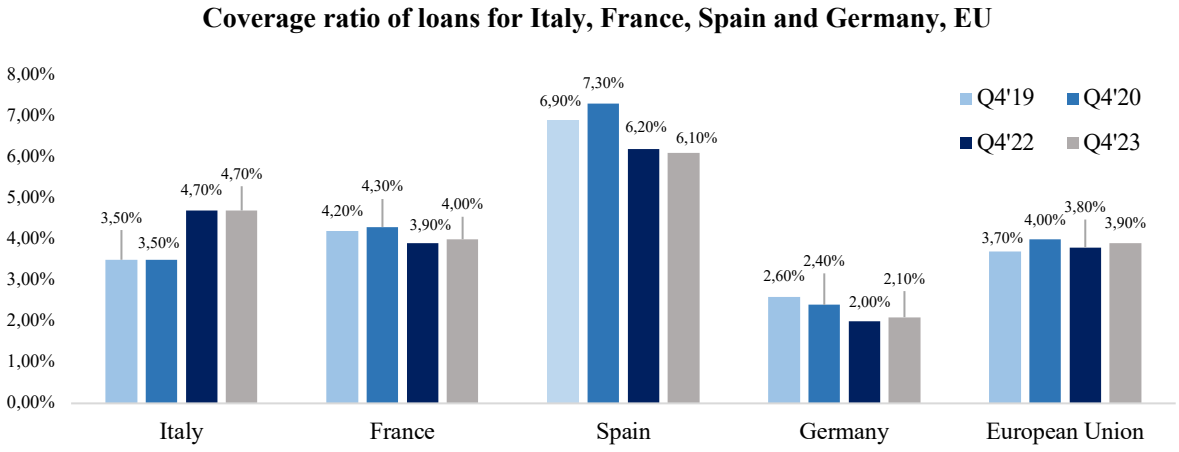


Chart 4 – Source: Re-elaboration of "*Market Watch NPLs, NPL transaction market and servicing industry*", forecast 2023-2025, Ifis Bank

Chart 4 analyzes the Coverage Ratios of Italy, Spain, France, and Germany compared to the European average, from 2019 to 2023; Italy has higher results than Germany and France, but far lower than Spain, which ranks as the country with the best European Coverage Ratio. In any case, in 2023, the Italian situation remains better than the European average by 80 basis points.

1.4.1. European NPL's market in 2023

The inflation levels, the financial crisis, the Covid and post-Covid situation and the continuing conflict between Ukraine and Russia have inevitably impacted on the stock of NPLs in a negative way. Because of this rise, however, an increase in transactions involving impaired loans has become necessary. In fact, the European NPLs market performed positively in 2023, registering an upturn in transactions and loan disposals. According to data from Banca Ifis, in the first half of 2023, NPLs disposals reached €32 billion, compared to €28 billion in the first half of 2022.
This was due to a substantial decrease in the average prices of NPLs transactions as a result of the increased loan supply in the market.
The capital ratios of Significant Institutions achieved remarkable results in Q2 of 2023. CET1 reached 15.72%, Tier 1 ratio 17.11%, and Total Capital Ratio 19.78%.

Analyzing the data and key statistics published by the ECB for the second quarter of 2023, in Chart 5 we can see how capital ratios and their components have sharply increased from 2015 to the present:

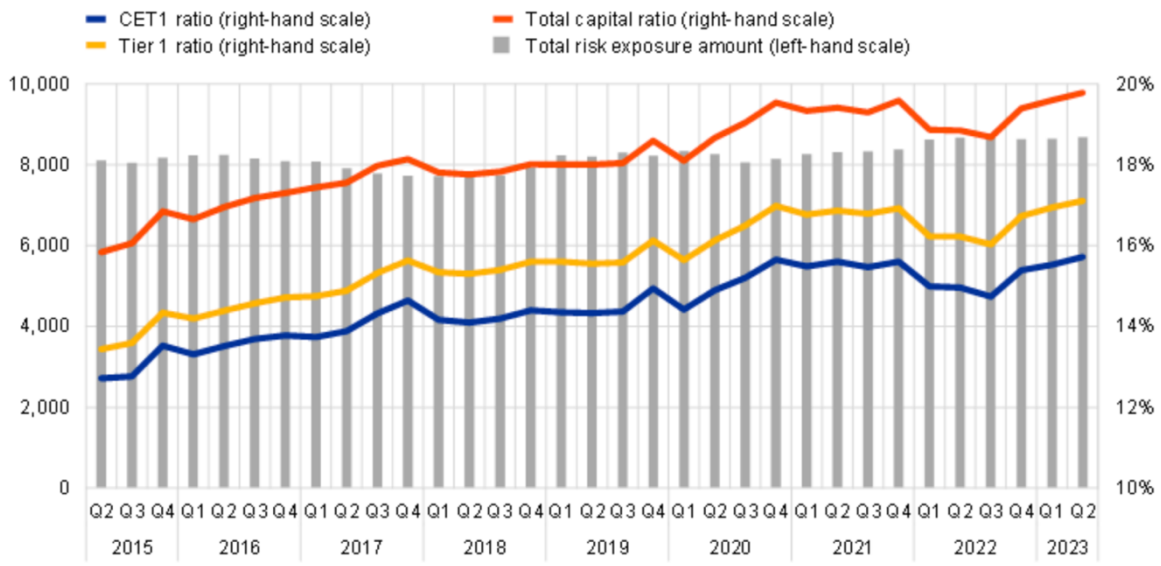


Chart 5 – Capital ratios and their components, "*Supervisory Banking Statistics on Significant Institutions*", European Central Bank

The trend has been gradual and with a steady upward pattern, with a slight decline until the third quarter of 2022, but with a more than positive recovery for the first and second quarters of 2023. The total amount of risk exposure, on the other hand, has remained fairly stable over the past 8 years.

More specifically, in Chart 6 we can see the level of capital ratios and components by country:

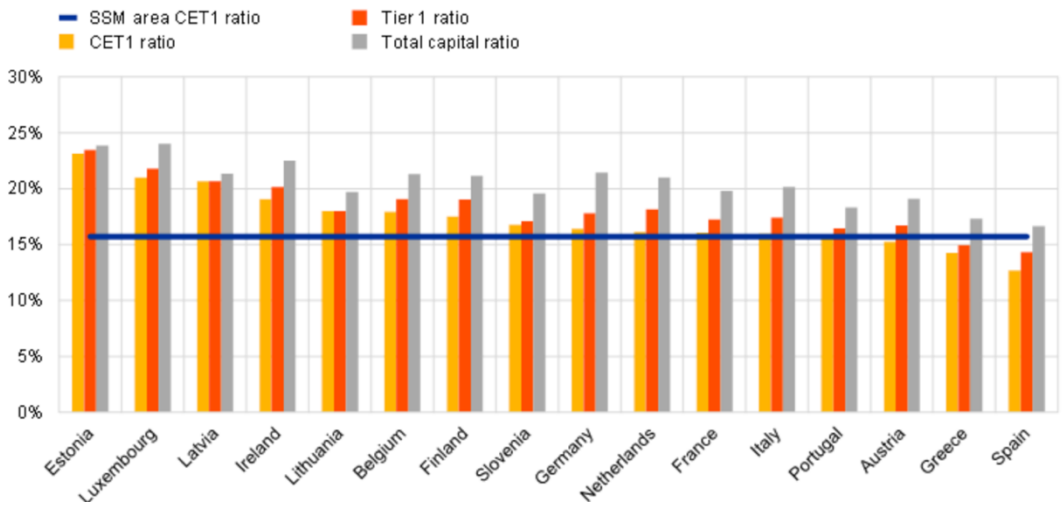


Chart 6 – Capital ratios by country for the second quarter of 2023, "*Supervisory Banking Statistics on Significant Institutions*", European Central Bank

The area considered in these statistics is the SSM ("*Single Supervisory Mechanism*"), which is the territory of the European Union that is subject to direct supervision by the ECB. The SSM area CET1 Ratio, the line in blue, represents the average of banks included in the area which is around 14.74%.

As of September 30, 2023, Estonia ranks highest in ratios; CET1 Ratio reaches 23.2%, Tier 1 Ratio 23.4% while Total Capital Ratio 24.1%. Spain, on the other hand, ranks below the European average, with a CET1 of 14.07% and a Tier 1 of 15.44%. Italy, on the other hand, ranks 12th out of the countries[19] considered in the chart.

Let 's now turn to analyze how Return On Equity ("ROE") and the composition of net profit and loss has varied over time and the results of the first two quarters of 2023.

ROE is a general profitability indicator that measures the ratio of net profit to equity; it allows us to look at the overall performance of SSM member banks and examine the impact of loan deterioration on their profit and losses.

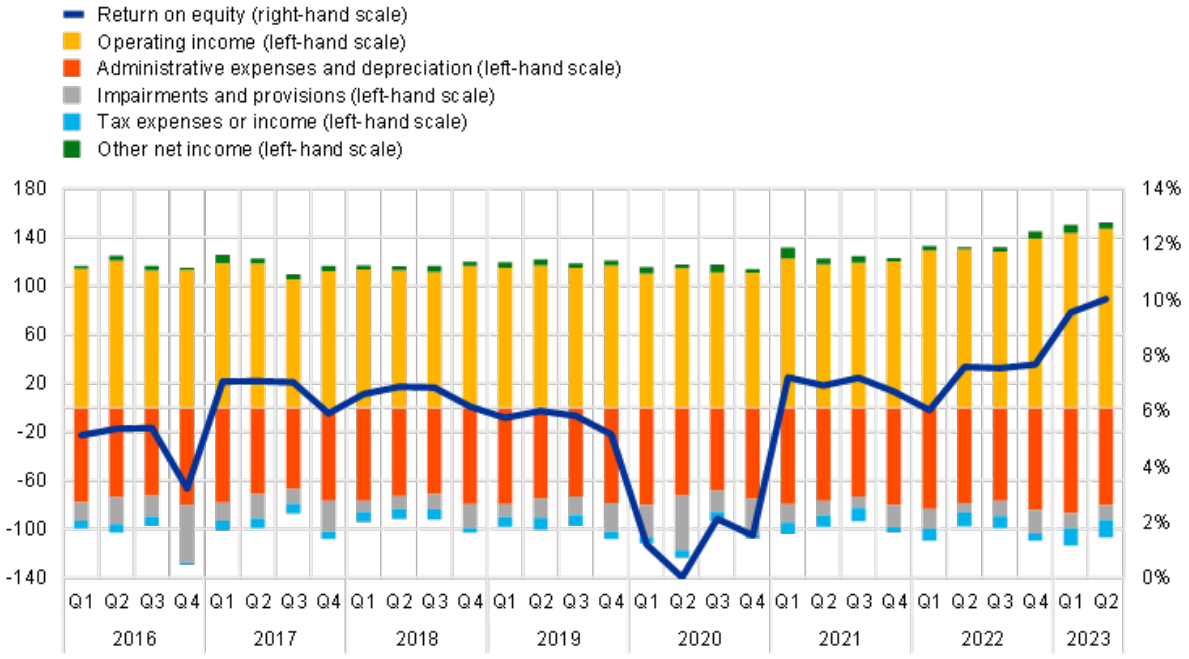


Chart 7 – Return on equity and composition of net profit and loss, "*Supervisory Banking Statistics on Significant Institutions*", European Central Bank

[19]Some countries participating in European banking supervision are not included in this chart, either for confidentiality reasons or because there are no significant institutions at the highest level of consolidation in that country.

On average, banks in the SSM area experienced an increase over the period. In the first quarter of 2016, the average ROE was about 5.5%, reaching a full 10% in the second quarter of 2023, going through a sharp decline from the first quarter of 2020 to the first quarter of 2021, due to the negative economic effects of Covid-19. However, the increase in ROE was certainly stimulated by the new regulatory measures, which have strengthened competition in the banking sector, and, again, by the increase in NPLs transactions; in fact, the disposals free up resources for banks to put into new business and greatly increase their profitability.

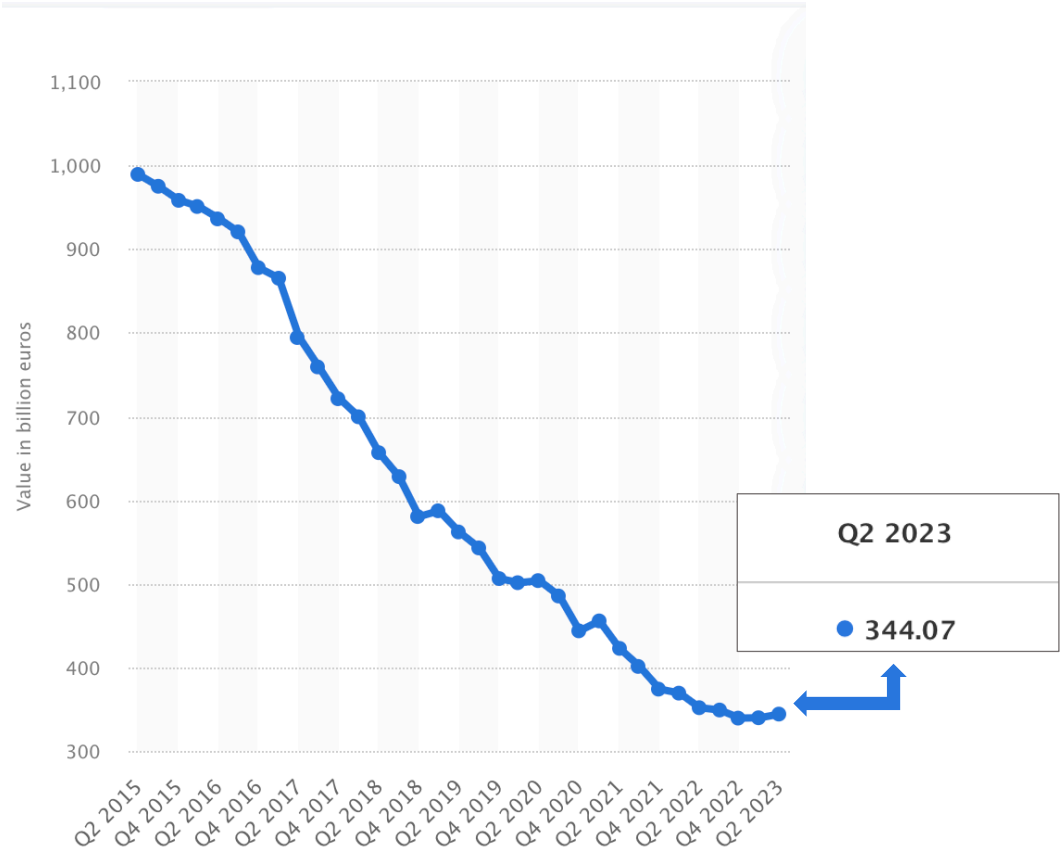


Chart 8 – Non-performing loans and advances in the euro area from 2nd quarter of 2015 to 2nd quarter 2023. Source: *statista.com*

More generally, we can say that the total stock of impaired loans in the euro area decreased by about 2% from the first quarter of 2022 to the second quarter of 2023,

reaching 344 billion euros[20]. Despite this decrease, the level of impaired loans still remains high; the average European NPL ratio is 2.26 %[21].

1.4.2. Italian NPL's market in 2023 onwards

The stock of NPLs in Italy is still an important issue to be addressed both for banks and for the entire economic system.
A high stock of non-performing loans necessarily has negative consequences for individual banks, as it generates a compression of profits and a reduction in the ability to raise new resources in the market. Moreover, such problems could affect the entire banking system; this generalization could lead to malfunctions in the credit allocation mechanism. In addition to the worries about the health of the banking sector, the NPL phenomenon has the ability to trigger a vicious circle, leading to a contraction in the supply of credit. This contraction brings with it a reduction in growth and a slowdown in recovery; the vicious circle closes with further deterioration of bank balance sheets.

In the current economic phase, companies are facing the negative effects of the various shocks that have hit the economy in recent years; the consequence is a gradual deterioration of companies' financial fundamentals and a worsening of risks.
We can observe this dynamic by analyzing the deterioration rates of nonfinancial companies; this rate indicates the share of loans that have deteriorated in quality in a given period as a proportion of total loans.

As reported by the Bank of Italy, after the slight increase in late 2022, rates continued to rise in the first quarter of 2023, reaching 3.1%:

[20] Source: *"Non-performing loans and advances in the euro area from 2nd quarter of 2015 to 2nd quarter 2023",* statista.com;

[21] Source: "*Supervisory banking statistics on significant institutions for the second quarter of 2023*", ECB.

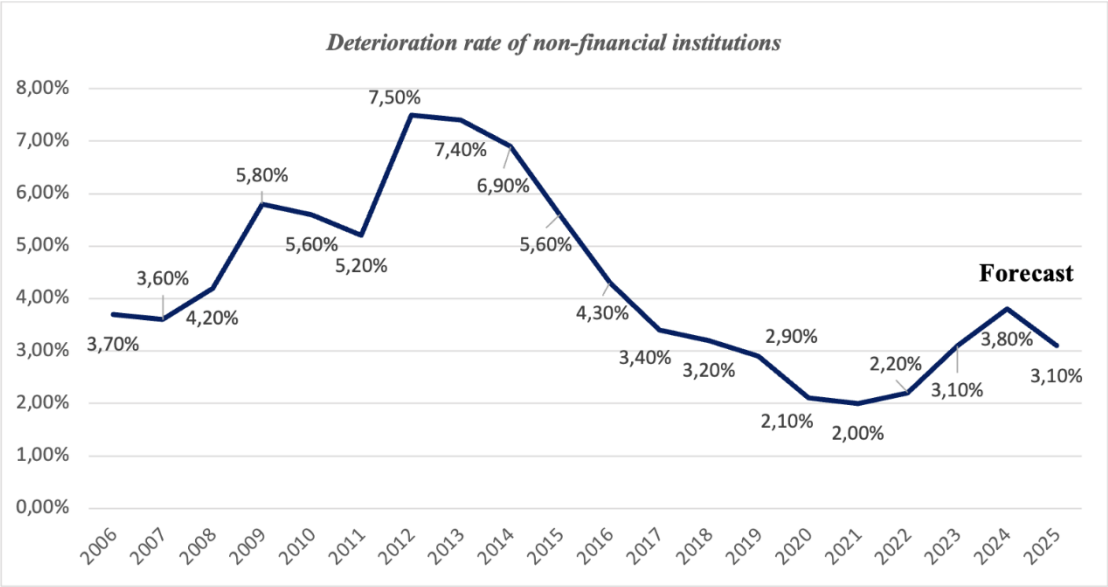


Chart 9 – Source: Re-elaboration of "*Outlook ABI-Cerved of firms' Non-performing loans*", ABI-Cerved

The outlook for the next two years reflects an unfavorable economic situation, made up of uncertainties regarding inflation and interest rates and by a slowdown in economic growth, although a reduction in the price level is beginning to be seen. This environment will bring a rise in corporate deterioration rates, which will increase significantly from the historically low levels recorded in previous years. ABI[22] Director General Giovanni Sabatini states the following: *"High inflation, restrictive monetary policy guidance, and economic slowdown are likely to lead to a reacquisition of corporate financial risks, creating conditions for an increase in impaired loans."* He further adds, *"In this regard, some current European rules that penalize the renegotiation of bank loans, for example, should be promptly reviewed."*

[22] The "*Italian Banking Association"* (ABI) is a voluntary, nonprofit organization representing the interests of the Italian banking sector. Founded in 1919, ABI performs several functions, including promoting initiatives for the development of the banking system, participating in the definition of industry rules and regulations, managing services of common interest to member banks, and promoting studies and research in banking and finance.

Central banks raising interest rates to counter the inflationary spiral slows international trade; the effects of this rise impact the risk profile of firms, leaving them exposed to idiosyncratic shocks.

Starting from 2023, the country's GDP is estimated to slow down; while in 2022 it grew by 3.8%, in 2023 it will reach +1.3%, followed by +0.9% in 2024. The slowdown in 2023 GDP growth is also linked to the reduction in international trade volumes as a result of the collapse of exports and imports.
By contrast, international trade is expected to increase slightly in 2024, as well as in 2025; estimates for the economic scenario are very similar for the next two years, with GDP growing by 1%, exports and imports at 2.8% and 2.6%, respectively, private consumption at 1.1% and government consumption at 0.5%.

The price level and inflation will continue to be high, as well as interest rates. Under this scenario, new loans in default for nonfinancial companies are expected to rise sharply. In 2024 the deterioration rate will touch 3.8%, reaching its highest peak since 2016. In 2025 it will drop to 3.1% returning to 2023 levels.
The growth in the deterioration rate will occur in all firm sizes:

	Micro	Small	Medium	Big
2023	3,3%	2,4%	2,0%	1,9%
2024E	4,0%	3,0%	2,7%	2,5%
2025E	3,3%	2,3%	1,8%	1,4%

Table 3 – Source: excerpt from "*Outlook ABI-Cerved of firms' Non-performing loans*", ABI-Cerved

For microenterprises, the rate will increase from 4.0% in 2024 to 3.3% in 2025, for small enterprises from 3.0% to 2.3%, for medium enterprises from 2.7% to 1.8%, and finally from 2.5% to 1.4% for large enterprises. In 2024, new loans in default will be higher than pre-Covid for all size classes, while a reversal is expected in 2025; microenterprises will remain the riskiest size followed by small, medium and last by large enterprises.

1.5. Main determinants and consequences

Loans are the most crucial products of banks; indeed, the topic of NPLs has attracted the attention of numerous scholars and researchers over the past decades. Various studies have shown that the asset quality of a financial institution depends largely on the level of NPLs the bank holds. Barseghyan, Ghosh and Makri have described the NPLs phenomenon as "financial pollution" because of its pervasive effects in the economy.
This pollution stems from multiple factors that drive NPLs levels; below we will first analyze macroeconomic determinants and, in a second part, we will study how NPLs, in turn, erode bank-specific variables and balance sheet indicators.

1.5.1. Macroeconomic determinants

Numerous authors and scholars have shown that a country's economic conditions have a significant impact on banks' loan losses. We will analyze below the factors that play an important role at the macroeconomic level, capable of influencing the stock of loans.

1) GDP growth

The relationship between NPLs and GDP has been discussed extensively in the literature; what scholars have tried to demonstrate is the inverse relationship between economic growth, thus increasing GDP, and the level of NPLs.
A healthy financial environment stimulates economic growth, while one that does not have an adequate capital structure struggles to manage credit deterioration; the result is reduced growth and an overall worsening of the situation.
Under good economic conditions, both corporations and households are more likely to meet their obligations. GDP is often used as an indicator of such economic conditions; high GDP reflects high country wealth and good business cycle status.

In 2015, econometric research by R. Beck, P. Jakubik, and A. Piloiu on 75 countries showed that GDP growth is the main driver of NPLs Ratio in the decade prior to the publication of the article. Thus, a drop in the global economy poses the greatest threat to bank asset quality. The analysis focuses on the effect of lagged NPLs growth, contemporaneous and lagged real GDP growth, and also on nominal effective exchange rates, which we will address below in section 2, as the second macroeconomic determinant.

Arellano-Bond estimation	Dependent variable NPL							
	1	2	3	4	5	6	7	8
NPL (−1)	0.191** *(0.037)*	0.223** *(0.034)*	0.248*** *(0.000)*	0.230*** *(0.000)*	0.213** *(0.014)*	0.191** *(0.050)*	0.293*** *(0.001)*	0.189** *(0.045)*
RGDP	−5.997*** *(0.000)*	−5.025*** *(0.000)*	−3.661*** *(0.000)*	−3.086*** *(0.000)*	−5.845*** *(0.000)*	−5.213*** *(0.000)*	−3.819*** *(0.000)*	−5.208*** *(0.000)*
RGDP (−1)	2.110*** *(0.000)*	2.220*** *(0.000)*	1.488** *(0.017)*	1.277* *(0.089)*	2.262*** *(0.000)*	2.282*** *(0.000)*	1.615** *(0.037)*	2.247*** *(0.000)*

Table 4 – Excerpt from the Arellano-Bond estimation. Source: *"Key Determinants of Non-performing Loans: New Evidence from a Global Sample",* R. Beck, P. Jakubik, A. Piloiu

This table represents the coefficients that the variables take in relation to different significance levels. Specifically, ***,** and * represent significance levels at 1%, 5% and 10%, respectively. In contrast, the columns numbered 1 to 8 identify different models to which variables and conditions have been added. In particular, column 1 considers the variable without interaction terms, column 2 adds lagged lending interest rates to the base variable within the regression, column 3 introduces share prices, and column 4 considers both share prices and lagged interest rates. Columns 5 through 8 introduce the interaction with a dummy variable[23], which in this case takes a value of 1 for countries with International Claims ("ICLs") to GDP above the median and 0 for those below the median. The study uses LCIs to GDP as a proxy for unhedged foreign currency loans. Again, column 5 takes the variable with no other interactions, column 6 considers lending interest rates, column 7 share prices, and column 8 both additional variables.

[23] A *dummy variable* is a variable that takes value 0 or 1, depending on whether a given condition is met or not

The Arellano-Bond estimation[24] used in the research shows how an increase in contemporaneous real GDP growth is correlated with a reduction in NPLs ratios. Lagged GDP growth also affects NPLs growth but this time with a positive sign. The more lag increases in response to a positive growth outcome, the more the bank's asset quality deteriorates; this stems from the loose credit standards applied during periods of growth booms.

In any case, the overall effect of GDP growth remains negative; we can see that in all 8 models, the results are quite consistent with the main assumption.

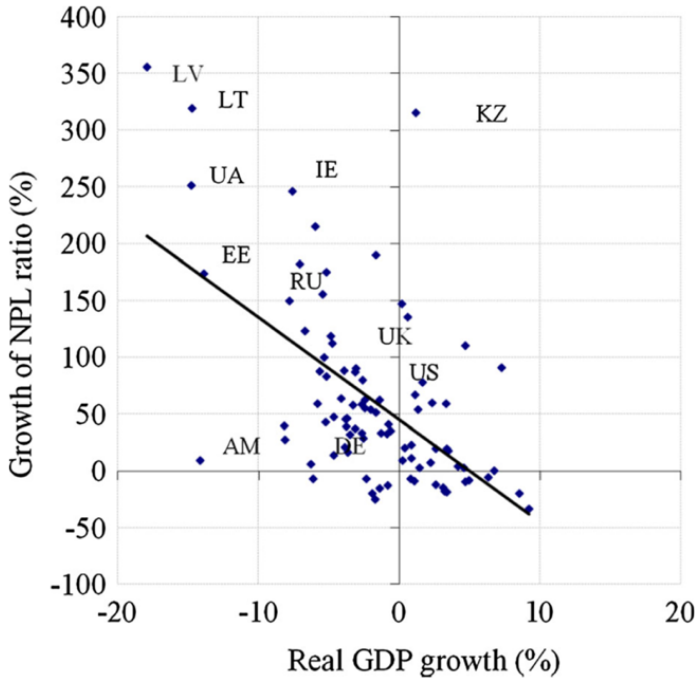


Chart 10 – Growth of NPL ratio and real GDP growth. Source: *"Key Determinants of Non-performing Loans: New Evidence from a Global Sample",* R. Beck, P. Jakubik, A. Piloiu

The regression line in Chart 10 visually shows the negative correlation existing between the two variables considered: as the independent variable x we find Real GDP growth (%) and as the dependent variable y the Growth of NPL ratio (%).

[24] *The Arellano–Bond estimation* is a generalized method of moments estimator used in econometrics, to estimate dynamic models of panel data.

Another more recent article once again demonstrates the above theory. In "*Non-Performing Loans and Macroeconomics Factors: The Italian Case*", M. Foglia attempts to demonstrate the inverse relationship NPLs / GDP growth, considering the Italian banking system over the period 2008Q3-2020Q4. This study uses an "ARDL" (*Autoregressive Distributed Lag*) cointegration model, which allows to demonstrate the significance of the analysis.

Variables	Coefficient	Std. Error	t-Statistic	*p*-Value
GDP	−0.456	0.249	−1.831	0.073

Table 5 – Excerpt from long-run coefficients. Source: *"Non- Performing Loans and Macroeconomics Factors: The Italian Case",* M. Foglia

As we can see from Table 5, GDP once again shows a significant negative relationship with NPLs. Looking at the coefficient, we can say that a +1% growth in the NPLs stock (and thus credit risk) is correlated with a -0.46% reduction in GDP.

Other important evidence from this study is the difference between short run and long run, as can be seen in Table 6:

Variables	Coefficient	Std. Error	t-Statistic	*p*-Value
ΔGDP	−0.051	0.015	−3.361	0.001

Table 6 – Exerpt from short-run coefficients. Source: *"Non- Performing Loans and Macroeconomics Factors: The Italian Case",* M. Foglia

In this case the coefficient records a fairly low value. This suggests to us that the statistic loses significance, and thus in the short-run the impact of change in the macroeconomic variable under consideration is less significant.

In any case, in the long run, it is evident that GDP growth implies higher incomes for households and higher profitability for firms. Thus, a better financial condition implies a higher economic capacity directed toward repaying debt and, consequently, reducing the stock of NPLs.

2) Nominal Effective Exchange Rate

Another key macroeconomic determinant in the analysis of the NPL phenomenon is the *Nominal Effective Exchange Rate* ("NEER"). R. Beck, P. Jakubik, A. Piloiu, in the study cited in point 1), highlight how NEER has a significant impact on the stock of NPLs.

Arellano-Bond estimation	Dependent variable NPL							
	1	2	3	4	5	6	7	8
NPL (−1)	0.191** *(0.037)*	0.223** *(0.034)*	0.248*** *(0.000)*	0.230*** *(0.000)*	0.213** *(0.014)*	0.191** *(0.050)*	0.293*** *(0.001)*	0.189** *(0.045)*
NEER	0.994** *(0.014)*	1.257** *(0.015)*	0.639 *(0.273)*					
NEER (−1)	−0.213 *(0.484)*	−0.222 *(0.491)*	−0.358 *(0.110)*					
NEER * Low ICL					1.063** *(0.025)*	1.113*** *(0.006)*	0.821* *(0.056)*	1.159*** *(0.007)*
NEER * Low ICL (−1)					0.117 *(0.780)*	0.063 *(0.852)*	−0.521** *(0.028)*	
NEER * High ICL					−0.732 *(0.424)*	0.406 *(0.659)*	0.052 *(0.975)*	
NEER * High ICL (−1)					−0.902 *(0.184)*	−1.430** *(0.026)*	−1.168 *(0.166)*	−1.388*** *(0.010)*

Table 7 – Excerpt from the Arellano-Bond estimation. Source: *"Key Determinants of Non-performing Loans: New Evidence from a Global Sample",* R. Beck, P. Jakubik, A. Piloiu

As we can see, the coefficients were found to be positive, implying a direct relationship between the two variables under consideration; as one increases (or decreases), the other will increase (or decrease). This implies that a depreciation of the domestic currency corresponds to a decline in non-performing ratios, and vice versa.

Again, researchers analyze the effects of both contemporaneous and lagged NEER. The interaction with the dummy variable allows the estimation to make the impact of the exchange rate on the impaired even clearer.

The inverse relationship between NEER and NPLs turns out to be true especially in emerging countries and economies, where the stock market is underdeveloped and the

exchange rate turns out to be crucial (e.g., countries where exports are the essence of the economy).

3) Unemployment

The common view among many scholars is that a country's unemployment is positively correlated with the level of impaired loans on bank balance sheets; if the labor market is poorly functioning, demand will fall and at the same time the incomes of households and businesses will shrink. Again, this situation translates into a lower ability to repay debts and thus an increase in NPLs.
M. Foglia's study, which analyzes the Italian case, confirms this theory.

Variables	Coefficient	Std. Error	t-Statistic	*p*-Value
UR	0.024	0.004	5.615	0.000

Table 8 – Excerpt from long-run coefficients. Source: *"Non- Performing Loans and Macroeconomics Factors: The Italian Case",* M. Foglia

The coefficient results positive; this evidence confirms the central role that this determinant also plays in the phenomenon we are studying.

Compared to previous results, however, this relationship would seem to take the form of a logarithmic function rather than a linear function. This is shown by the results of the paper "*Effects of economic variables on NPLs depending on the economic cycle*" by S. Climent-Serrano (2016), which deals with the analysis of the Spanish NPLs situation between 2004 and 2015.

	In logarithms: nonlinear model				
	2004–2015	Elasticity	2004–2009	2010–2015	Difference
Unemployment	0.809***	0.073	1.727***	0.586***	1.144***
	(0.030)		(0.242)	(0.027)	

Table 9 – Excerpt from regression model. Source: "*Effects of economic variables on NPLs depending on the economic cycle*", S. Climent-Serrano (2016)

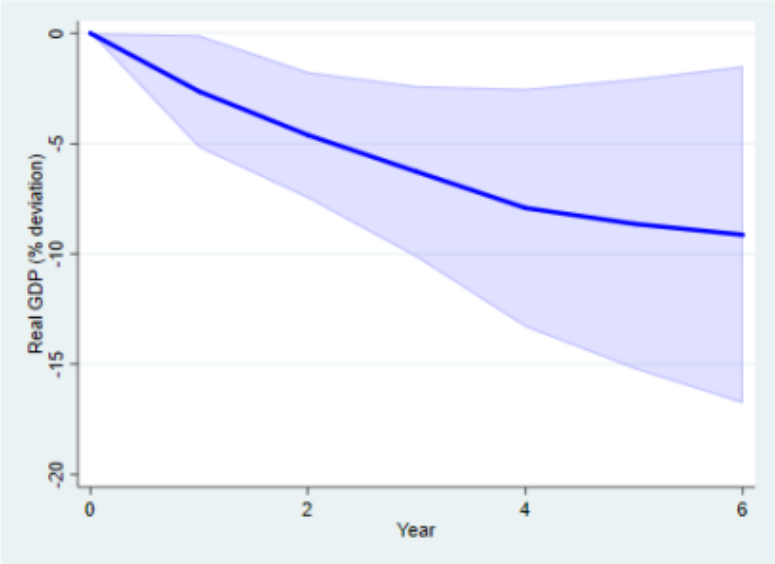
As can be seen again, the results are self-explanatory; the relationship is confirmed true in every interval considered, with significance level at 10%.

4) NPLs / post-crisis output ratio

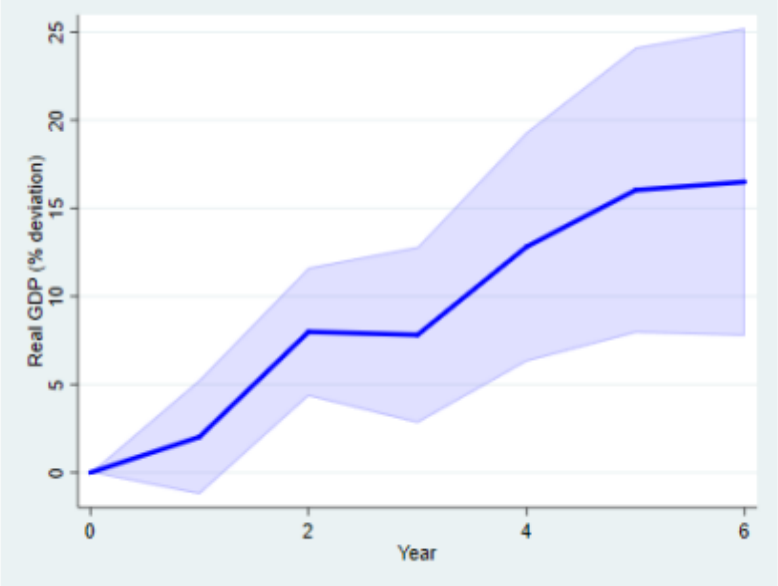
Another interesting macroeconomic variable to analyze in this context is a country's output, to understand whether output can be affected by high levels of NPLs. Specifically, below are the results of a study that seeks to show how post-crisis output is lower in countries with a high stock of NPLs.
The study, called "*The dynamics of non-performing loans during banking crises: A new database with post-COVID-19 implications*" by A. Ari, S. Chen and L. Ratnovski (2020), focuses on the analysis of NPLs during 92 banking crises from 1990 to 2020.
What it proposes to do is, first, to assess whether NPLs influence the post-crisis output path and then to analyze whether NPLs resolution helps to improve growth outcomes.

As a representative variable of growth, the researchers use real GDP (in logs multiplied by 100), which captures the cumulative change in GDP over the crisis years.
In panels A and B we can see the results of the study:

Panel A: *Output path and high NPLs outcomes*



Panel B: *Output path and NPLs resolution outcomes*



The results confirm the hypothesis. In panel A we note that there is a negative relationship between economic growth and the level of NPLs; in other words, countries with a higher level of NPLs tend to experience slower economic growth. In panel B, on the other hand, the relationship is positive; the higher the resolution of NPLs, the more economic growth will be stimulated.

Researchers show that output is lower on average in banking crises with high NPLs, and among crises with high NPLs, output is higher in countries able to resolve non-performing in a timely manner.

NPLs and output dynamics.

	(1) Year 1	(2) Year 2	(3) Year 3	(4) Year 4	(5) Year 5	(6) Year 6
Panel A: Elevated NPLs (actual)						
Elevated NPLs	-1.344	-3.533***	-5.024***	-5.252**	-5.146*	-5.236
	(0.918)	(1.142)	(1.462)	(1.989)	(2.565)	(3.216)
Constant	-3.607***	-3.230**	-1.665	-1.583	-0.743	1.348
	(1.189)	(1.512)	(1.885)	(2.672)	(3.863)	(4.528)
Observations	54	54	54	52	52	52
R-squared	0.588	0.607	0.634	0.624	0.587	0.582
Panel B: NPL resolution (actual)						
Timely NPL resolution	1.795	3.292	5.946	8.517*	9.817*	9.718*
	(1.814)	(2.781)	(3.539)	(4.356)	(4.833)	(5.507)
Constant	-4.528**	-4.748	-4.656	-5.175	-5.102	-2.529
	(2.065)	(3.268)	(4.030)	(5.465)	(7.016)	(8.094)
Observations	39	39	39	39	39	39
R-squared	0.423	0.394	0.402	0.391	0.386	0.377

Table 10 – Excerpt from table 2. Source: "*The dynamics of non-performing loans during banking crises: A new database with post-COVID-19 implications*", A. Ari, S. Chen e L. Ratnovski (2020)

As we can see from Table 10, the estimates produce a difference in real GDP levels of 1.795% in the first post-crisis year, peaking at 9.8% and 9.7% in years 5 and 6. Specifically, if the resolution is timely, the pre-crisis level of output is recovered within 4 years of the beginning of the crisis. If the resolution is not timely, output remains below the pre-crisis level throughout the time horizon considered in the analysis.

The conclusion of the study confirms that high and unresolved NPLs are correlated with deeper recessions.

1.5.2. Bank-specific variables

Other important factors to consider in order to arrive at the most comprehensive analysis are bank-specific variables, in particular we will define the ratio of NPLs to ROE, and the ratio of NPLs to ROA.

1) NPLs / ROE relationship

As stated earlier, *Return on Equity* ("ROE") is a key indicator for estimating the profitability of a company or bank, because it shows the efficiency of capital use and allows the strength of the institution to be measured. The higher the ability to make profit, the higher the return expected by investors and thus, the institution will be better valued in the future. Therefore, the higher the value of ROE, the firmer the institution's position will be. ROE is calculated as follows:

$$ROE = \frac{\text{Net profit}}{\text{Equity}}$$

The basic assumption on which many studies are based is that a high level of ROE contributes to a lower level of NPLs and vice versa, i.e., the more NPLs the bank has, the lower its profitability.

This is because, as Vasiliki Makri (2012) states in his study "*Determinants of Non-Performing Loans; The case of Eurozone*", the profitability of banks is related to their risk-taking behavior: since highly profitable banks have less incentive to engage in high-risk activities, the correlation between NPLs and ROE is expected to be negative and their relationship inverse.

This hypothesis is empirically verified in the study of A. Vellanita, G. Arimbawa and E. Damayanti, as we note from Table 11:

		NPL	ROE
NPL	Pearson Correlation	1	-.794**
	Sig. (2-tailed)		.000
	Sum of Squares and Cross-products	2.429	-12.462
	Covariance	.174	-.890
	N	15	15

Table 11 – Excerpt from table 3, "Correlations". Source: "*relationship between non-performing loans (NPLs), capital adequacy ratio (CAR), loan to deposit ratio (LDR) towards return on equity (ROE) at pt. Bank Central Asia*", A. Vellanita, G. Arimbawa e E. Damayanti, (2018)

The NPLs / ROE relationship results to have a negative sign; this confirms the main assumption that the relationship between one and the other is inverse.
A coefficient of -0.794 means that NPLs have a strong and significant negative effect on Return on Equity.

Thus, if the bank has a high stock of NPLs, operational costs increase and the bank's profitability decreases; bad management leads to investing in riskier assets and thus weakening performance.

2) NPLs / ROA relationship

For this ratio, the same arguments made for ROE hold true.
In this case we are talking about *Return on Assets* ("ROA"), which measures the profitability of a company relative to the resources (i.e., assets) used:

$$ROA = \frac{\text{Net profit}}{\text{Total assets}}$$

Once again, the relationship that is attempted to be shown is an inverse one. We can take, in support of this thesis, another study from 2021. A.B. Koten demonstrates the negative correlation between NPLs and ROA, using the latter as dependent variable y in his regression model:

Dependent Variable: FReturn on Assets (ROA)				
Method: Panel EGLS (bi-directional fixed effects)				
Sampling: 2010.Q1 - 2020.Q4				
Horizontal Section Number: 27				
Ratios	**Coefficient**	**Std. Error**	**t-Statistics**	**Probability**
FNon-Performing Loans/Total Loans	-0.230101	0.039738	-5.790408	0.0000*

Table 12 – Excerpt from table 7, "Panel Regression Estimation Results". Source: "*Determination Of The Relationship Between Non-Performing Loans And Profitability In The Turkish Banking System With Panel Regression Analysis",* A.B. Koten (2021)

In that research, the independent variable x is represented by the NPLs / Total loans ratio; the coefficient is again negative and equal to -0.23. Therefore, when the independent variable increases by one unit, the ROA variable decreases by 0.230 units.

Again, the explanation is linear; an increase in NPLs results in a cost to banks because it reduces the quality of their loan portfolio.

CHAPTER 2

NPL'S MANAGEMENT: POTENTIAL ALTERNATIVES

2.1. Main management alternatives

After having defined and analyzed the determinants and consequences of non-performing loans in the portfolio, we now move on to identify possible methods of resolving this issue.

There are several options for managing deteriorated loans; before choosing a strategy, banks should carefully examine the range of possible options available and their respective financial impact. Since this is a significant problem for the banking environment, banks must necessarily use all available strategic tools, applying the most appropriate methodologies to each specific portion of the portfolio.
A successful strategic decision involves two types of prior analysis: a bottom-up one, i.e. a portfolio analysis, and a top-down one, i.e. an analysis of the operating model to identify the best choice to enhance each segment of the portfolio.

Each type of NPL has its own specific characteristics and criticalities and it is therefore necessary to apply an approach that takes into account:

- *NPL type*: secured, unsecured, corporate, household;
- *NPL life stage*: early stage, mid stage, late stage;

- *Debtor characteristics:* solvency, repayment capacity, financial strength;
- *Debt characteristics:* amount, guarantees, type of interest rate.

A strategic plan to address non-performing loans should incorporate, at a minimum, clearly defined quantitative targets to be achieved within specific time limits. These objectives should be accompanied by a detailed operational plan, thus providing a comprehensive roadmap for their pursuit. The formulation of such a strategy should be derived from a careful self-assessment and a considered analysis of the options available for implementation.
It is crucial that this strategy, together with its related operational plan, be subject to approval by the governing body. Furthermore, it should be subject to periodic review, at least annually, to ensure its adaptability to changing market dynamics and economic conditions.

According to the Bank of Italy, the objectives should be articulated along the following dimensions:

(a) *For time horizons*: short (1 year), medium (3 years) and long term;

(b) *By main portfolios* (e.g. retail mortgages, retail consumer credit, loans to small and medium-sized enterprises, loans to large enterprises);

(c) *By implementation method* selected for the purposes of the proposed reduction (e.g. enforcement of collateral, legal debt collection, proceeds from the sale of NPLs or write-offs).

This proactive approach not only promotes effective management of NPLs, but also provides the flexibility to respond to the evolving challenges in the financial landscape.

The numerous methodologies can be classified into internal management methods and external management methods.

2.1.1. Internal management

One of the several strategies to choose from is the retention of non-performing loans in the portfolio, with the aim of making their management and organization efficient.
Internal management of NPLs can occur when the creditor bank retains control of these loans, regardless of who materially performs the management and monitoring activities. In this scenario, NPLs remain in the bank's balance sheet.

Within this macro category, there are various strategies that can be implemented:

1) Debt Restructuring

The first is debt restructuring: by changing the terms of the loan, UTP or NPLs could be recovered.
Debt restructuring attempts to save credits and maximize their recovery. This approach can be implemented in several ways:

(a) *Change in the amortization plan*: extension of the term of the loan, reduction in the number of repayments or change in the frequency of payments;

(b) *Reduction of the outstanding principal amount* of the loan;

(c) *Granting of a new loan* to provide liquidity to the borrower.

NPL debt restructuring is a methodology aimed at supporting the borrower in repaying its loan, while at the same time facilitating the reduction of non-performing loans for the bank and improving the quality of its portfolio.

2) Outsourcing

Another internal management strategy is the outsourcing, which in turn can be distinguished into:

Internal Servicing

It envisages the creation of an entity, controlled by the bank, which is responsible for managing non-performing / impaired exposures;

External Servicing

The bank outsources the management of impaired loans to a third party, acting on its behalf and in its name. In this way, the bank outsources the administration of the impaired exposures, without actually selling the loans.

Internal management allows the bank to maintain direct supervision of the recovery process and to have more flexibility to negotiate possible solutions with debtors.

2.1.2. External management

Sometimes, internal management is not deemed sufficient to combat non-performing loans; in the case of irrecoverable or nearly irrecoverable loans, their recovery through in-house management may prove difficult or impossible. In such cases, external management may be necessary; it involves the actual transfer of the loans out of the portfolio and thus their removal from the banks' balance sheet.

In particular, online platforms for the sale of NPLs have become very popular in recent years. Such platforms allow banks to get in touch with investors interested in buying the loans. In other words, the platform acts as an intermediary between the two parties, i.e. the transferor and the transferee. The most used models are the marketplace or the online auction. Among the main portals we can mention BlinkS (owned by Prelios), Cerved Credit Management, DoValue or Banca IFIS through the NPLs Trading Platform.

There are different types of external management of NPLs, which we can distinguish into two main categories:

1) NPLs disposal

The disposal of NPLs represents a decisive strategy for banks wishing to rid themselves of non-performing exposures and transfer their ownership to other parties; indeed, this method allows for the divestment of these exposures.

Transferees can be of different types, depending on the assigning bank's strategic and resolution choices:

Private investors

They represent an important segment in the NPLs market. They can be high net worth individuals or investor groups including private equity or hedge funds.

Sovereign funds

Some sovereign wealth funds may express interest in acquiring non-performing loans as part of their long-term investment strategy. These funds, under the management of State Governments or Sovereign Entities, may look for investment opportunities in various areas and asset types, including non-performing loans.

Bad Banks

Under certain circumstances, banking institutions may opt to transfer their non-performing loans to a “bad bank”, i.e. a vehicle created specifically to collect NPLs or other risky loans often established by a government. These entities have the specific objective of administering poor-quality loans to enable the acceleration of the financial recovery process and the recovery of the capacity of “healthy” banks to lend again.

Asset Management Companies (AMC)

These companies play an important role in the banking system, since through the purchase of problematic assets held by banks, they clean up their balance sheets.
There are four types of AMCs, namely:

- *Single name AMC:* NPLs management carried out at the individual bank level and without third-party support;
- *Privately / publicly funded Single name AMC:* management at individual bank level but with public support or opening to the private sector;
- *Leveraged pooled AMC*: Bad bank system financed or participated in by the state;
- *Private pooled AMC*: bad bank system without public support.

Alternative investment funds (AIFs)

These are funds with differentiated investment strategies, to which the bank can sell a portfolio of NPL / UTP loans for a fee (fair value). The AIF then uses independent advisors to issue units to private or institutional investors. An important role is played by the Special Servicer[25], which carries out credit recovery support activities and above all ensures the performance of the fund.

2) NPL securitization

The securitization process is the most popular external management strategy. What characterizes it is the transfer of credit risk to the investor market.

[25] The "*Special Servicer"* is a specialized intermediary acting between creditors and debtors in difficulty, performing portfolio management activities. It is also the entity in charge of collecting transferred loans and providing cash and payment services.

Technically speaking, securitization represents a way of transferring one or more loans for a consideration. In more detail, the creditor transfers its receivables to the assets to a *Special Purpose Vehicle* ("SPV").
In order to pay the purchase price of the receivables, the SPV issues securities, effectively transforming the debt into securitized financial instruments.

2.2. A focus on securitization

Among many functions, banks carry on important activities: risk assessment and its ex-post monitoring. Once the institution has assumed credit risk, constant monitoring of the risk position is carried out in order to avoid opportunistic behavior of the borrower (the so-called "*moral hazard*") and verify the customer's ability condition.
At the end of the assessment activity, positions are classified as "*performing* ("in bonis")", if the judgment on the reliability of the borrower and the credit remains unchanged, or as "*non-performing*" loans, if an anomaly has been recorded.
In the presence of anomalies, the bank may use one of the above-mentioned methodologies. Among the most popular ones we certainly have securitization operations. In particular, the securitization market has grown exponentially in recent years. The success of such transactions is due to the set of theoretical benefits that originator banks can access. Through securitization, a bank can:

- Reduce the cost of fundraising;
- Improve risk management;
- Increase profitability.

The achievement of these potential benefits derives from the quality of the assets underlying the transaction. In turn, quality appears to be linked to the credit and underwriting risk management of the assets themselves. Here we find the downside: the consequences for bank performance are, sometimes, adverse for institutions.

In the following paragraphs we will take a close look at the securitization process, identifying its steps, advantages and any disadvantages or costs involved.

2.2.1. Definition and types

The financial technique of securitization has been popular since the 1980s in the United States, and then in the European Union since the 1990s. This process is defined as "an articulated transaction by which the bank can transform its illiquid assets into marketable financial instruments."
It thus represents a mode of bank funding through the sale of previously granted loans to third parties. In doing so, the bank does not create new liabilities, but disinvests loans and generates asset-based funding, based on the liquidation of assets. Therefore, through securitization, illiquid assets are refinanced through the issuance of potentially liquid, marketable *asset-backed securities* (ABS). This is why securitization is a technique that assumes relevance on financial balances, as a liquidity management tool. The object of securitization transactions can be both secured and unsecured loans, problematic loans but also outstanding loans.

A very important point to emphasize is that, in the case of nonperforming loans, the so-called financial practice of "*overcollateralization*" is used; the originator, because the loans in question are doubtful, will receive a lower transfer value than the face value[26] of the loan.

The actors involved in the process are the following:

[26] The "*face value*" (or *nominal value)* of a claim refers to the amount due at maturity. The notion expresses the financial value of an asset that can be exchanged or transferred.

1) Originator or transferor company

It is usually a bank, but actually this financial technique can theoretically be implemented by any enterprise. Obviously, by definition, a bank's assets consist mostly of loans in various forms, and it is therefore the main user of such a strategy.

2) The Intermediary

The intermediary is a purpose-built entity whose aim is to acquire the assets sold by the originator and then issue the bank-guaranteed securities in the market. Thus, its main function is to effectively separate the loans from the originator bank's balance sheet. This intermediary is a proper special vehicle company or issuing company, which has the name Special Purpose Vehicle (or also "SPV"). This entity is set up as an independent company in order to be isolated from possible bankruptcy risks of the originator; indeed, it takes the form of a "bankruptcy remote finance company," since the possibility of bankruptcy is very low or nonexistent. Between the originator bank and the transferee entity, a true sale takes place, thus a non-recourse assignment of loans. This means that the assignee will not have recourse against the assignor in case of insolvency of the assigned debtor.
In addition, the SPV will not be able to engage in entrepreneurial activities other than those for which it was established.

3) The investors

They are mainly institutional figures or financial intermediaries, as opposed to individual investors.

4) The Arranger

It is the person in charge of organizing the operation in every aspect.

5) The Loan Servicer

Also referred to as a "treasurer," the Servicer is responsible for the recovery and transfer of principal and interest flows produced by the asset portfolio. Its function is to collect and transfer monetary flows. Often this activity is carried out by the originator bank itself.

6) The Investment Bank

It deals with the placement of securities through public offering or private placement. In the former case, the securities are directly placed in the market, while in the latter case the securities will be placed with institutional investors.

7) Rating agency

It has the function of assessing the issuance of ABS.

8) The Credit Enhancer

Financial institutions that guarantee a percentage of ABS repayment.

9) The Swap Provider

They are counterparties of the SPV that offer hedging against certain risks, such as interest rate or foreign exchange risk.

There are many types of securitizations, distinguished by type of underlying asset or by structure and operation:

- **Traditional securitization:** is the most common one, discussed earlier in this thesis. The underlying of the transaction are ABS; investors are repaid according to them.

- **Synthetic securitization**: it is based on the use of particular derivative instruments ("*Credit derivatives*[27]") that allow one of the parties to purchase protection against the risk of default, transferring it to a counterparty that decides to assume that risk upon payment of a premium. Therefore, the SPV acts as if it was an insurance company; it agrees to reimburse the originator if the borrower defaults, in exchange for the premium paid by the originator, the amount of which represents the hedging price.

- **Revolving securitization**: the SPV issues ABS containing assets sold and brought to maturity periodically as they emerge on the originator's balance sheet.

- **Securitization through "conduit":** loans are not sold to the SPV as is usually the case, but to another vehicle named "Conduit." The difference lies in the type of financial instrument: no ABS are issued but ABCP, or "*Asset Backed Commercial Paper*" with a maturity of one year or less.

- **"Repackaging" securitization:** in this technique the subject of the sale are securities generated by a previous transaction. The securities, which are called CDOs ("*Collateralized Debt Obligation*"), are already securitized assets that are bundled together again and resold in the form of new financial instruments. This type of transaction is bullet type, meaning that it involves a repayment schedule with no amortization (that would be with progressive repayment); the principal is repaid in one payment when the security matures.

- **Self-securitization**: in this type of securitization, the securities issued by the SPV against the loans sold by the bank are not placed on the market but are fully subscribed by the bank itself. Therefore, there is no transfer of credit risk; it remains entirely with the bank that carried out the transaction, almost as if it were an internal management strategy.[28]

[27] "*Credit derivatives*" are instruments such as swaps, options, futures, forwards, which allow to isolate and trade the credit risk of a financial asset without the asset itself being transferred.
[28] Bank of Italy "*Annual Report 2008*".

2.2.2. Regulation

In Italy, the securitization transaction is regulated by Law No. 130 of April 30, 1999. This legislation establishes the rules and structures through which these transactions can be carried out.

Below we identify the key points:

1. *Scope of application*: the law applies to credit securitization transactions, including those carried out through the assignment of both existing and future pecuniary claims, whether identifiable or in bulk;

2. *Operation schedule:* transferee companies must prepare a prospectus containing details of the transaction, including receivables and financial securities issued;

3. *Credit securitization companies:* this article identifies the characteristics of the assignees, which must be specific companies with the sole purpose of carrying out the transaction. Loans, collections, and financial assets must constitute separate assets, protected from the actions of other creditors. In addition, the sums paid by the assigned debtors must be used to fulfill the obligations embedded in the issued ABS, to finance the purchase of the loans, and to cover the costs of the entire transaction;

4. *Modalities and effectiveness of the disposal:* it regulates the modalities of transfers, including rights and protections for transferees and assignees;

5. *Discipline of ABS and financial securities*: it regulates the issuance by transferee companies, specifying that certain limits and prohibitions typical of other forms of financing do not apply. In the case of securities offered to the public, the transaction must be subject to evaluation by rating companies (third-party operators);

6. *Fiscal and financial provisions:* it provides tax and accounting specifications related to the transactions, including favorable tax treatments and accounting rules for impairments;

7. *Other operations:* This article extends the applicability of the law to various other financial transactions, including those involving impaired loans and covered bank bonds.

In recent years, securitization regulations have undergone several changes. Law No. 96/2017, (converting DL No. 50/2017), introduced the Article 7.1, which regulates the securitization of impaired loans by banks and financial intermediaries. Specifically, the introduced provisions allow securitization companies to offer financing to improve the recovery of NPLs and facilitate debtor resolution by entrusting the management of loans to banks or financial intermediaries.
The law also simplified procedures for the assignment of impaired loans, requiring the publication in the Gazzetta Ufficiale to be legally effective, based on Article 58 of the "Testo Unico Bancario," and allowing specific legal effects for such assignments.
Further changes were made by Law No. 45/2018 and Growth Decree 2019 (DL No. 34/2019), which introduced, among other things, the so-called "real estate securitizations," through *Real Estate Owned Companies* ("ReoCo") to manage and enhance the value of real estate and assets securitized loans and allow limited liability companies to issue bonds if subscribed by securitization companies reserved for qualified investors.

Finally, the 2019 Budget Law clarified that the securitization rules also apply to transactions carried out through financing to the originator (sub-participation) and extended the rules to securitization of proceeds from real estate and other assets.

The framework was also extended at the European level through Regulation (EU) 2017/2402, (so-called "Securitization Regulation"), which came into force on January 1st, 2019, and was subsequently amended by Regulation (EU) 2121/557, on March 31st, 2021.

This Regulation established a unified regulatory framework for securitization, ensuring its uniform application in all member states. This Regulation has played a crucial role in promoting these transactions at the European level, helping the development of the securitization market.

2.2.3. The process: structure and stages

Let's now analyze the process of a traditional securitization and understand its structure. The process involves a set of assets, which includes predetermined or determinable cash flows and their transfer to the SPV. Typically, the vehicle issues tranches of securities, characterized by different levels of risk or duration. Based on increasing risk ranking, tranches can be investment grade ("senior tranches"), "mezzanine," followed by a tranche of unrated subordinated securities ("junior"). This subdivision allows risk to be spread and relocated to counterparties. To obtain high ratings for the securities generated by the securitization, the SPV benefits from credit enhancement, a significant portion of which comes directly from the originator bank. This support can be provided through various tools, ranging from letters of credit to the purchase of a majority share of the "junior" securities issued by the vehicle.
Below we can find a diagram of the typical structure of a securitization transaction:

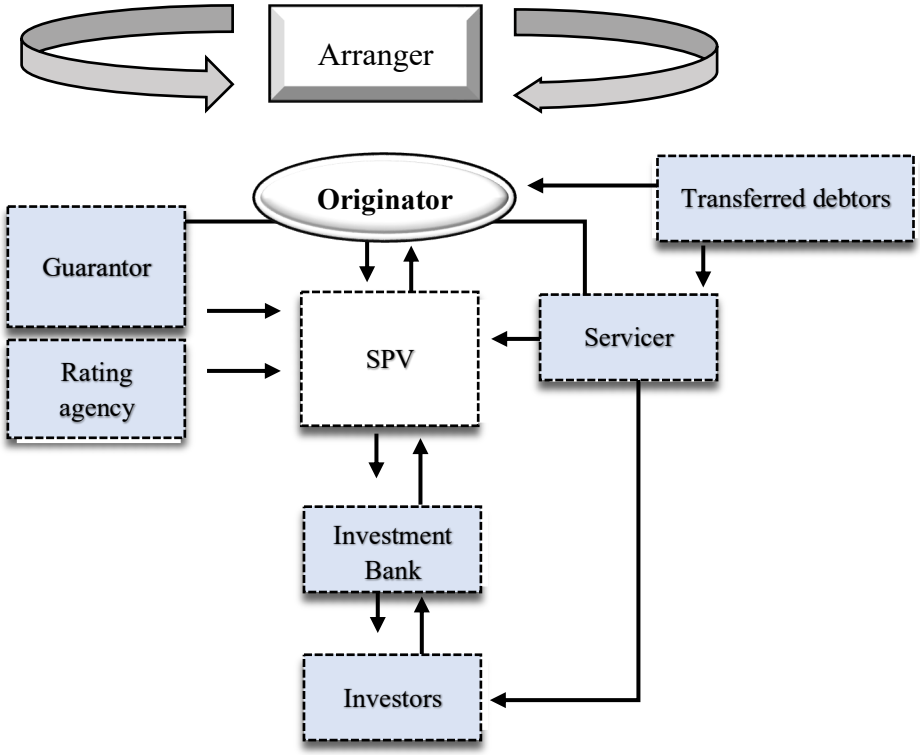


Figure 2: Outline of a traditional securitization

The operation can be divided into three main stages:

(1) Identification and aggregation of the portfolio of assets to be securitized;

(2) Disposal of assets;

(3) Issuance of securities.

For portfolio identification, it is essential to choose assets (typically loans) that produce periodic cash flows, with homogeneity requirements. The most common transactions are disposals of portfolios of mainly mortgages, but also consumer loans, leases, and disposals of nonperforming loans. A large part of the success of the transaction depends

on this stage, and it is important to select assets with a similar profile in terms of duration, rate terms, and repayment schedule.
After that, the selected portfolio is transferred from the originator to the Special Purpose Vehicle. The latter, accordingly, will issue the ABS representing the acquired assets and place them on the market of private and institutional investors, subject to a rating to facilitate their placement.
From the sale of the securities, the securitization company will obtain resources to finance the purchase of the transferred receivables. Cash flows from the management of the portfolio of transferred loans will be used to pay interest and principal of the securities issued by the SPV.

If we talk about securitization of non-performing loans, there are some key points and differences to highlight compared to a securitization of "*in bonis"* loans.
First of all, traditional securitized loans are usually loans that generate regular cash flows and are considered performing, meaning the debtors are actively repaying according to the terms of the loan. On the other hand, NPEs are defaulted or non-performing, which means that debtors have stopped making regular payments for a significant period.
In addition, due to the uncertain nature of NPLs, the securitization of these loans carries more risk than securitization of standard loans. As a result, investors may demand higher returns to compensate for the additional risk.

One important point concerns the structuring and pricing of securities; the valuation and structuring of NPLs securitization transactions can be more complex than for standard loans. This stems from the difficulty in assessing the probability of recovery of NPLs and the time it takes to recover them. Therefore, structuring such transactions requires more sophisticated pricing methods and risk mitigation techniques.

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Another topic to emphasize is the concept of investor remuneration in the case of NPLs securitization. Remuneration to securityholders depends on the recovery of loans from the assigned debtors and their guarantors. In this context, the legal procedure for debt recovery becomes crucial. It is not only about getting the money, but also the time taken for recovery is fundamental. This affects the amount of money the securitization company can actually provide as remuneration to the investors of its securities.

In addition, if loans are recovered faster than expected, the company can remove these loans from its balance sheet, improving its financial position. However, one cannot simply write off a receivable without extensive legal and accounting evaluations that take into account the minimum secured value, such as the mortgaged property; the debtor's assets and the collateral provided are essential to the securitization company, as they are the security of the loan recovery. Thus, any decision to reduce the value of a loan on the balance sheet must be justified by rigorous legal and accounting assessments. This is important not only for the company itself but also for transparency to investors and regulators.

2.2.4. Factor of success and possible risks

For sure, the securitization process enables numerous benefits for banks. These financial opportunities explain the remarkable growth of such transactions in recent decades and extend to both originating banks and investors in the financial market.
Through this process, an originating bank has the ability to convert loans previously frozen on its balance sheets into liquid assets. This conversion of traditional loans into external income streams allows banks to significantly improve the profitability of their

capital by reducing the amount of capital required in reserves, while allowing for greater operational efficiency.
Reducing the costs associated with raising funds is another important benefit for banks. Through securitization, institutions can access new sources of capital at a lower cost than through traditional funding channels. This fresh capital may then be used for various initiatives, such as developing new projects or services, expanding into new markets, or investing in new technologies, further fueling the institution's growth and innovation.

In terms of financial management, securitization allows banks to improve their liquidity and credit risk management. They can diversify their loan portfolios and reduce exposure to defaulted loans, thus contributing to a more stable and resilient banking system.

On the investor side, securitized assets represent an attractive option because of their potentially higher returns than other financial instruments similar in risk profile. This higher yield offsets the associated risks, such as the possibility of early repayment of loans or limited liquidity in the secondary market. In addition, the flexible structuring of these securities allows their adaptation to a wide range of investment objectives and preferences.
Securitization also brings benefits to borrowers, as it increases the general availability of credit in the market. Without the ability to securitize loans, banks may be hesitant to provide long-term financing because of the risk and impact on their balance sheets. Securitization, therefore, promotes access to credit for businesses and consumers, supporting the broader economy.

More generally, this financial technique manages to extend its benefits to the entire financial system, generating positive effects through:

a. The diversification of funding sources;

b. The introduction of new financial instruments;

c. Financial risk management;

d. The minimization of costs imposed in compliance with supervisory regulations.

Despite its numerous benefits, however, securitization requires careful consideration of the associated risks and prudent management. It is critical that banks maintain high standards of underwriting and that investors are fully aware of the characteristics and risks of the securities in which they invest. Only through careful evaluation and prudent management, the securitization process can continue to offer significant benefits to all financial market participants.

In addition, the transaction brings with it a significant increase in costs. Indeed, this technique can be costly and complex; in particular, fixed costs (e.g., investment bank fees, rating firms, guarantors, legal and accounting fees, internal guarantees, and administrative costs) are high.

To sum up, through securitization, a bank can: reduce the cost of funding, improve risk management, and increase overall profitability.

Let's deal with these three points one by one, analyzing benefits and potential risks:

1. The cost of financing

First, it is important to point out that the securities issued by the SPV can obtain a higher rating than the originator bank. Thus, securitization should allow banks to raise funds in the capital market at a lower cost; the cost of funding is reduced because the assessment by the rating agency with respect to the creditworthiness of securitization-derived securities is independent from the financial condition of the originator bank. This rating is based on the expected performance of the underlying asset pool and the credit enhancement obtained.

In addition, entering the securitization market gives the bank access to a wide choice of sources of funds; the best solution will be selected based on an all-in-cost comparison.

Nevertheless, the bank's access to the market could be hindered if there are abnormal items. This could require taking on high levels of credit risk to obtain "investment grade" ratings and thus a significant increase in the cost of this source of fund raising. In addition, an over-reliance on securitizations could override other forms of funding and lead the bank to ignore some traditional ones such as deposit-taking. The resulting consequence is the disruption of cash flows associated with them and thus the reduction of the institution's liquidity, which could lead to huge critical issues.

2. Risk management

Securitization offers banks the opportunity to reduce their risk exposure. This is achieved by transferring a portion of the default risk (the “unexpected” portion) to lenders and outside investors.
However, this process is not free from some potential risks. Those risks have been highlighted by several research, including studies of Diamond (1984), Gorton and Pennacchi (1995), and Keys et al. (2008).

First of all, management may be incentivized to so-called "cherry-picking": this phenomenon refers to management's incentive to select only the best quality loans for securitization, creating a portfolio that is not representative of the entire exposure and also leading to an implicit buyer's choice after the transaction itself.
Additional risk is that of a loosening of selection criteria; securitization could cause a loosening of both the selection of borrowers and the monitoring of the customer lending process.

3. Profitability

Finally, securitization provides access to multiple channels that enable banks to increase profitability, for example through more prudent choice for funding sources and better risk management. In terms of operational strategies, securitization offers banks the opportunity to outsource, on an ongoing basis, the operations characterized by a competitive disadvantage such as fundraising, focusing and keeping in-house those operations that generate greater value added, like promotion and debt servicing.
This approach allows originator banks not only to get fees and thus earn income by maintaining servicing on transferred debt, but also to deploy the additional capital from securitization to finance expansion goals or to reduce existing debt, potentially increasing profit margins.

Researches such as the study of Cebenoyan and Strahan (2004) have shown that banks tend to invest the benefits of securitization in more profitable but also riskier assets, operating with higher leverage.

Purnanandam (2009) reports further evidence, which can demonstrate how banks, in this case U.S. banks, have used proceeds from securitization transactions to lend loans characterized by higher-than-average levels of default risk.
In particular, this study highlights how, prior to the 2007 subprime crisis, banks that had made extensive use of risk transfer techniques experienced significantly higher loan impairments in the post-crisis period.
These observations show how both the theoretical literature and empirical analyses provide different results regarding the impact of securitization transactions on the performance of originator banks.

In conclusion, while securitization undoubtedly offers a number of benefits to financial institutions, including increased liquidity, more efficient credit risk management, and the ability to expand operations without placing an undue burden on balance sheets, it is critical to also recognize the significant risks that this technique entails. These hazards include exposure to high default risk loans, excessive leverage, and the potential creation

of financial instability, as demonstrated by the 2007 subprime crisis. Therefore, it is crucial that banks and regulators maintain a delicate balance between exploiting the opportunities offered by securitization and managing the risks associated with it. By implementing appropriate regulations and adopting prudent risk management practices, the banking industry can continue to benefit from the opportunities provided by securitization while minimizing problems to overall financial stability.

2.2.5. Theoretical impact on banking performance

The securitization process has been the subject of considerable debate regarding its impact on bank performance. This discussion has been enriched by numerous studies aiming to unravel the multiple effects of securitization on financial institutions.
Here is a summary of some fundamental studies to shed light on the nuances of securitization's impact, providing a more comprehensive understanding of its role in banking operations, risk management, and profitability.

A first study that should be mentioned is the analysis by Sarkisyan et al. (2009). This paper examines the landscape of U.S. commercial banks from 2001 to 2008. It critically examines the dual nature of securitization, initially perceived as a way to improve profitability and risk management. Using a Propensity Score Matching approach[29], the research constructs a hypothetical scenario representing the operational dynamics of banks in the absence of securitization. The results demolish the expectations surrounding securitization, revealing no substantial evidence that it significantly influences bank performance. Banks engaged in securitization showed higher profitability metrics but simultaneously sustained an increase in credit risk and financing costs. This paradox highlights a critical assessment of securitization's value proposition, suggesting that the

[29] "*Propensity score matching"* (PSM) is a method used in statistics to approximate the impact of a treatment, policy, or intervention by considering the variables that influence the likelihood of receiving the treatment. PSM aims to minimize the bias arising from confounding variables in the assessment of the treatment effect, which could occur if one were to directly compare outcomes between the group that received the treatment and the group that did not.

allure of securitization in enhancing performance might be overestimated, prompting a reevaluation of the strategic motivations behind banks' trend toward these activities and their broader systemic implications. However, the results of this first study could be largely influenced by the 2008 crisis. Therefore, it is necessary to analyze more recent studies.

Considering studies closer to us, we notice either a change in trend or a reconfirmation of the above hypothesis, depending on the analyzed pool of banks.
Abdelsalam et al. (2020) provide a critical analysis of the impact of securitization on financial stability and risk profiles of banks, examining an international pool of commercial banks in 21 countries from 2003 to 2012. This study reveals the precarious dimension of securitization, associating it with an increase in risk behaviors and an evident erosion of financial stability. Interestingly, the analysis diverges to assess the performance of Islamic banks within the realm of asset securitization, discovering a unique resilience characterized by superior asset quality in the face of lower cost efficiency, particularly during financial difficulties. This divergence underlines the heterogeneity of securitization's impacts, depending on the contractual structures and the overall situation in which the bank operates.

In contrast, Bakoush et al. (2018) conducted an empirical investigation into the mechanisms through which securitization influences bank profitability. Their analysis, enriched by an in-depth understanding of the transmission channels of securitization (including bank risk, liquidity, cost of funding and regulatory capital) paints a comprehensive picture of its ability to increase profitability. By analyzing the direct and indirect effects of securitization, the study quantitatively demonstrates the technique's positive impact on profitability. This exploration not only affirms the instrumental role of securitization in managing the financial landscape, but also highlights its strategic utility in managing the intricate interdependencies between risk and regulatory frameworks, laying the groundwork for a detailed understanding of its multiple benefits.

Furthermore, in a complementary way, Ishak et al. (2021) analyze the Southeast Asian banking sector's engagement in securitization between 1998 and 2018. Their research

highlights a positive trajectory, linking asset-backed securities with an increase in return on assets (ROA), thus emphasizing the role of securitization in amplifying profitability. This study meticulously reveals how securitization facilitates banks in the liquidation of their loans, thus tracing a liquidity transformation profile that reshapes the traditional banking model.

Together, these studies build a detailed picture of the role of the technique in banking, crossing the themes of profitability, risk management and financial stability. Taken together, they underline how the approach to securitization needs to be calibrated, balancing its potential benefits against increased risk and systemic implications. In a changing banking landscape, these insights provide key reference points for both investors and originator banks as they navigate the complex field of financial innovation.

The intricate overview of the results discussed paints a complex and dynamic portrait of the impact of securitization on the banking sector. The exploration of different geographic regions, banking systems and periods provides a varied understanding of the two-sided nature of securitization. The conclusion drawn from this comprehensive analysis underlines the importance of an informed approach to securitization, recognizing its potential to increase profitability and the risk scenario, but also its limitations and the challenges it presents to financial stability. Securitization, as highlighted by Sarkisyan and Bakoush, offers banks a strategic way to increase profitability. The ability to convert illiquid assets into marketable securities can significantly reduce funding costs, improve liquidity and potentially increase financial returns. These advantages, however, are not without their downsides. The increased exposure to credit risk and higher funding costs, as identified by Sarkisyan, serve as a reminder of the trade-offs involved in leveraging securitization as a financial strategy.

Summarizing these results, the conclusion that emerges is that of cautious optimism. Securitization offers great potential as a financial innovation tool, as it provides pathways to higher profitability and efficient risk management. However, its implementation and impact are highly dependent on a myriad of factors, including regulatory frameworks, market conditions and institutional strategies. Banks and regulators are therefore called

upon to conduct a rigorous analysis of the potential risks and benefits, developing policies and practices that exploit its advantages while preventing its threats.
This duality underlines the need for banks to maintain a balanced and cautious attitude, ensuring that the pursuit of profitability does not inadvertently increase financial vulnerability.

2.2.6. European and Italian context

European and Italian securitization markets have undergone significant transformations in the last decade, responding both to the challenges posed by the global financial crisis and to regulatory changes aimed at revitalizing this financial practice for future growth. This summary draws on surveys and regulations to provide an overview of the main trends and forecasts for the securitization landscape in Europe and Italy in particular.

In the following, we will start by reviewing the main developments and innovations, whether instrumental or regulatory, aimed at boosting operations, both at European and Italian level:

1. <u>"Asset-Backed Securities Purchase Programme" (ABSSP):</u>

This asset-backed securities purchase programme was developed and issued by the ECB in November 2014. It aimed to purchase simple and transparent asset-backed securities to improve the functioning of the monetary policy transmission mechanism. Through this programme, the ECB indirectly supported the securitization market by providing liquidity and stabilizing asset prices, thereby encouraging new issuances in Europe and Italy.

2. SME Financing through securitization

An example of innovative use of securitization for SME financing is the involvement of the European Investment Fund (EIF) in guaranteeing portfolios of securitized loans to SMEs. This approach has allowed banks to free up capital and extend credit to SMEs, which is crucial for economic growth and development in Europe.

In this light, we can mention the paper "*Securitization of SMEs in Europe"* by Helmut Kraemer-Eis of the EIF. It summarizes the state and latest developments in the SME securitization market in Europe. The paper emphasizes the crucial role of these operations in providing SMEs with indirect access to capital markets, as these types of companies often face significant barriers to direct access. The paper explains how securitization can strengthen banks' ability to offer new loans by transforming illiquid SME loans into more liquid assets. Furthermore, the paper addresses common misconceptions about securitization, stating its potential to support economic growth if applied correctly. The recovery and development of the securitization market is linked to broader financial strategies such as the Capital Markets Union[30], which aims to improve financing options for SMEs.

The paper also focuses on regulatory changes and the need for a well-functioning securitization market to support SME financing, emphasizing the use of public resources to incentivize private investment in these enterprises.

3. Green securitization for sustainable projects

As a result of the growing focus on sustainability, there has been a move towards "green securitization" in Europe. These transactions involve the securitization of assets linked to renewable energy projects, energy-efficient real estate, or other green investments.

The European green bond framework shows a focus of the legislator on green securitizations, attempting to adapt existing rules for standard bonds to the peculiarities

[30] The "*European Capital Markets Union* (CMU)" project was initiated with an action plan in 2015 by the Juncker Commission. The aim is to create a single set of regulations for all European countries in order to create a single capital market.

of these operations. The aim is to reduce financial complexity in this area by adapting the mechanism of securitization proceeds allocation to European Green Bond (EuGB) standards, focusing mainly on green financing. The main feature concerns the allocation of proceeds from the sale of securitized exposures, which must follow specific guidelines to qualify as EuGB.

The asset eligibility rules and refinancing limits outlined in the EuGBR should be respected proportionally by originators, allowing for some flexibility. However, the need for detailed and reliable reporting for securitization underlying still poses challenges to the applicability of this regulation to traditional operations. Current contractual practice and disclosure requirements still represent significant obstacles for small green project originators in accessing credit, but there are encouraging signs pointing in the right direction.

4. "Garanzia Cartolarizzazione Sofferenze" (GACS)

In Italy, in response to the financial crisis and the subsequent European sovereign debt crisis, banks have increasingly turned to securitization as a means of releasing non-performing loans from their balance sheets. A significant example is the “GACS” (*Garanzia Cartolarizzazione Sofferenze*) scheme, introduced by the Italian government in 2016. This State guarantee mechanism for the tranches of NPL securitizations has facilitated several significant transactions, allowing banks to improve their financial health and lending capacity and has now become an important tool in securitization transactions (see section 2.2.7).

2.2.7. GACS and its cost

The concept of the "Guarantee on Securitizations of Non-performing Loans" (GACS) refers to a strategy adopted by the Italian government to address the problem of non-performing. This strategy involves the introduction of a guarantee mechanism that allows banks to separate non-performing loans from their balance sheets, facilitating their sale and management.

Decree-Law No. 18 of 14th February 2016 introduced the GACS, explaining how the guarantee mechanism works, providing a legal and commercial analysis, and also considering the chances of success of this instrument.
The Decree, in particular Article 5, states that in order to obtain a government guarantee on senior securities, the latter must have obtained an investment grade rating from a credit assessment agency (ECAI) recognized by the European Central Bank by 1st January 2016. If required, two ratings must both meet the minimum investment grade criteria, with the second being provided by an ECAI registered under Regulation (EU) 1060/2009. Alternatively, a private rating for the Ministry of Economy and Finance may be accepted, if the rating agency is approved by the Ministry and chosen by the originator bank from among those recognized by the ECB.
The Article also states that rating costs must be paid by the originator bank or the transferee company, which undertakes to maintain the rating until the senior securities are fully repaid. In addition, the NPLs servicer must be different and independent from the originator bank, with the specification that a change of servicer must not adversely affect the rating of the senior security.

Article 9 of the same law analyses guarantee costs; to establish the cost of the State guarantee, three groups of Credit Default Swaps (CDS) are used, based on the rating of Italian issuers assessed by S&P, Fitch Ratings, or Moody's. The groups are defined by rating: the first for ratings BBB/Baa2 to BB+/Ba1, the second for BBB+/Baa1 to BBB-/Baa3, and the third from BBB/Baa2 to A-/A3, depending on the ratings of the senior securities.

The annual cost of the guarantee is calculated at market conditions through a formula that considers the average of CDS prices over the six months prior to the guarantee request, using data from the Bloomberg platform. Furthermore, the cost varies over the different years: for the first three years it is based on the three-year average, for the following two years on the five-year average, and for the following years on the seven-year average. Further adjustments to the cost are made for the fourth and fifth years, and for the sixth and seventh years if the senior securities have not been fully repaid by the due date.

GACS aims to stimulate the market for non-performing loans in Italy by offering State guarantees on securities issued by impaired loan management companies in order to make the purchase of these securities more attractive to investors. Under the scheme, the State provides guarantees on the financial instruments issued by the banks, covering the less risky tranche of debt resulting from the securitization of NPLs.

Since its launch, GACS has allowed Italian banks to get rid of €117 billion in bad debt, mitigating the negative impact on their finances.
Analysts see GACS as a useful tool for the Italian banking sector and for the development of the securitized debt market, despite the fact that the volume of non-performing loan securitizations is expected to decrease in the coming year. The reason is that banks have already significantly reduced their NPLs due to the good economic conditions in recent years, which have limited the build-up of new non-performing loans. Moreover, there is relatively less regulatory pressure to sell, despite the new hedging measures.
The scheme was therefore introduced into the Italian legal system with the Gentiloni government in 2016, following special approval by the European Commission; the initial validity was 18 months, but it was extended until March 2019. After that, with some modifications, the GACS was renewed through Decree-Law No. 22 of 25th March 2019, converted by Law No. 41/2019. Finally, with the Minister of Economy and Finance's decree of 15th July 2021, the GACS's operability was further extended until 14th June 2022, the scheme's official expiry date.

As of today, the measure has not yet been renewed, but could be soon, since it is an indispensable tool - according to bankers and investors - for divesting new flows of NPLs.

In fact, negotiations are underway with the EU authorities to renew the scheme, with Italy proposing a stricter version of the programme with more stringent conditions; in Brussels, the authorities are considering: (i) reducing the guaranteed coverage for the senior tranche of securitizations from 100% to 80% and (ii) imposing stricter controls on the performance of recovery plans by servicers.
On the other hand, the idea of extending coverage also to loans classified as Unlikely to Pay remaining on banks' balance sheets continues to be considered unrealistic. Both the European Union and the Italian State agree in rejecting the coverage of UTP credits under the GACS. This exclusion reflects the shared fear that including UTP credits under state protection may lead analysts and rating agencies to equate them with NPLs due to the similarity in treatment they receive.

The discussion on a possible renewal of the GACS is indicative of the continued focus of Italy and the EU on the issues of non-performing loans and financial stability. Reducing the risk for taxpayers and supporting banks in coping with the expected increase in unpaid loans as a result of the pandemic and the energy crisis are among the key objectives of the ongoing negotiations.

To summarize, GACS represent an important tool for Italian banks to address the problem of non-performing loans, facilitating their sale and making the investment safer and therefore more attractive to the market, thus contributing to the stabilization of the Italian banking system.

CHAPTER 3

THE FINANCIAL IMPLICATIONS OF NPLS SECURITIZATIONS

3.1 Aim of the analysis

The following analysis focuses on the impact of securitizations on banks' financial statements. The purpose is to understand the changes in key ratios and items related to the holding of NPLs and to identify the possible benefits and costs of a loan sale.

In particular, I decided to focus on a recent multi-originator securitization, called "BCC NPLs 2022". This transaction involved 71 banks, including 68 belonging to the BCC Iccrea group, joined by Banca Valsabbina, Banca di Credito Popolare and Cassa di Risparmio di Asti.

The analysis is first focused on the entire transaction under consideration, using the key metrics of all the banks that participated in BCC NPLs 2022; through a fixed-effects panel regression analysis, the NPLs/ROE relationship is examined, reducing the size effect of banks.

Following this analysis, we move from the macro to the micro, through the study of one specific bank: Banca Valsabbina. I decided to analyze this institution because it is one of the three banks that is not part of the BCC Iccrea Group, in order to eliminate the risk of "influence" on the financial statement values resulting from being part of such a large banking group. To observe the outcome of the transaction on the financial results, I needed a sufficiently independent bank whose performance could not be affected by additional factors (e.g. synergy costs, shared operations, other common costs).

The goal is reached through an in-depth study of the bank's financial statements before and after the transaction, and a broader analysis over time.

Hence, the study is divided into three parts: Panel Regression Analysis of the transaction, Banca Valsabbina pre-securitization financial analysis and Banca Valsabbina post-securitization financial analysis, with a final comparison between the bank’s key metrics

(ROE, ROA, Cash & Cash Equivalents and Operating Costs) over five years, from 2017 to 2022, to observe how the performance of the bank aligns with the level of non-performing loans recorded on the balance sheet.
The purpose of the first part is therefore to study the effects of the transaction as a whole, in order to reach a general understanding of how a securitization transaction works. Specifically, this allows us to determine, or not, the existence of a correlation between Gross NPL Ratio and bank performance (ROE).
The intent of the second and third part is, instead, to observe changes on the financial values of the bank under consideration, while the last part allows to understand how the presence of non-performing loans may impact the earnings of the banks, to analyze whether the benefit of a securitization also extends at the profitability level.

Therefore, the research questions are: does a securitization transaction really bring tangible benefits to banks? Do these benefits stop at a fictitious improvement in cash, or does the operation also allow for an impact on other fronts, such as the overall profitability? And therefore, does a reduction in NPLs lead to an increase in ROE?

The data collected came directly from the financial statements of the analyzed bank, downloaded through the AIDA platform, specifically from the 2020-2022 financial statements for the entire banks pool and from the 2017-2022 financial statements for Banca Valsabbina.

3.2. BCC NPLs 2022

Between 2015 and 2022, a huge number of securitizations were successfully completed. Unicredit, with an operation of about €47 billion, MPS (for €43 billion), Intesa San Paolo (€25 billion), and Banco BPM (€19 billion) are just some of the Italian banks that have implemented de-risking initiatives of bank assets. These institutions have managed to generate additional liquidity by disposing performing loan assets, such as mortgages, leasing operations, and consumer loans, and especially to improve the level of capitalization by selling low-quality portfolios.

In Italy, this modality seems to be one of the few remaining ones capable of strengthening bank capital and containing banks' credit risk.
Therefore, the Italian government has launched a series of initiatives to encourage the development of these operations, including the release of a public guarantee on the SPVs issues that securitize NPLs.
Among recent securitizations, we can categorize the operation examined in this analysis as successful; the "BCC NPLs 2022" transaction is one of the most accomplished securitizations in recent years. The sale was finalized on June 29th, 2022 and resulted in numerous benefits for the banks involved. First, it should have enabled the reduction of the weight of non-performing loans on banks' balance sheets, succeeding in improving their capital strength and financial health. In addition, the transaction was expected to generate a capital gain for the originator banks due to the substantial inflow of cash into the banks' balance sheet assets.

The success of the transaction -and those similar to it- extends throughout the Italian banking system, as well-performed securitizations allow for a reduction in the overall level of NPLs circulating in the system.

3.2.1. Transaction overview

The "BCC NPLs 2022" securitization, assisted by GACS guarantee (70%), involved non-performing loans worth €644.5mln, originated by 5,700 borrowers.
The special servicer for the transaction was doValue S.p.A., which is a fully dedicated independent credit servicing and real estate platform. About the monitoring agent, Zenith Service S.p.A. was responsible for distributing the payment reports of the transaction and verify the cumulative collection ratio[31] calculated by the servicer.

[31] The "*Cumulative Collection Ratio*" refers to the percentage aggregate ratio on an Interest Payment Date, as specified in the Investor Report provided just before that date. It is calculated by dividing: (i) the total Net Collections received from the Issue Date onward, by (ii) the total Net Expected Collections anticipated to be received from the Issue Date onward;

The portfolio of loans sold was composed of:

- **Unsecured loans:** loans not secured by mortgage or pledge;
- **Secured loans:** secured by mortgages on real estate.

The secured part of the portfolio is made up of mainly residential (45.2%) and commercial/industrial (35.9%) properties in Italy, in particular North of Italy (45,5%). The portfolio's cut-off date is 31st December 2021 for the 78.5% of the pool, while the remaining 21.5% is between 31/03/2022, 06/04/2022 and 15/04/2022. The maturity of the notes is 31st January 2047.

ISSUER	TRANCHE	SIZE	SPREAD	RATING CLASS	RATING	OUTLOOK
BCC NPLs 2022 S.r.l	Senior Notes Class A	EUR 142M	6M* Euribor +0.5%	Non-Performing Loan	BBB(sf)	Stable
BCC NPLs 2022 S.r.l	Mezzanine Notes Class B	EUR 19.5M	6M Euribor +9.5%	Non-Performing Loan	NR	NR
BCC NPLs 2022 S.r.l	Junior Notes Class J	EUR 6.5M	15% + VR	Non-Performing Loan	NR	NR

* CAPPED AT THE RATE DESCRIBED BELOW AND FLOORED AT ZERO.

Table 13 - Source*: ARC Ratings*.

Specifically, the transaction was conducted through the securitization vehicle "BCC NPLs 2022 srl," established under Law 130/99, which issued three tranches of ABS[32] notes:

1) A *senior*[33] *tranche* of € 142mln, corresponding to 21.84% of GBV[34], which has been rated Baa1 (sf) and BBB (sf) by the agencies Moody's Italia and ARC Rating SpA, eligible for GACS;

[32] "*Asset backed securities (or ABS)"* are financial instruments, issued in securitization transactions, quite similar to regular bonds; the process of creating an ABS is the act by which a company carves off a series of loans from its balance sheet, "packages" them and sells them in the market through the vehicle, along with the cash flows they generate;

[33] "*Senior tranche*" refers to that portion of securitized assets that provides the lowest risk of default for underwriters and the highest priority of repayment;

[34] "*Gross Book Value*" (GBV) is the value of a loan before value adjustments, and is equal to the discounted loan amount;

2) A *mezzanine*[35] *tranche* of €19,5mln, corresponding to 3% of GBV;

3) A *junior*[36] *tranche*, not rated, amounting to €6.5mln corresponding to 1% of total GBV.

In particular, the rationale behind the BBB rating has been driven by ARC's expected recoveries from the asset portfolio, their timing and the real estate market situation. ARC Rating has compiled a list of strengths and weaknesses of the transaction, which I summarize in table 14 below:

Transaction streghts	Transaction weaknesses
1) Cash reserve *"A cash reserve representing 3.0% of the tot. outstanding balance of Class A protects the transaction from temporary cash shortfalls"*	**1) Real estate market liquidity risks** *Risk of fire sale*
2) High portion of real estate assets with updated valuation *"72.6% of the properties included in the secured non-performing loans segment have a valuation date within 2021 – 2022, while 11.2% were valued during 2020, and the remaining 16.2% between 2003 and 2019."*	**2) Appraisal Uncertainty** *"After repossession, the value of the properties can suffer a further adjustment due to continued deterioration of the asset which makes the appraisal value more volatile than in other cases"*
3) Properties and Debtors' location *In terms of GBV value, 20.8% is concentrated in Lombardia for a total of 45.5% in the North of Italy. "These regions are characterized by more active economic activities and more efficient financial system than in the rest of the country"*	**3) High proportion of commercial/industrial properties in a post – pandemic period**
4) Historical data received from the special servicer	**4) Costs incurred by the issuer in relation to the property acquisition**
5) Interest rate cap *"The SPV has entered into an interest rate cap spread mechanism which allows to receive the difference between 6 months Euribor and the strike price. The notional covers the balance of Class A Notes and amortizes as defined at closing. The 6m Euribor cap increases to 2.0% at closing in January 2034."*	
6) Real estate recovery in the next years	
7) Business plan and senior notes protection through performance triggers *The transaction documentation includes provisions for the case of underperformance of the special servicer that increase the funds available to redeem the Class A Notes at a faster pace.*	
8) Performance Incentives for the Special Servicer	
9) Portfolio Granularity	

Table 14 – Strength and weaknesses of the transaction. *Source: ARC Rating*

[35] "*Mezzanine debt*" is a financing instrument that ranks in terms of remuneration, repayment terms, and duration somewhere between venture capital and medium- to long-term loans.
[36] The "*junior tranche*" is repaid with secondary priority to the previous tranches.

3.2.2. The portfolio

The portfolio can be classified either by asset type or borrower type, depending on the percentage of the portfolio's GBV:

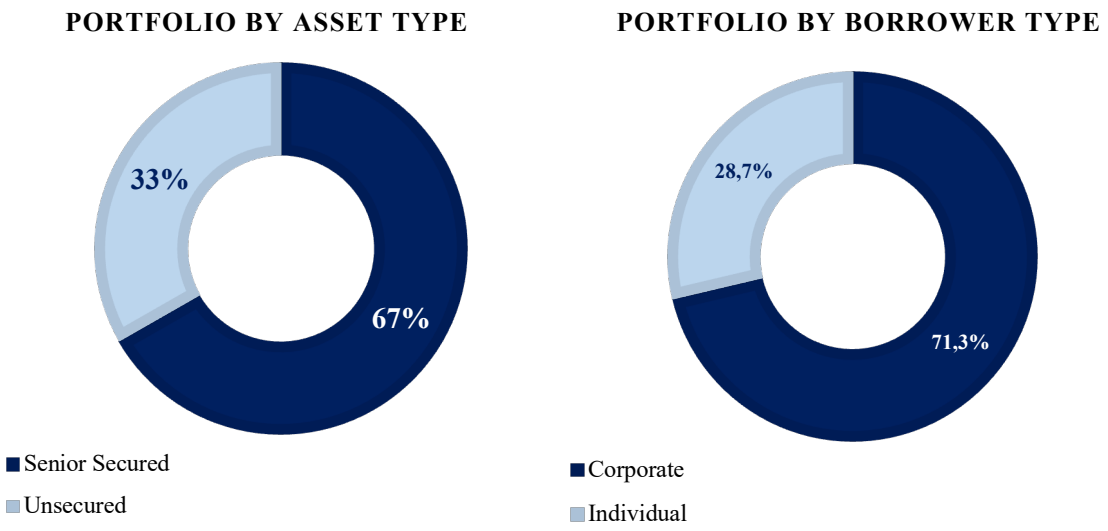

Chart 11-12: – Portfolio composition of "BCC NPLs 2022". *Source: ARC Rating*

According to ARC's perspective and the historical data supplied by the special servicer, recoveries tend to be higher in the initial years post-default (before tapering off). Consequently, the default date for each unsecured asset in the portfolio is crucial for determining the recovery rate assumption. The majority of loans defaulted in 2021, gradually decreasing to 11% in 2022.

Based on ARC reserch, the split by borrower's legal proceedings indicates that 14.4% of secured non-performing loan borrowers are undergoing foreclosure, with the majority (79.7%) involved in bankruptcy procedures based on the overall number of active proceedings.

The chart 13, derived from ARC's rating report, illustrates ARC's gross collection vector over the transaction's duration; the recovery timing has been stressed compared to that

presented by the servicer in the business plan. The stress applied to potential collections depends on the target rating levels, specific regional stresses, and the type of process. At transaction closure, the arranger reported €3mln in initial collections.

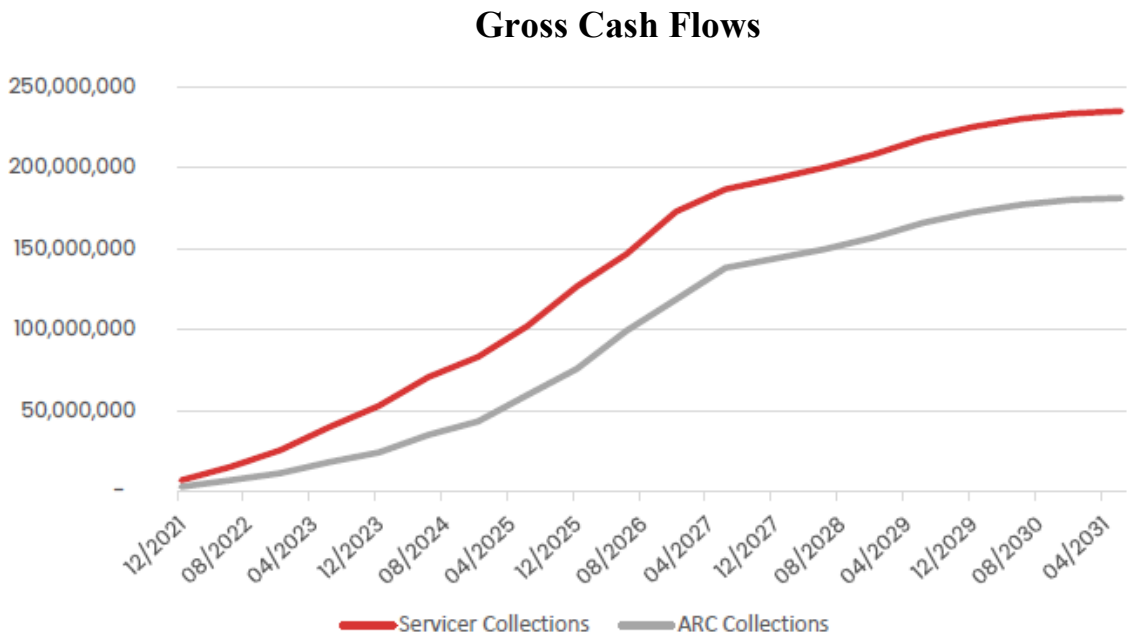

Chart 13: Servicer and ARC Gross Cash flows. *Source: ARC rating report*

For the analysis of Senior Notes (BBB (sf)), the total recovery rate was 28.3% with a weighted average life of approximately 5.3 years. Regarding the secured and unsecured NPL portions of the portfolio, the recovery rates were 40.6% and 3.9%, respectively.

The structure of the transaction, coupled with the rating assignment and the issuance of GACS, enabled the originator banks to obtain a higher valuation of the transferred non-performing loans than other alternative de-risking solutions without a government guarantee.

3.2.3. General results of the transaction: a fixed-effects panel analysis regression

The BCC NPLs 2022 transaction, as anticipated, has been classified as a successful transaction. To verify these positive results, in the next paragraphs we will tackle a deep analysis of the transaction, with the aim of assessing its real effectiveness.

A reduction in the stock of NPLs corresponds to a reduction in the Gross NPL Ratio. Such an improvement in the balance sheet of banks should lead to an increase in bank performance and the health of institutions, or at least that is what theory and studies on the phenomenon claim. The next paragraphs aim to empirically test this claim, first at the aggregate level, considering the pool of banks as a whole, then more specifically, with a pre- and post-transaction balance sheet analysis of one of the banks in the pool.

a) Introduction to the Panel Regression Analysis

In this first part of the analysis, the intent is to identify the relationship between Gross NPL Ratio of participating banks and their banking performance, using as a tool a fixed-effects panel regression analysis.
This model allows us to estimate, with the highest precision, the effect of a variable on a dataset, which is particularly useful for causal inference in the case of panel or longitudinal data studies, i.e., data that observe more than one unit simultaneously, over a period of time. Its importance in our study lies in its ability to isolate the effects of explanatory variables on the outcomes of interest.
The main assumption of this type of regression is unobserved unit-specific heterogeneity that is constant over time. This heterogeneity succeeds in being controlled by the inclusion in the model of a unit-specific constant in the analysis, which removes the effects of all time-invariant variables.

The purpose, in the specific case of our analysis, is therefore to quantify the change in y when variable x increases, using a control variable to isolate its effects. Fixed effects, in fact, remove all time-invariant variables that could be correlated with either the dependent or independent variables.
Such regression uses a transformation called "de-meaning": it allows each observation to be differentiated from the mean over all time observations for that unit. This type of transformation is capable of removing the fixed effects of the equation, allowing us to focus on the time variables for each unit.
In addition, once these fixed effects are removed, the model treats the errors as independent and homoschedastically distributed.

b) Research methodology

More specifically, the analysis was carried out with the following research methodology:

1) Identification of the 71 banks pool, with corresponding tax code.
2) Download, through AIDA[37] platform and banks' balance sheet of the ratios of interest for the regression model, such as ROE, Gross NPL Ratio and value of Total Assets for the three years of interest: 2020-2021-2022.
3) Creation of the CSV file to process the analysis, containing six columns: Bank Name, ID, Year, ROE, NPL Ratio and Total Assets (in logarithm).
4) Creation of the code to be used on the MATLAB programming platform for performing the fixed-effects panel regression analysis.
5) Reporting and interpretation of statistical results and presentation of the corresponding scatter plot.

[37] "*Analisi Informatizzata Delle Aziende Italiane*" (AIDA) is a platform that allows the research, consultation, analysis and processing of key economic-financial metrics and business information of all Italian Enterprises that have filed financial statements.

c) The variables under investigation

First, we identify the variables: the independent variable x is the Gross NPL Ratio and the dependent variable y is the ROE. This approach allows us to determine whether there is a dependence between the two metrics considered.
Finally, as a control variable, I used the value of banks' Total Assets as a proxy for bank size to reduce its impact. This size index was taken as a logarithmic value since in statistics many relationships are not linear; by transformation to logarithm, an exponential relationship can be converted into a linear relationship. In addition, by doing so, the variables scale down to a more comparable scale, making interpretation more straightforward.

The x variable, Gross NPL Ratio, represents the presence of impaired loans recorded by the banks under analysis in their balance sheets. In contrast, variable y aims to represent the bank's profitability; ROE is the key indicator of an institution's earnings strength.
These metrics have been taken into consideration for three years, from 2020 to 2022, to study the values before and after the adoption of de-risking policies in order to observe the impact and effectiveness of these operations.

The basic assumption is that there is an inverse correlation between Gross NPL Ratio and ROE; the hypothesis is based on the fact that a high level of NPLs should have a negative impact on ROE, generating a reduction in its value, and vice versa.

The equation of our fixed-effects regression is equal to:

$$Y_{it} = \alpha_i + \beta X_{it} + \gamma Z_{it} + \varepsilon_{it}$$

In which:

- Y_{it} represents the dependent variable (ROE) for entity *i* at time *t;*
- α_i is the entity-specific fixed effect *i* that captures unobserved, time-constant features for each entity;
- X_{it} is the independent variable (NPL Ratio);
- Z_{it} is the control variable (in our case refers to total assets used as the dimension variable);
- β and γ are the coefficients to be estimated;
- ε_{it} is the error term.

d) Analysis execution

The following table provides an excerpt from the database of banks that participated in the BCC NPLs 2022 transaction: the total number of banks is 71, but some cooperative credit institutions concluded merger transactions during 2022.
For example, BCC Calabria Ulteriore groups four institutions (BCC Catanzarese, BCC Vibonese, BCC Crotonese, BCC Cittanova), which are counted individually as participants in the transaction. Or again Banca Centro-Credito Cooperativo Toscana-Umbria, which merged Vival Banca.
The consequence of these mergers is reflected in the size of the database, which is reduced to 62 institutions; although the banks are counted individually, the balance sheets of the individual banks as of December 2022 cannot be found.

Bank _Name	ID	Year	ROE	NPL_Ratio	Total_Assets
Terre Etrusche di Valdichiana e di Maremma Credito Cooperativo	1	2020	0.0276	0.1135	6.160989252
Terre Etrusche di Valdichiana e di Maremma Credito Cooperativo	1	2021	0.0401	0.0859	6.469245273
Terre Etrusche di Valdichiana e di Maremma Credito Cooperativo	1	2022	0.1006	0.0604	6.434016584
Rivierabanca - Credito Cooperativo di Rimini e Gradara	2	2020	0.0538	0.0660	6.447804184
Rivierabanca - Credito Cooperativo di Rimini e Gradara	2	2021	0.0145	0.0460	6.47649716
Rivierabanca - Credito Cooperativo di Rimini e Gradara	2	2022	0.0827	0.0310	6.477193921
Emil Banca Credito Coperativo	3	2020	0.0646	0.0497	6.753501784
Emil Banca Credito Coperativo	3	2021	0.0530	0.0357	6.808251159
Emil Banca Credito Coperativo	3	2022	0.1420	0.0273	6.813598667
Credito Padano BCC	4	2020	0.0367	0.0974	6.275763615
Credito Padano BCC	4	2021	0.0330	0.0604	6.325882893
Credito Padano BCC	4	2022	0.0796	0.0335	6.326066187
BCC Valdarno Fiorentino	5	2020	0.0431	0.1047	5.363177468
BCC Valdarno Fiorentino	5	2021	0.0323	0.0662	5.41148502
BCC Valdarno Fiorentino	5	2022	0.0938	0.0485	5.392943042
Credito Cooperativo Romagnolo	6	2020	0.0065	0.1355	6.133612988
Credito Cooperativo Romagnolo	6	2021	0.0044	0.0961	6.165007968
Credito Cooperativo Romagnolo	6	2022	0.0884	0.0551	6.120738734
BCC Ravennate forlivese e imolese	7	2020	0.0649	0.0680	6.727519054
BCC Ravennate forlivese e imolese	7	2021	0.0602	0.0458	6.754626562
BCC Ravennate forlivese e imolese	7	2022	0.1567	0.0100	6.756212331
Credito Cooperativo Mediocrati	8	2020	0.0128	0.1220	6.041814535
Credito Cooperativo Mediocrati	8	2021	-0.0342	0.1080	6.04127383
Credito Cooperativo Mediocrati	8	2022	0.0975	0.0580	6.04058375
Banca di Credito Cooperativo del Friuli	9	2020	0.0716	0.0409	6.211507388
Banca di Credito Cooperativo del Friuli	9	2021	0.0704	0.0325	6.251757422
Banca di Credito Cooperativo del Friuli	9	2022	0.1150	0.0180	6.279215536
BCC Paliano	10	2020	0.0419	0.0604	5.360218403
BCC Paliano	10	2021	0.0141	0.0439	5.3986482
BCC Paliano	10	2022	0.0557	0.0380	5.393050223

Table 15 –Extract of the first ten banks from the complete database

As mentioned earlier, the database contains, for each of the 62 banks, the values of the variables under examination for the three years under consideration.

Once the database was created, I proceeded to create the programming code to run the analysis on MATLAB, software for numerical computation and statistical analysis. This platform allowed me both to obtain the key statistical results for the analysis such as coefficients and parameters and to represent them visually through a scatter plot.

The code itself consisted of six parts:

(1) Loading the database and checking column names

(2) Definition of the three variables: dependent variable x, independent variable y, and size variable

(3) Fixed effects model creation

(4) Visualization of the model outcomes

(5) Prediction of ROE values using the model

(6) Scatter plot representation

e) Presentation and interpretation of results

The findings of the analysis and subsequent interpretation are given below:

Estimated Coefficients:

	Estimate	**SE**	**tStat**	**pValue**
(Intercept)	0.40518	0.41919	0.96656	0.33571
NPL_Ratio	-0.41177	0.25306	-16.272	0.10633
Total_Assets	-0.050462	0.065254	-0.77332	0.44085
ID_2	-0.016126	0.042491	-0.3795	0.70499
ID_3	0.032297	0.050373	0.64114	0.52265
ID_4	-0.018032	0.041517	-0.43433	0.66483
ID_5	-0.053969	0.075644	-0.71346	0.47695
ID_6	-0.030155	0.043228	-0.69759	0.48678
ID_7	0.038916	0.048706	0.79899	0.42587
ID_8	-0.042684	0.045672	-0.93458	0.35188
ID_9	0.0010404	0.044236	0.023519	0.98128
ID_10	-0.083982	0.077302	-10.864	0.27947
ID_11	0.045021	0.044516	10.114	0.31388

ID_12	0.011242	0.041067	0.27375	0.78474
ID_13	-0.055526	0.057304	-0.96897	0.33451
ID_14	-0.043812	0.043698	-10.026	0.31807
ID_15	-0.022585	0.048985	-0.46107	0.64559
ID_16	0.022347	0.041015	0.54485	0.58687
ID_17	0.0085228	0.063829	0.13352	0.894
ID_18	-0.030777	0.043572	-0.70633	0.48135
ID_19	0.010235	0.049325	0.20749	0.83598
ID_20	0.044864	0.050684	0.88516	0.37784
ID_21	-0.1524	0.065867	-23.138	0.022379
ID_22	-0.069676	0.065744	-10.598	0.29136
ID_23	-0.016266	0.050987	-0.31902	0.75027
ID_24	-0.18791	0.041939	-44.805	1,71E-01
ID_25	-0.038796	0.05	-0.77592	0.43932
ID_26	0.088275	0.04491	19.656	0.051652
ID_27	-0.02023	0.042425	-0.47684	0.63434
ID_28	-0.032527	0.050054	-0.64983	0.51704
ID_29	-0.082099	0.083	-0.98915	0.32458
ID_30	-0.05623	0.057723	-0.97414	0.33195
ID_31	0.0088416	0.042911	0.20604	0.83711
ID_32	-0.021156	0.040996	-0.51605	0.60677
ID_33	-0.06474	0.043163	-14.999	0.13627
ID_34	0.028126	0.066713	0.4216	0.67407
ID_35	-0.01852	0.052135	-0.35524	0.72303
ID_36	-0.025906	0.050998	-0.50797	0.6124
ID_37	-0.042424	0.056795	-0.74696	0.45655
ID_38	-0.00035477	0.048806	-0.007269	0.99421
ID_39	-0.047623	0.052438	-0.90816	0.36561
ID_40	-0.069441	0.072164	-0.96227	0.33785
ID_41	-0.061068	0.057387	-10.641	0.2894
ID_42	-0.043952	0.063608	-0.69099	0.49091

ID_43	0.011198	0.043318	0.2585	0.79646
ID_44	-0.086971	0.090322	-0.9629	0.33753
ID_45	-0.057337	0.056491	-1.015	0.31216
ID_46	-0.14489	0.067554	-21.449	0.03398
ID_47	-0.019632	0.075	-0.26176	0.79395
ID_48	-0.012867	0.050286	-0.25589	0.79848
ID_49	-0.052929	0.051848	-10.209	0.30937
ID_50	-0.035289	0.042909	-0.82242	0.41247
ID_51	-0.033418	0.043008	-0.77704	0.43867
ID_52	-0.037573	0.081306	-0.46212	0.64483
ID_53	-0.021616	0.055633	-0.38855	0.6983
ID_54	-0.02052	0.050088	-0.40969	0.68276
ID_55	0.00060887	0.055427	0.010985	0.99125
ID_56	0.014599	0.043483	0.33573	0.73766
ID_57	0.0078108	0.05101	0.15312	0.87856
ID_58	-0.010405	0.043077	-0.24155	0.80954
ID_59	-0.023065	0.041631	-0.55402	0.5806
ID_60	-0.015941	0.042546	-0.37467	0.70857
ID_61	-0.020023	0.041708	-0.48009	0.63204
ID_62	-0.065363	0.051789	-12.621	0.20935
Year_2021	-0.021561	0.010464	-20.605	0.04151
Year_2022	0.043321	0.014746	29.377	0.0039655

Global statistics results:

Number of observations: 186, *Error degrees of freedom*: 120
Root Mean Squared Error: 0.0501
R-squared: 0.636, *Adjusted R-Squared*: 0.439
F-statistic vs. constant model: 3.23, *p-value* = 1.38e-08

Table 16 -Fixed-effects panel regression analysis output

1. Results of global statistics

Let's start by interpreting the latter values, i.e., the model statistics.
R-Squared is also called the coefficient of data determination: this measure assesses how much difference there is between the observed values of y in the sample and the values that the model estimated for y. In other words, it identifies the extent to which variation in the variable y can be explained by the regression line. In our case, the R-Squared takes a value of c. 0.64, meaning that the predictive power of the model is quite strong; 63.6% of the ROE variability is explained by the model.
The Adjusted R-Squared, on the other hand, is adapted for the number of predictors in the model and is less optimistic than the unadjusted R-squared; in our analysis, the result is c. 0.44.

The key result for the regression is that of the p-Value, which is equal to 1.38e-08. This metric represents the overall significance level of the regression.
The p-Value indicates the probability of obtaining results that are at least as extreme as those observed, assuming that the null hypothesis is true. In our case, the null hypothesis is that there is no statistically significant relationship between the independent and dependent variables. A p-Value less than 0.05 indicates that we can reject the null hypothesis.
This metric results in 1.38e-08; this means that it is unlikely that the observed result is due to chance and therefore the model is globally significant at the 95% confidence level.

In summary, it emerges that the overall significance of the model is high, as indicated by the F-statistic and the very low value of its p-Value, because the model explains a significant part of the variability in ROE.
In any case, the overall significance of the model does not allow us to say that every single independent variable is meaningful. Therefore, we need to go into more detail by going to analyze the estimated coefficients of the model and their significance.

2. Coefficients interpretation

The model's intercept represents the expected value of ROE when all independent variables are equal to zero; this metric turns out to be 0.40518.
We can see that its p-Value is relatively high; therefore, it turns out not to be statistically significant (p-Value = 0.33571), indicating that the intercept is not significantly different from zero.
An important result is that of the NPL_Ratio coefficient, which is -0.41177. It indicates that, all else being equal, an increase of one unit in the NPL Ratio is associated with a decrease in ROE of 0.41177 units. However, this effect is not found to be highly significant because of its p-Value.

In the table 16 we have four columns: the first represents the coefficients corresponding to each ID, which represents each bank in the pool for the three years. Then we turn to values such as the standard error (SE), which measures the mean distance around the regression line. The smaller this value, the more precise the regression analysis. Penultimate column identifies the t-Stat, which is a representation of how far the estimated coefficient deviates from zero in terms of standard deviations. Generally, the value is considered significant when it is found to be greater than 2. Finally, the last column is the p-Value.
In general, we move from more significant results to some that are not related at all.

Finally, we look at the variables called “temporal,” which are the last two lines in the table 16:

- Year_2021: -0.021561 (p-Value = 0.04151)

It suggests that in 2021 the ROE was 0.022 lower than in the base year. This effect is statistically significant.

- Year_2022: 0.043321 (p-Value = 0.0039655)

As before, it represents the ROE in 2022, which was 0.043 higher than the base year; this effect is also found to be significant.

f) Scatter plot

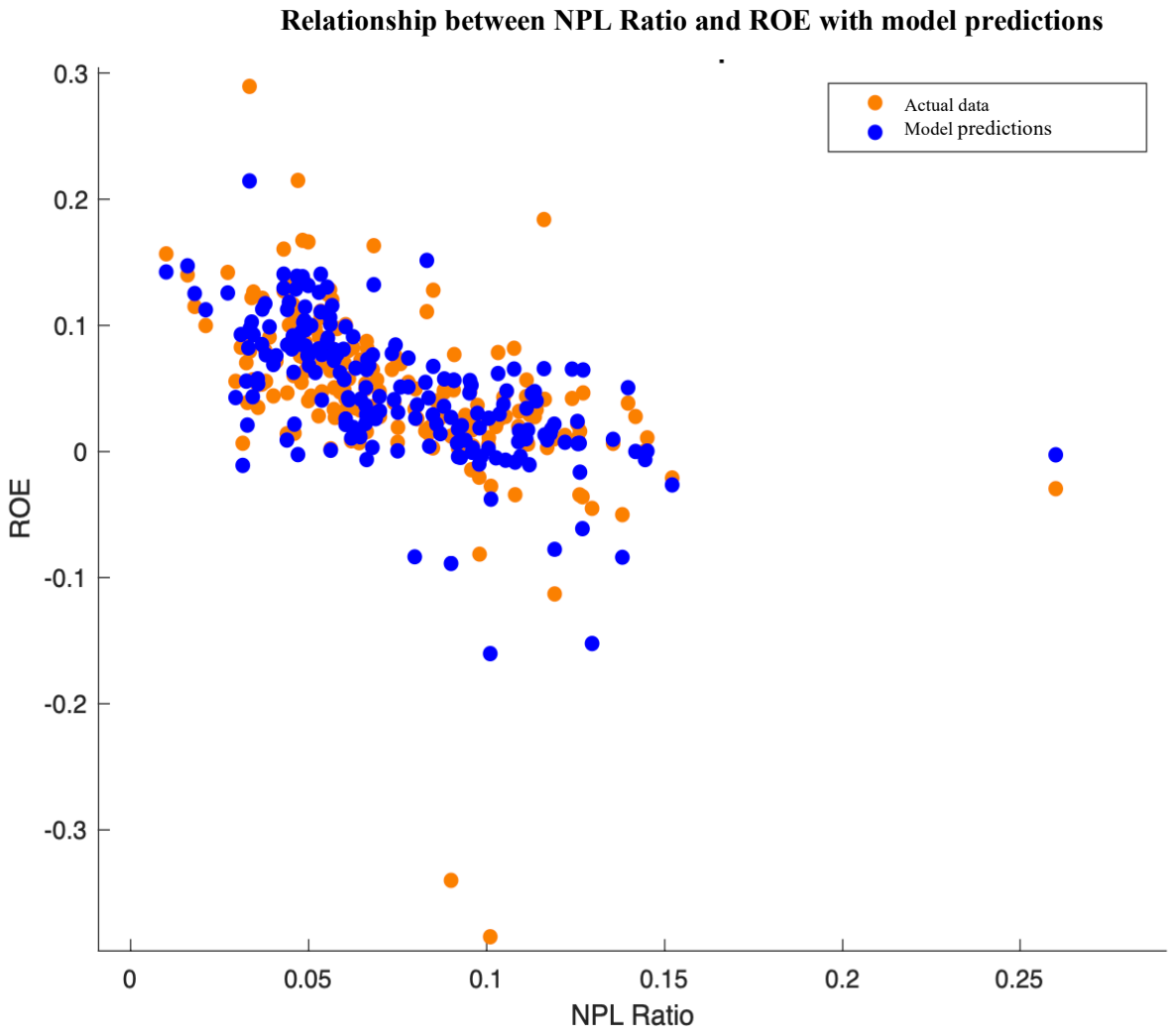

Chart 14 -Scatter plot representing the relationship between NPL Ratio and ROE with model predictions

The scatter plot visually shows the relationship between NPL Ratio and ROE for two sets of points.

The orange dots represent actual data i.e., observed values of ROE, corresponding to different levels of NPL Ratio. The blue dots, on the other hand, identify the model's predictions of ROE for the same levels of NPL Ratio.

From the orange dots we extract the general trend, which is that of visually observable negative relationship; as the NPL Ratio increases, ROE tends to decrease. This inverse relationship is consistent with the result of the negative coefficient of the NPL Ratio, which is -0.41177.
However, we note a scattering of points, indicating high variability in ROE; this suggests that the bank performance ratio cannot be explained by the NPL Ratio alone.

In addition, most of the actual data focuses:

- Between 0 and 0.15, for values of NPL Ratio;
- Between about -0.3 to 0.3, for ROE values, with higher density particularly between -0.1 and 0.1.

Concerning the blue dots, i.e., the model's predictions, they are distributed very similarly to the actual data. This observation suggests that our model is capable of capturing the general trend.
In particular, in the central region of the graph, we notice an overlap between the orange and blue dots; for those levels of NPL Ratio, the model has high predictive power for ROE values.

However, for very low values of NPL Ratio as well as for higher values, the predictions show more variability than the actual data. The divergent forecasts, as stated earlier, suggest the presence of factors not included in the model capable of influencing ROE.

g) Final considerations

The output resulting from our analysis appears to have high overall significance, but for some individual variables we observe low statistical significance.
However, the combined effect of all variables may be sufficient to make the model globally significant. In particular, the value of R-squared suggests that the model is able to explain a substantial part of the variance of ROE. This contributes to the particularly

high F-statistic, indicating that the overall model turns out to be better than a model with only the intercept, i.e., without predictors.

In conclusion, the dummy variables for IDs and Years turn out to be able to capture significant variations in ROE that are associated with specific banks or specific time periods. Thus, the aggregate effect allows us to assert a high probability of correlation between our variable x, i.e., the Gross NPL Ratio, and variable y, the ROE of banks.

To test whether, even at the micro level, this analysis is true, we will proceed with a specific balance sheet analysis for an individual bank. The goal is to move from the overall econometric look to a more detailed case study, in order to test the basic assumption of this thesis once again: does the reduction of the stock of NPLs allow for improved bank performance?
The best way to prove this is to go into the detail of the banks' key financials, using a direct approach on their balance sheets, with an in-depth study of the pre- and post-transaction “BCC NPLs 2022.”

3.2.4. The bank under analysis: Banca Valsabbina

The bank under examination is an Italian banking group of cooperative origin and is the principal popular bank in the province of Brescia. It was established in 1898 as a cooperative joint-stock company with limited liability and unlimited capital.
With the financial crisis of 2008, the bank experienced a significant increase in the number of non-performing loans, due to the economic recession and the deterioration of credit quality. From that year on, the situation got worse and worse.

For this reason, in 2018 the institution defined the NPL Plan for the period 2018 - 2021, with the main objective of improving the effectiveness and efficiency of the process of managing and recovering non-performing loans, also with a view to progressively reducing and disposing of the stock.
Among the most important securitizations concluded by the bank in recent years, we can mention the "POP NPLs 2021" transaction, together with 11 other participating institutions for a gross value of non-performing loans sold of €9.3 mln.

In addition, during the 2020 financial year, the bank finalized the “Valsabbina SME Platform” transaction, a traditional securitization transaction with an original nominal value of €58.5 mln.

Although the stock of gross NPLs decreased from €403 million in 2018 to a total of €199.6 million in 2021, a further securitization transaction, i.e. 'BCC NPLs 2022', was necessary in 2022, thus extending the de-risking plan outlined in 2018.

3.3. Pre-securitization balance sheet and asset analysis

In the following paragraphs, we will go deeper into the analysis. As anticipated, in the first part we will analyze the balance sheet of Banca Valsabbina before securitization,

first identifying its asset composition and capital structure. After that, we will move on to a profitability analysis to understand how the bank is able to generate profit, and finally we will calculate and analyze the main ratios related to NPLs. The goal is to identify the bank's NPLs/profit correlation to study the impact of non-performing loans on profitability. In particular, this first part of the analysis will outline the starting context and the bank's pre-securitization situation, to get a general overview. The second part will complete this analysis, as it will allow a comparison of the metrics before and after the transaction.

3.3.1 Asset composition

The analysis of a bank's asset composition is an important process for assessing its capital strength, profitability, and ability to manage risk.

First of all, an important indicator to be analyzed is the structure of loans. More specifically, one factor to consider is the volume of these loans; it provides insight into the size and ability to compete in the market in meeting customer needs. Obviously, the longer the credit disbursed remains of good quality, safe from the risk of deterioration, the more competitive a bank will remain.
Second, it is also important to assess the liquidity of assets; the more liquid assets a bank holds, the better able it is to meet its financial maturities and manage any liquidity crises. Finally, assets should be well diversified; good geographic and sectoral diversification of loans reduces a bank's exposure to the risk of concentration[38].

In 2021, Banca Valsabbina recorded a boost in its lending compared to previous years, especially with growth in bank loans provided to households and non-financial

[38] "*Concentration risk"* is the risk to be incurred when investments or credits are directed to the same entity, or to groups of entities belonging to the same business sector or geographic area.

companies. Compared to 2020, the growth rate was 8.97%; the rates recorded by the bank are even higher than the average rates of the banking system which were equal to 3.5%[39]. This average rate refers, precisely, to bank loans to households and non-financial companies: the rate probably stems from the Covid-19 situation, which caused a contraction in demand for loans and an increase in inflation, which made them more expensive. Despite this, Banca Valsabbina managed to improve its position through territorial expansion, as can be seen in chart 15:

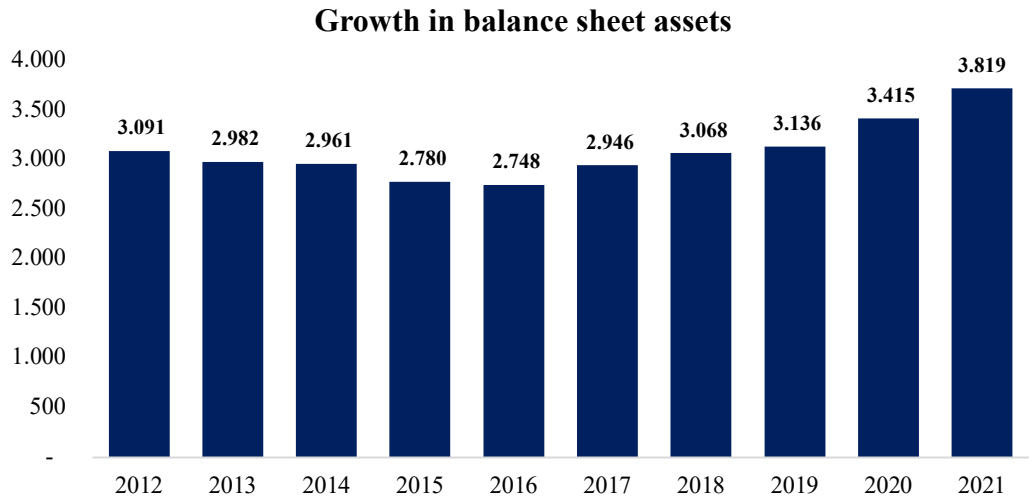

Chart 15 – Growth in balance sheet uses of Banca Valsabbina. *Source: Financial Statement Banca Valsabbina 2021*

If we look at the composition of these assets, we see that the most significant component is mortgages, followed by current accounts and other loans. The category of mortgages brings together both mortgage loans and all disbursements with installment repayment (including loans with state guarantee).

[39] Data resulting from BNP Paribas: "*Focus Economia e Banche - Overview of the Italian Banking Market*", Nr.04.

Below we can observe the composition of loans by technical form as of December 31, 2021:

Financial assets at AC - customers ***(€/000)***	**31/12/21**	**31/12/20**	**Change (%)**
Current accounts	381,653	314,467	21.4%
Reverse repurchase agreements	-	26.298	(100.0%)
Mortgages	2,964,988	2,641,212	12.3%
Personal loans	86	150	(42.7%)
Other financing	273,060	292,839	(6.8%)
Non-performing loans	199,600	261,300	(23.6%)
Loans	**3,819,387**	**3,536,266**	**(8.0%)**
Debt securities	1,424,072	1,449,963	(1.8%)
Total financial assets at AC- customers	**5,243,459**	**4,986,229**	**(5.2%)**

Table 16– Financial assets of Banca Valsabbina. *Source: Financial Statement Banca Valsabbina 2021*

As we can see from the table, the number of non-performing decreased by -23.6% from the previous year, while mortgages continued to increase (+12.3%). Below, in chart 16, we can see a breakdown of that composition in 2021:

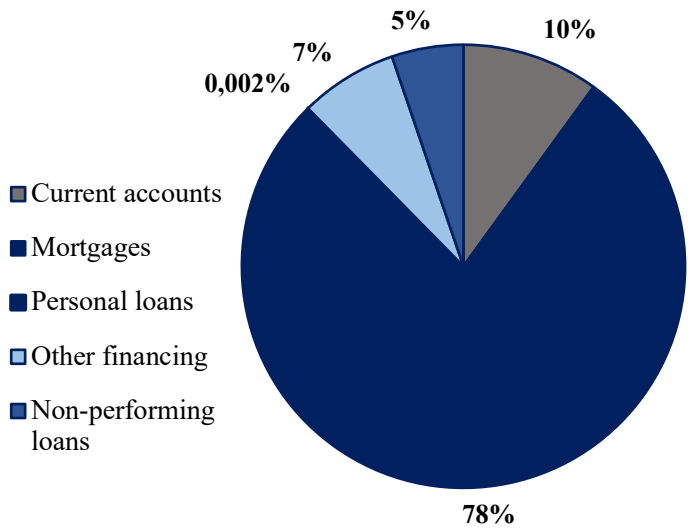

Chart 16 - Financial asset composition of Banca Valsabbina (%). *Source: Financial Statement Banca Valsabbina 2021*

Generally speaking, a high number of mortgages on the balance sheet can be good for a bank if the mortgages are of good quality, diversified, and profitable.
In particular, mortgages can be a stable and recurring source of income for banks. In addition, mortgages can contribute to economic growth by enabling households and businesses to purchase real estate.
However, a high number of mortgages on the balance sheet can also be a risk for a bank if the mortgages are of poor quality, concentrated in a single geographic area or a single economic sector. In such cases, the bank is exposed to a higher risk of default by borrowers, which can lead to significant losses.

To analyze the liquidity of Banca Valsabbina, we need to consider the following items:

1. Bank deposits
2. Bonds and Government securities
3. Cash & Cash equivalents

The above items represent the most liquid financial assets a bank can hold. It is very important to hold a good level of liquid assets, because this is synonymous with soundness and reliability, as the bank will be able to meet its financial maturities.

Customer collection ***(€/000)***	**31/12/21**
Saving deposits	22,296
Current accounts	3,712,921
Time deposits	939,243
Repurchase agreement	-
Future lease payments	5,210
Other deposits	53
b) Due to customers	**4,679,723**
Bonds	78,343
Subordinated bonds	60,505
Certificates of deposit	15,428
c) Securities issued	**154,276**
Total direct deposits	***4,833,999***
Indirect	***2,645,269***
Total deposits	**7,479,268**

Table 17 - Deposits composition of Banca Valsabbina 2021

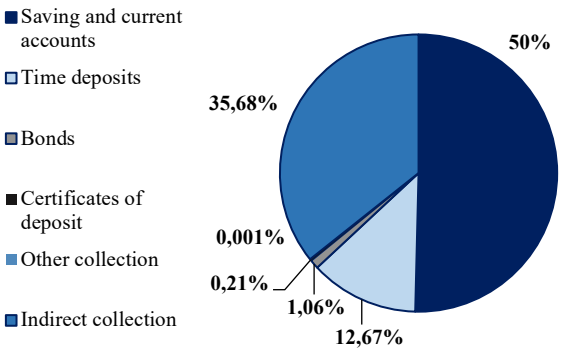

Chart 17 - Deposits composition (%) of Banca Valsabbina 2021

Starting with bank deposits, they represent the main item of a bank's liabilities. More generally, they are part of customer deposits, which include savings deposits, current accounts, time deposits, repos, and others. As we observe from table 17, the main items of customer deposits are current accounts, and together with saving accounts they represent 50% of total deposits. We can also note an important presence of time deposits, with total due to customers of €4.679bln.
In the second part of the table, we can look at securities issued, another important variable for the bank to achieve a good level of liquidity. Total securities stand at €155mln and represent 2.1% of total deposits.
Finally, by indirect deposits, the bank refers to government securities (€232mln), Italian and foreign stocks (€391mln), corporate and foreign bonds (€129mln), mutual funds (€1.151bln), and others. Some of these items are also important for the bank's liquidity.

To understand whether customer deposits are sufficient to meet the bank's obligations, we can consider the ratio shareholders' equity / customers collection.
A higher metric indicates that the bank has more resources at its disposal. In contrast, a lower ratio indicates that the bank may be more vulnerable to financial risks. The ratio can also be used to monitor a bank's capital strength over time. For example, if a bank's ratio declines over time, this could be a sign that its capital strength is deteriorating.
This ratio, as of December 31st, 2021, was 8.30%; not a very high result but still not a concern.

To complete the liquidity analysis, we now consider the item "Cash & Cash Equivalents". This asset item on the balance sheet is €31.8mln, or 0.47% of total assets. The value of cash & cash equivalents has decreased compared to 2020 (€33,0mln); this identifies lower liquidity of the bank. The reasons behind this decrease could be multiple:

- An increase in customer withdrawals;
- An increase in payments/investments from the bank.

However, we can say that Banca Valsabbina holds a good level of liquidity; the reduction in cash & cash equivalents is offset by an increase in the total value of deposits (+16.03%).

Finally, we look at the geographical and sectoral diversification of Banca Valsabbina's activities. The purpose is to examine the bank's ability to face concentration risk through the distribution of banking activities in different lines of business and in different regions. Let us first focus on the allocation of loans, particularly the distribution by business lines:

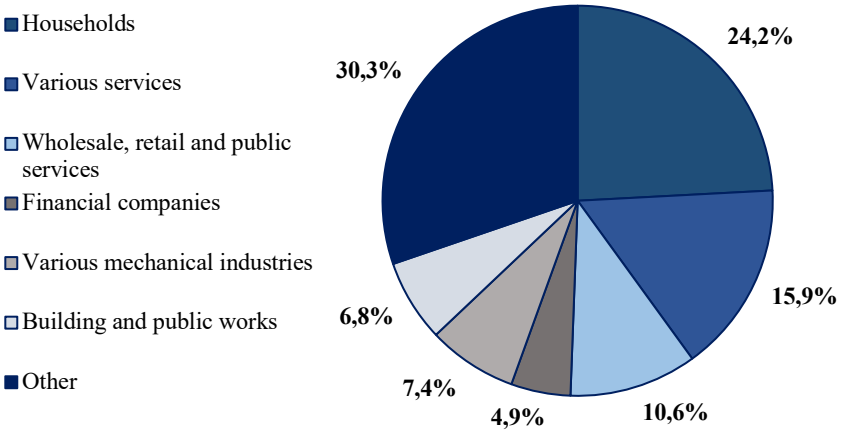

Chart 18 – Breakdown by economic activity sector of Banca Valsabbina. *Source: Financial Statement Banca Valsabbina 2021*

As previously mentioned, the household sector accounts for 24.16% of total loans, followed by the service sector with 15.85% and trade with 10.58%. With decreasing importance then we find the industry sector (7.42%) and construction / public works (6.81%).

Geographically, in recent years Banca Valsabbina has embarked on an expansion strategy in Central and Southern Italy. This diversification is necessary because the geographical distribution of the bank's loans is concentrated in Northern Italian regions, particularly Lombardia (68.02%), Veneto, Trentino Alto-Adige, Emilia-Romagna and Piemonte. The remaining Italian regions, in contrast, received a much smaller share of loans.

3.3.2 Capital structure

Analyzing a bank's capital structure is a complex task that requires a multidimensional assessment of several factors, including:

- *Capital composition*: A bank's capital consists of various financial instruments, such as common stock, preferred stock, reserves, reserve funds, and capital funds. The composition of capital is important in assessing the soundness of the bank and its ability to absorb any losses;

- *The capital level and quality:* determined by the riskiness of its component financial instruments. First-quality (Tier 1) capital is considered more solid than second-quality (Tier 2) capital.

In table 18, we can observe the capital structure of Banca Valsabbina. Capital reserves account for 57.33% of total capital, followed by share capital with 26.55% and extraordinary reserves, with 15.66%.

(€/000)	31/12/2021	(%) tot capital
(A) Capital		
Share capital	106,550	26.55%
(B) Capital reserves		
Share premium reserves	230,083	57.33%
(C) Profit reserves		
Legal reserve	30,175	7.52%
Extraordinary reserve	62,864	15.66%
Reserve for purchase of own shares	12,014	2.99%
Other reserves	(65,256)	(16.26%)
(D) Other reserves		
Merger differences	(3,092)	(0.77%)
IAS valuation reserves	(1,964)	(0.49%)
(E) Own shares		
Own shares	(9,225)	(2.30%)
Total		
Profit for the year 2021	39,186	9.76%
Total Equity	**401,338**	

Table 18: Capital structure of Banca Valsabbina. *Source: Financial statement 2021*

Overall, the institution's equity increased from the year before, from €373.6 million to €401.3 million (+7.4%).

In terms of risk assets and regulatory ratios, as of Dec-21, the bank recorded the following results:

- Risk-weighted assets: 2,535,017
- CET1 Capital Ratio: 15.32%
- Tier 1 Capital Ratio: 15.32%
- Total Capital Ratio: 16.64%

In general, the results are positive. The measured ratios are in line with the minimum regulatory requirements in effect in 2021.

The Total Capital Ratio is slightly higher than the CET1 Capital Ratio. This indicates that the bank has a strong capital base but could improve its capital structure by focusing more on first-quality capital.

3.3.3. Profitability analysis

The profitability analysis of a bank focuses on numerous factors, which are able to capture the overall health of the institution, encompassing various aspects of it. Financial statement ratios derived from the construction of ratios between items in the income statement, balance sheet, or between items on either side are used. These indices are distinguished by their purpose:

a. *Profitability measurement:* whether they offer insights into the bank's economic balances;

b. *Efficiency measurement:* whether they investigate the level and type of cost structures and how the bank uses resources;

c. *Structure identification:* whether they compare lending to other items (such as to balance sheet assets or direct deposits).

A proper profitability analysis allows the bank to be evaluated in its entirety, identifying its strengths and weaknesses. It helps to recognize fragilities to intervene and improve the institution's balance and capital-economic strength.

Profitability measurement can be done using indicators such as ROE, ROA, EPS and so on. Below are the results computed on the balance sheet data of Banca Valsabbina as of 31/12/21:

PROFITABILITY RATIOS *(€/000)*	**31/12/2021**
Brokerage margin	178,703
Profit (loss)	39,186
Shareholders' equity	371,377
Total Assets	6,692,507
Tax rate	21.6%
Number of shares	34,244
ROE	**11.02%**
Brokerage margin / Total Assets	**2.7%**
ROA	**0.6%**
Earnings (loss) per share	**1.14**

Table 19: Profitability ratios of Banca Valsabbina and corresponding items (2021)

ROE, at 11.02%, has increased surprisingly compared to the 2020 result (7.20%). This change to positive indicates that the bank is improving its profitability; in fact, profit increased by 61.1% compared to 2020. By increasing the numerator of the ratio, the ratio itself also increases, considering that the change in 2020/2021 equity turns out to be minimal.

The Brokerage Margin / Total Assets ratio appears not very high compared to the Italian banking sector average; Bank of Italy identifies 3.3% as the average ratio, while Banca Valsabbina stands at only 2.7% (growing, however, compared to 2020 when it had a value of 2.5%).

The ROA has a very low value, especially compared to the Italian average of 4.2%[40]. This is due to the large imbalance between total assets and operating costs; Banca Valsabbina faced a substantial increase in operating costs. In fact, it goes from about €90 million in 2020 to €106 million in 2021, for a change of +18%. This rise is explained by an increase in personnel expenses and administrative expenses.
In particular, administrative expenses surged significantly due to increased contributions to the Bank Resolution Funds and Depositors' Guarantee. High operating expenses reduce operating income and necessarily impact ROA.

Now we move on to the analysis of Banca Valsabbina's *efficiency*:

EFFICIENCY RATIOS ***(€/000)***	**31/12/2021**
Administrative expenses	109,017
Total Assets	6,692,507
Brokerage margin	178,703
Costs	106,186
Administrative expenses / Total Assets	**1.7%**
Administrative expenses / Brokerage margin	**61.0%**
Cost / income	**59.4%**

Table 20: Efficiency ratios of Banca Valsabbina and corresponding items (2021)

[40] Data resulting from KPMG's 2021 report: "*Financial statements of the Italian banking groups: trends and prospects*".

We immediately note how, as already stated for profitability, operating costs and administrative expenses have a big impact on the bank's economic situation. In fact, the ratio of administrative expenses to brokerage margin is 61%; this indicates that the bank uses a significant portion of its brokerage margin to support its administrative activities. The same applies to the cost / income ratio, which is 59.4%. Thus, for every euro of income earned, the bank incurred costs of €0.59; the ratio is very high.

The last efficiency ratio, administrative expenses / total assets, has a fairly low value (1.7%). This result comes from the high value of total assets; the bank obviously holds a large amount of loans to customers, which is also growing compared to 2020.

Finally, let's review the *Structure Ratios*:

STRUCTURE RATIOS *(€/000)*	**31/12/2021**
Loans	3,720,810
Total Assets	6,692,507
Direct deposits	4,833,999
Loans / Total Assets	**55.6%**
Loans / Direct deposits	**77.0%**

Table 21: Structure ratios of Banca Valsabbina and corresponding items (2021)

As we can notice, loans account for an important portion of both total assets and direct deposits. Respectively, Loans / Total Assets exceeds 50% while Loans / Direct deposits reaches almost 80%.
Therefore, the lending structure has as its main characteristic a very high level of loans, which generates high structure ratios.
A high value of loans can be seen as positive, but at the same time the bank exposes itself to a high level of credit risk.

In broad terms, the values as of Dec-21 for Banca Valsabbina have increased from the previous year. This is true, however, both from the point of view of profitability and from an expense point of view.

To summarize, the main changes recorded in 2021 by the bank in the balance sheet are as follows:

- Cash & cash equivalents: -3.7%;
- Loans to customers: +5.8%;
- Total assets: +11.8%;
- Outstanding securities: -24.1%;
- Tax liabilities: +98.7%;
- Reserves: +112.1%.

And for the income statement:

- Brokerage margin: +17.2%;
- Operating profit: +61.0%;
- Operating costs: +18.1%.

3.3.4. Computation of key NPLs ratios

In this last part we will calculate the main ratios related to non-performing loans that will be useful in assessing the post-securitization change.
These types of ratios are called "A*sset Quality Ratios"*, as they make possible to analyze the quality of the bank's loan portfolio and the risk associated with them.

The indexes we will review are:

- Gross NPL Ratio;
- Net NPL Ratio;
- Net Bad loans – UTP – Past Due / Net Loans;
- Texas Ratio;
- Coverage Ratio.

Gross NPL Ratio	31/12/2021
Gross loans	3,842,816
Gross non-performing loans	199,588
Gross NPL Ratio	**5.2%**

Net NPL Ratio	31/12/2021
Net loans	3,720,810
Net non-performing loans	101,023
Net NPL Ratio	**2.7%**

The NPL Ratio is the key metric, perhaps the most important one, for analyzing a bank's impaired loan situation. The concept is simple; it tells us what percentage total NPLs (Bad loans, UTPs, and Past Due) represent of the bank's total loans. Specifically, we can identify two types of NPL Ratio; the gross and the net. The difference between the two is the sum of all write-downs, adjustments, and provisions that reduce the value of the loan on the balance sheet.

Thanks to several de-risking activities, Banca Valsabbina was able to reduce its gross ratio considerably, from 7.34% in 2020 to 5.19% in 2021. Despite this, as of 31/12/21 Banca Valsabbina is, albeit slightly, above the minimum supervisory threshold for significant banks of 5%[41]. This indicates that the bank has not yet succeeded in efficiently and comprehensively managing its credit risk.

As for the Net NPL Ratio, the scenario becomes a bit more critical; although the ratio decreased from 4.09% in 2020 to 2.72% in 2021, the bank keeps above the minimum supervisory threshold that is, according to the Bank of Italy, equal to 2%.

[41] According to the Bank of Italy

Below, there are calculations for individual types of NPLs, in order: Bad Loans, Unlikely-to-Pay, and Past Due.

Net Bad Loans / Net Loans	31/12/2021
Net bad loans	55,844
Net loans	3,720,810
Net Bad Loans / Net Loans	**1.5%**

Net UTP / Net Loans	31/12/2021
Net UTP	39,217
Net loans	3,720,810
Net UTP / Net Loans	**1.1%**

Net Past Due / Net Loans	31/12/2021
Net past due loans	5,962
Net loans	3,720,810
Net Past Due / Net Loans	**0.2%**

Two other ratios that we can consider in NPLs analysis are the Texas Ratio and the Coverage Ratio. The former measures the ratio between net non-performing loans and equity, once intangible assets are deducted; it expresses the capital capacity with respect to the residual risk outstanding on the non-performing loan portfolio. In other words, it indicates the ability to cover losses from impairment through equity.
The second indicator, instead, allows us to identify the volume of non-performing loans that is covered by provisions. The latter are actual cash reserves that banks build up to deal with any losses arising from NPLs.

Below are the indices calculated for Banca Valsabbina:

Texas Ratio	31/12/2021
Net non-performing loans	101,023
Equity (including income of the period)	401,338
(-) intangible fixed assets	9,916
Texas Ratio	**25.8%**

NPL coverage Ratio	31/12/2021
Gross non-performing loans	199,588
Adjustments / Provisions	98,565
Coverage Ratio	**49.4%**

The Texas Ratio is found to be 25.81%, much lower than the Italian average of 38.8%[42]. This means that Banca Valsabbina's loan portfolio appears to be of good quality compared to its capital endowment.
The Coverage Ratio (49.38%) is close to the Italian average (53.7%[41]); this result represents a good level of provisions, which are able to "cover" almost 50% of the stock of NPLs.

In conclusion, at the end of 2021, Banca Valsabbina's financial results respected the average, with some stronger points and others quite weak. Certainly, in recent years the bank has achieved an improvement in its balance sheet values, both in terms of profitability and from the point of view of credit deterioration. Many ratios, however, have been borderline compared to the minimum acceptable levels; these vulnerabilities have necessitated further commitments in NPLs management. The "BCC NPLs 2022" operation fits into this context.

3.4. Post-securitization balance sheet and asset analysis

This paragraph will address the second part of the analysis. As anticipated, we will present the variations and impacts of securitization on the balance sheet of Banca Valsabbina. The goal is to identify the advantages of the operation on the institution’s financial health, to understand if they are truly tangible and impactful.

First, the new capital structure and asset composition in 2022 will be outlined. After that, we will compare the new credit quality ratios with pre-securitization results. Continuing, we will analyze the banks' liquidity and the impact the operation has generated on it.

[42] Data resulting from KPMG's report: "*Financial statements of the Italian banking groups: trends and prospects*".

Finally, to make the analysis more comprehensive, we will compare some of the bank's metrics, including NPL Ratio, ROE, ROA, Cash&Cash eq. and Operating Costs over the time period 2017-2022. This section will allow us to compare the levels of these ratios between years, to highlight any changes as a result of the de-risking plan implemented by the bank from 2018 onward.

3.4.1. New asset composition and capital structure

In this section, we will determine the bank's new asset structure in 2022 to highlight any differences and put the securitization in context.

Financial assets at AC - customers ***(€/000)***	**31/12/2022**	**31/12/2021**	**Change (%)**
Current accounts	421,301	381,653	10.4%
Mortgages	2,989,236	2,964,988	0.8%
Personal loans	50	86	(41.9%)
Other Financing	381,015	273,060	39.5%
Non-performing loans	185,855	199,600	(6.9%)
Loans	**3,977,457**	**3,819,387**	**4%**
Debt securities	1,613,459	1,424,072	13%
Total financial assets at AC- customers	**5,590,916**	**5,243,459**	**7%**

Table 22: Financial uses of Banca Valsabbina. *Source: Financial Statement Banca Valsabbina 2022*

In 2022, the aggregate of mortgages will once again be the strength of Banca Valsabbina's lending, with the highest proportion of total loans (+0.8% vs. 2021).
Current accounts continue to increase, although by a smaller percentage than the 2020-2021 change; the growth is mainly related to working capital needs of businesses in 2022.

As can be seen from the table, the item that experiences the most significant increase is "Other Financing"; the bank's financial statement explains that the development of the latter is of a transitory technical nature, as it is mainly related to the collections remitted to the special purpose vehicles that take care of the self-securitization transactions.
Finally, the gross value of non-performing decreases by -6.9%, as a direct result of securitization.

Moving on, we now consider the 2022 capital structure of Banca Valsabbina:

Capital Structure ***(€/000)***	**31/12/2022**	**(%) tot capital**
(A) Capital		
Share capital	106,550	27.45%
(B) Capital reserves		
Additional paid-in capital reserve	228,709	58.93%
(C) Profit reserves		
Legal reserve	34,096	8.79%
Extraordinary reserve	82,287	21.20%
Reserve for purchase of own shares	10,100	2.60%
Other profit reserves	(60,185)	(15.51%)
(D) Other reserves		
Merger differences	(3,092)	(0.80%)
IAS valuation reserves	(45,699)	(11.77%)
(E) Own shares		
Own shares	(6,080)	(1.57%)
Total		
Profit for the year 2022	41,421	10.67%
Total Equity	**388,107**	

Table 23: Capital structure of Banca Valsabbina. *Source: Financial statement 2022*

The equity of Banca Valsabbina decreases from €401,4 million in 2021 to €388.1 million in 2022, a reduction of -3.3%, due to small changes in items from one year to the next. In particular, legal reserves, extraordinary reserves, and IAS valuation reserves increase, while other profit reserves, reserves for purchased of own shares and own shares decrease

substantially. Significant is the increase in profit for the year, from €39.2 million to €41.4 million.

In terms of risk assets and regulatory ratios, as of 31/12/2022, the bank records the following results:

- Risk-weighted assets: 2,780,792;
- CET1 Capital Ratio: 14.03%;
- Tier 1 Capital Ratio: 14.03%;
- Total Capital Ratio: 15.33%.

Compared to the previous year, all ratios are declining, but still in line with minimum regulatory requirements.
RWA increases, probably due to the rise in loans disbursed or the increase in credit risk associated with the asset portfolio, and this inevitably leads to a reduction in all capital ratios.
Nevertheless, the results obtained allow the bank's capital strength to be affirmed once again.

3.4.2. Main ratios and financial statement items: comparison before and after securitization

Regarding participation in the transaction, Banca Valsabbina contributed a portfolio of 44 positions classified as non-performing, with GBV of €9.6 million (net credit €4.5 million) at a price of €3.8 million.
More specifically, the bank was assigned:

- A senior bond with a value of €3.78 million. The bank retained the full accrual of this security and was admitted to GACS;
- A mezzanine bond, a junior bond, and a cash component for a total amount of €6,000.

In order to achieve the deconsolidation of the assigned loans, in accordance with prudential supervisory regulations (retention rule), 5% of the securities were subscribed by the participants in the transaction. The remaining 95% of mezzanine and junior tranches issued by the vehicle were placed with third-party institutional investors.

This transaction inevitably impacted the bank's financial statement items and ratios since a securitization generates both costs and cash inflows. The main changes are outlined below:

(€/000)	31/12/22	31/12/21	Change (%)
Balance Sheet			
Cash & Cash equivalents	159,212	31,781	401.0%
Loans and receivables with customers	5,506,981	5,144,882	7.0%
Total Assets	6,985,940	6,692,507	4.4%
Outstanding securities	107,885	154.,276	(30.1%)
Tax Liabilities	4,719	11,887	(60.3%)
Reserves	63,206	36,707	72.2%
Income Statement			
Earnings (loss)	41,421	39,186	5.7%
Operating costs	122,886	106,186	15.7%
Brokerage margin	212,675	178,703	19.0%

Table 24: Main changes in Banca Valsabbina Financial Statement from 2021 to 2022

Starting from the *balance sheet*, the item that has been most impacted is cash. In fact, thanks to the sale, cash has experienced a huge increase (+401%). The change in liquidity is certainly the most striking and visible in the case of a securitization, which is why it deserves further consideration (see section 3.4.3).

The item "Loans and receivables with customers" also increased slightly (+7.0%); this balance sheet item is not directly related to securitization but derives from an increase in the acquisition and disbursement of loans, particularly in the technical form of mortgages. Such an increase certainly could improve the bank's profitability, but at the same time it could increase credit risk, running counter to the main objective of securitization, which is to reduce that risk.

Moving on, although the tax rate has increased from 21.58% to 28.35%, the amount of tax liabilities have decreased. This could result from a reduction in taxable income due to an increase in provisions for non-performing loans.

Finally, reserves increased by 72.2%.

Regarding the *income statement*, the main variation concerns the increase in brokerage margin, which undergoes a change of +19.0%. This increase depends on the rise in net interest margin, which jumps from €100,460 thousand to €141,846 thousand, coupled with the growth in net commissions (from €45,447 thousand to €55,507 thousand), and a reduction in dividends / trading and valuation income (-51.9%).

Continuing, we can see an increase in operating costs; again, they represent direct consequence of the disposal. The increase is 19.0%, specifically €16,700 thousand more than the previous year.

Finally, we have an increase in total earnings, from €39,186 thousand to €41,421 thousand (+5.7%).

Now let's analyze the main ratios:

Gross NPL Ratio	**31/12/2022**	**31/12/2021**	**Change (%)**
Gross loans	4,002,195	3,842,816	4.15%
Gross non-performing loans	185,855	199,588	(6.88%)
Gross NPL Ratio	**4.64%**	**5.19%**	**(0.55%)**

Net NPL Ratio	**31/12/2022**	**31/12/2021**	**Change (%)**
Net loans	3,893,522	3,720,810	4.6%
Net non-performing loans	101,920	101,023	0.9%
Net NPL Ratio	**2.62%**	**2.72%**	**(0.10%)**

First of all, let's examine the values of NPLs ratios. As expected, the ratios have decreased as a result of the reduction in the stock of non-performing. Specifically, the impact on the Gross NPL ratio is half a percentage point, while on the net the change is less marked (-0.10%). The gross result represents an important achievement for Banca Valsabbina, as it allows it to position itself below the 5% materiality threshold.
These effects on ratios are perfectly in line with the intent of the transaction and represent direct consequences of the sale.

More specifically, below we see the impact on the types of NPLs involved in the transaction.

Net Bad Loans / Net Loans	31/12/2022	31/12/2021	Change (%)
Net bad loans	46,854	55,844	(16.10%)
Net loans	3,893,522	3,720,810	4.64%
Net Bad Loans / Net Loans	**1.20%**	**1.50%**	**(0.30%)**

Net Past Due / Net Loans	31/12/2022	31/12/2021	Change (%)
Net past due loans	5,990	5,962	0.47%
Net loans	3,893,522	3,720,810	4.64%
Net Past Due / Net Loans	**0.15%**	**0.16%**	**(0.01%)**

Net UTP / Net Loans	31/12/2022	31/12/2021	Change (%)
Net UTP	49,076	39,217	25.14%
Net loans	3,893,522	3,720,810	4.64%
Net UTP / Net Loans	**1.26%**	**1.05%**	**0.21%**

The stock of Bad Loans decreases by -16.10%, a very important result for the bank: the total impact falls by -0.30%, from 1.50% to 1.20%. In contrast, the impact of Past Due on the total is only 0.01%.
Finally, the impact of UTPs on the total is found to be increasing. This means that the bank continued to accumulate NPLs during 2022 (+25.14% Net UTP).
The explanation for the increase in the latter metric could stem from several factors:

a. The disposal mainly involved Bad Loans and not UTP; during the year, the bank continued to hold loans that had become unlikely to pay;

b. The Covid-19 situation: the pandemic has undoubtedly eroded the ability of borrowers to repay their debts, slowing their paybacks. therefore, a high percentage of loans have become unlikely to pay;

c. The reduction in adjustments / provisions caused net values to increase instead of decrease, reducing the impact the divestment should have had on ratios.

The point (c) can be explained by the Coverage ratio:

NPL coverage Ratio	31/12/2022	31/12/2021	Change (%)
Gross non-performing loans	185,855	199,588	(6.88%)
Adjustments / Provisions	83,935	98,565	(14.84%)
Coverage Ratio	**45.16%**	**49.38%**	**(4.22%)**

In fact, as we can see, provisions decrease by -14.84% from 2021 to 2022. The ratio drops from 49.38% to 45.16%; this means that the share of NPLs covered by reserves is significantly reduced. Precisely, we can see in the table the reduction of gross stock, but the simultaneous reduction of provisions has a stronger impact on the results.

Another negative outcome for Banca Valsabbina is the Texas Ratio result, which increases by 1.19%:

Texas Ratio	31/12/2022	31/12/2021	Change (%)
Net non-performing loans	101,920	101,023	0.89%
Equity (including income of the period)	388,107	401,338	(3.30%)
(-) intangible fixed assets	10,556	9,916	6.45%
Texas Ratio	**27.00%**	**25.81%**	**1.19%**

The increase in the ratio depends on a reduction in equity (-3.30%), as a result of a decrease in capital strength that generates less coverage with respect to losses from NPLs.

Finally, we analyze changes in profitability, structural, and efficiency ratios. These three categories are important tools for identifying whether securitization has had an effect on Banca Valsabbina's overall profitability.
In theory, a securitization transaction allows credit risk to be transferred to the securities issued, releasing capital that can be used for new loan originations. This can lead to an increase in ROE as well as ROA.

In addition, the transaction can generate fees and interest, helping to improve the net interest margin. Finally, it can enable the bank to obtain financing at a lower cost than traditional financing, improving the cost / income ratio.

PROFITABILITY RATIOS *(€/000)*	**31/12/22**	**31/12/21**	**Change (%)**
Brokerage margin	212,675	178,703	19.0%
Profit (loss)	41,421	39,186	5.7%
Shareholders' equity	352,766	371,377	(5.0%)
Total Assets	6,985,940	6,692,507	4.4%
Tax rate	28.4%	21.6%	31.4%
Number of shares	34,614	34,244	1.1%
ROE	**11.69%**	**11.02%**	**0.67%**
Brokerage margin / Total Assets	**3.04%**	**2.67%**	**0.37%**
ROA	**0.59%**	**0.59%**	**0.01%**
Earnings (loss) per share	**1.20**	**1.14**	**5.23%**

Table 25: Change in profitability ratios of Banca Valsabbina and corresponding items from 2021 to 2022

As expected, ROE registers an increase of almost one percentage point (+0.67%) and Brokerage margin / Total Assets rises from 2.67% to 3.04%, thanks to the growth in brokerage margin (+19.0%).
In contrast, ROA, contrary to expectations, does not experience any significant change, as the increase in profit is offset by an increase in total assets.
Finally, earnings per share increase due to the increase in end-of-period profit.

STRUCTURAL RATIOS *(€/000)*	31/12/22	31/12/21	Change (%)
Loans	3,893,522	3,720,810	4.6%
Total Assets	6,985,940	6,692,507	4.4%
Direct deposits	4,905,541	4,833,999	1.5%
Loans /Total Assets	**55.7%**	**55.6%**	**0.14%**
Loans / Direct deposits	**79.4%**	**77.0%**	**2.40%**

Table 26: Change in structural ratios of Banca Valsabbina and corresponding items from 2021 to 2022

Regarding structure ratios, both ratios taken into analysis increase.
In particular, the Loans / Total Assets ratio has a smaller increment, as both loans and assets increase equally, hence the change in the ratio is minimal (+0.14%). In contrast, direct deposits experience a smaller increase, causing the ratio to increase by +2.40%.

Lastly, let's analyze the efficiency ratios:

EFFICIENCY RATIOS *(€/000)*	31/12/22	31/12/21	Change (%)
Administrative expenses	126,240	109,017	15.8%
Total Assets	6,985,940	6,692,507	4.4%
Brokerage margin	212,675	178,703	19.0%
Costs	122,886	106,186	15.7%
Administrative expenses / Total Assets	**1.85%**	**1.72%**	**0.13%**
Administrative expenses / Brokerage margin	**59.4%**	**61.0%**	**(1.65%)**
Cost / income	**57.8%**	**59.4%**	**(1.6%)**

Table 27: Change in efficiency ratios of Banca Valsabbina and corresponding items from 2021 to 2022

In this class of ratios, we first notice an increase in the Administrative expenses / Total Assets ratio (+0.13%); this indicates an increase in administrative costs relative to the total amount of assets.
Positive signals, however, come from the other two ratios. The decrease in cost / income tells us that a lower percentage of income was used to cover operating costs. Finally, the

decrease in Administrative expenses / Brokerage margin reveals to us the importance of the increase in brokerage margin, which suggests efficient management of costs in relation to the income generated by brokerage activities.

3.4.3. Impact on liquidity

One of the main reasons for banks to undertake securitization transactions is the immediate generation of liquidity. By transferring assets to a vehicle, a bank obtains immediate liquidity from the sale of securities issued by the vehicle in the financial markets, which is useful for issuing new loans, investments, or to meet capital needs.
In addition, securitization allows banks to reduce their level of leverage and credit-weighted risk; thus, banks can improve their credit rating and, as a result, access more advantageous financing.
Although securitization can provide benefits from the standpoint of immediate liquidity, it is also important to consider the long-term effects.
Indeed, losses on securitized assets can have significant consequences on banks' balance sheets. These losses refer to the risk that the assets transferred to the securitization vehicle may decline in value over time and as a result:

- If the originator bank retains a residual share or participates in any residual proceeds from the securitization, it could suffer direct losses if the performance of the securitized assets deteriorates;
- Losses could impact the reputation of the originator bank. Investors and stakeholders could negatively evaluate the bank's ability to manage credit risk and securitization operations.

In the balance sheet of Banca Valsabbina, we quickly notice the impact of securitization on the cash.

The two effects that immediately stand out are:

- Increase in Cash & Cash equivalents: cash rises from €31,781 thousand in 2021 to €159,212 thousand in 2022;
- Increase in loans from €5,145 thousand in 2021 to €5,507 thousand in 2022.

To analyze Banca Valsabbina's total liquidity, we also consider bank deposits and bonds and government securities in the comparison:

Customer collection ***(€/000)***	**31/12/2022**
Saving deposits	20,050
Current accounts	3,647,368
Time deposits	1,055,729
Repurchase agreement	68,187
Future lease payments	6,016
Other deposits	306
b) Due to customers	**4,797,656**
Bonds	38,993
Subordinated bonds	56,851
Certificates of deposit	12,041
c) Securities issued	**107,885**
Total direct deposits	***4,905,541***
Indirect	***2,745,227***
Total deposits	**7,650,768**

Table 28: Deposits composition of Banca Valsabbina 2022

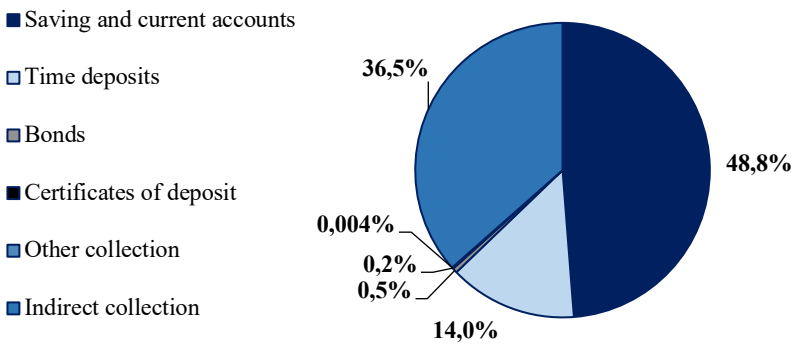

Chart 19: Deposits composition (%) of Banca Valsabbina 2022

The main entries in customer deposits once again remain current accounts, which together with saving accounts are equal to 48.77% of total deposits, down from 50% in 2021.
Almost all items appear to be decreasing from the previous year. In fact, we have a 10.1% decrease in saving deposits and a decrease in current accounts of about 2%. The most dramatic decrease is registered by total securities issued, which shows a -30% from 2021, due to the reduction in both bonds (-50.2%), subordinated bonds (-6.0%), and certificates of deposit (-22.0%).
The only growing items are time deposits, future lease payments, and other deposits.
The increase in total deposits is only a result of the increase in the indirect ones; this outcome, considering the negative performance of financial markets in 2022, indicates the effectiveness and efficiency of Banca Valsabbina's commercial functions.

The reduction in bonds certainly erodes Banca Valsabbina's liquidity; this is completely counterbalanced by the increase in Cash & Cash Equivalents, which allows for a huge improvement in the bank's liquidity. In addition, the increase in deposits, though small, also contributes to the improvement in the liquidity level.

The ratio calculated in the first part of the analysis, shareholder’s Equity / customer collection, is now equal to 7.91%, decreasing from 8.30% in 2021. This result is a direct consequence of the reduction in equity and total direct deposits from customers.

To conclude with the analysis of the impact of liquidity on the bank, let's observe the supervisory indicators represented by the short-term liquidity requirement (Liquidity Coverage Ratio, "LCR") and the structural liquidity requirement (Net Stable Funding Ratio, "NSFR"). The former is reported by the bank on a monthly basis and is equal to the ratio of the value of the stock of high-quality liquid assets under stressed conditions to total net cash outflows calculated according to certain scenario parameters.
The objective of the index is to maintain an adequate level of unencumbered, high-quality liquid assets that can be converted into cash to meet short-term (i.e., 30 calendar days) liquidity needs under stress scenarios. The NSFR, on the other hand, is published quarterly as it relates to medium - to - long term structural balance.

Liquidity ratios	31/12/2022	31/12/2021	Change %
Liquidity buffer	1,182,550	1,612,610	(26.7%)
Net liquidity out flow	613,180	765,850	(19.9%)
LCR coefficient	**192.86%**	**210.56%**	**(8.4%)**
Total available stable funding	4,644,244	5,257,463	(11.7%)
Total stable financing required	3,419,054	3,455,266	(1.0%)
NSFR coefficient	**135.83%**	**152.16%**	**(10.7%)**

The regulatory minimum threshold is 100% for both ratios. Although the two ratios have decreased from 2021 to 2022, they remain well above the regulatory threshold; this highlights that the bank performs very well in liquidity risk management.

In conclusion, post-securitization, Banca Valsabbina's overall liquidity is greatly improved as a result of the transaction, mainly due to the significant cash inflow within the institution's balance sheet.

3.4.4. Benefits and costs: comparison from 2017 to 2022

Let's now summarize the post-securitization analysis.
The results allow us to affirm the presence of numerous benefits for Banca Valsabbina in terms of total profitability (see the increase in ROE). Although changes in ratios have been small in some cases and negative in others, the benefits of securitization are visible on the balance sheet results.
Even though operating costs have increased, they have not destroyed the bank's profitability, especially with respect to the staggering increase in liquidity, which is critical to the institution's soundness and health.
Through the BCC NPLs 2022 securitization, the bank was able to achieve its goals: increase profitability, reduce the level of impaired loans on its balance sheet, increase liquidity, and generally improve the bank's level of capital and financial well-being.

For sure a single securitization, even a large one, cannot completely overturn the balance sheet results. It requires constant and frequent application of de-risking policies which the bank must put in place, just as Banca Valsabbina has done in recent years.

To demonstrate this argument even better, it is useful to show the change in some of Banca Valsabbina's metrics over time and to see how the performance of them correlates with the level of NPLs on the balance sheet. Below, we will show four graphs each representing the NPL Ratio and, alongside, the bank's key profitability indicators: ROE, ROA, Cash & Cash Equivalents and Operating Costs.
The data come from Banca Valsabbina's financial statements from 2017 (the year prior to the publication of the 2018-2021 de-risking plan) to 2022.
This allows us to extend the pre- and post-securitization analysis over a longer time horizon, taking into consideration key years for the bank with respect to securitization transactions. The goal is to understand whether the results presented in the previous paragraphs have also been confirmed in the past and whether we can actually find a pattern in these profitability and expense indicators.

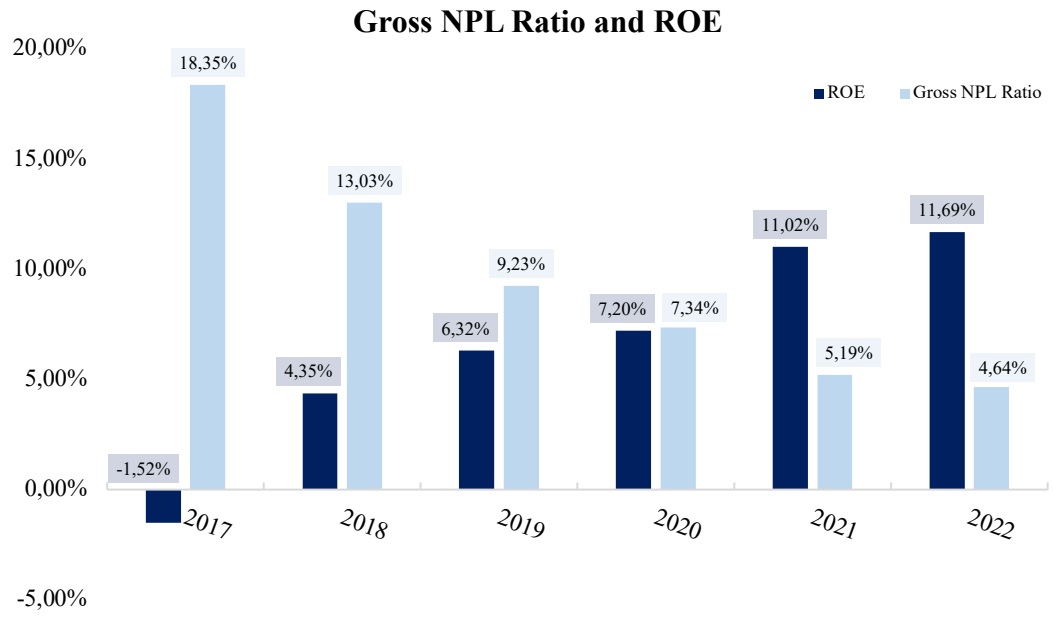

Chart 20: Evolution of Gross NPL Ratio and ROE, Banca Valsabbina. *Source: Financial statements 2017-2022*

The results in the first graph are very clear: as the NPL Ratio decreases, ROE increases. This confirms what was also observed earlier: such drastic reductions in the NPL Ratio result from the numerous securitizations implemented by the Bank in the years analyzed. This allows the institution to recover profitability, as we can see from the positive trend in ROE.

In fact, we go from a negative ROE (-1.52%) to a ROE of 11.69%. Of course, the increase in the ratio does not depend exclusively on the disposals of NPLs, but also on other factors that have led to an improvement in banking results.

In any case, it is certain that the reduction of on-balance-sheet impaired loans makes it possible to optimize the bank's efficiency, reduce exposure to credit risk, and thus make the institution more solid and reliable; all of which translates into increased profitability.

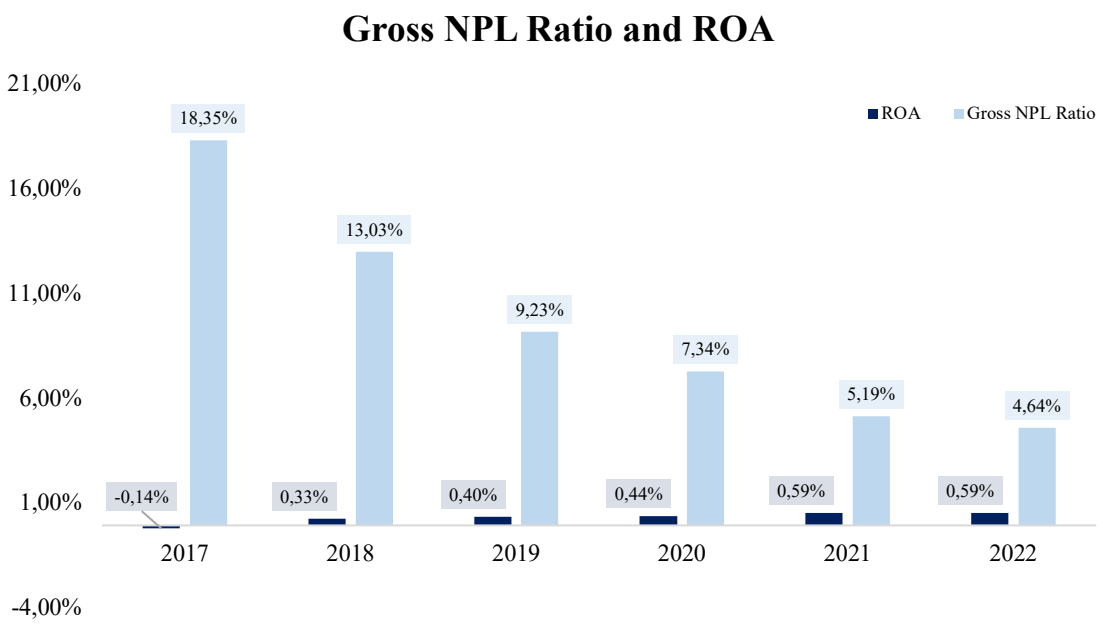

Chart 21: Evolution of Gross NPL Ratio and ROA, Banca Valsabbina. *Source: Financial statements 2017-2022*

We notice a similar trend in ROA results, but in a much smaller way. The change is not as dramatic as we noted for ROE.

In fact, the bank never held a very high ROA, but the value still managed to rise from a negative result of -0.14% in 2017 to a positive one of 0.59% in 2022. The low ROA ratios

are justified by the fact that banks are highly leveraged. When a bank is heavily indebted, it has to pay interest on its debt, which can reduce net profit and thus ROA.
In addition, the moderate growth in ROA in recent years also stems from the severe economic recession due to the Covid-19 pandemic, which necessarily eroded the bank's profitability levels.
In any case, the inverse correlation NPL Ratio / ROA is reconfirmed as expected.

Now we move on to a comparison of the main pros and cons arising from securitization: for simplicity, we assume as a benefit the increase in Cash & Cash Equivalents and as a disadvantage the increase in Operating Costs.

The assumption is that of an inverse relationship between both NPL Ratio and Cash & Cash Equivalents and NPL Ratio and Operating Costs.

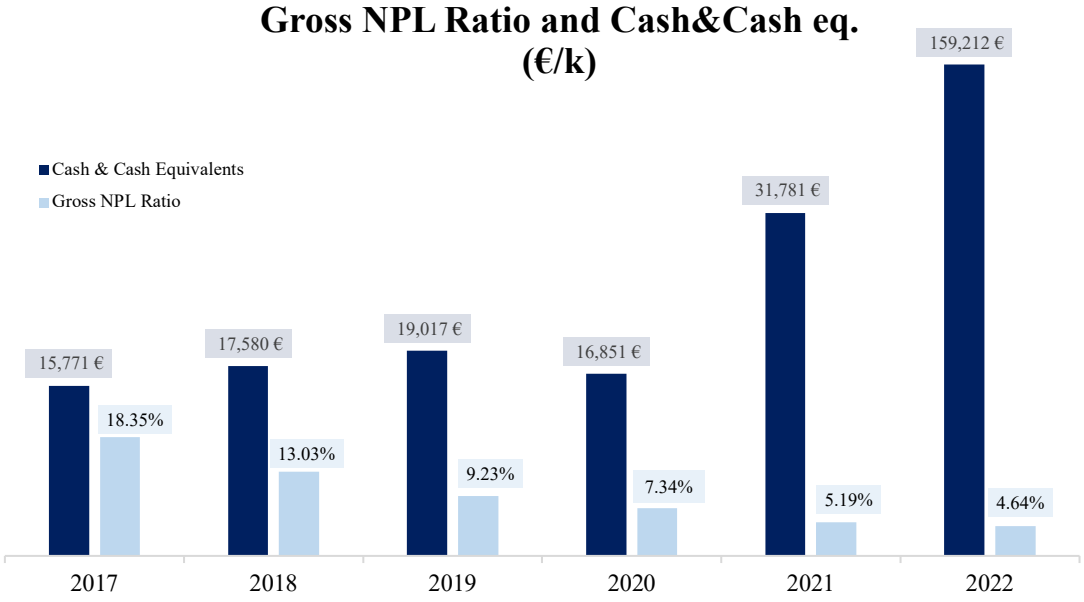

Chart 22: Evolution of Gross NPL Ratio and Cash&Cash eq., Banca Valsabbina. *Source: Financial statements 2017-2022*

By looking at chart 22, the hypothesis above is confirmed; we see a trend of increasing cash and, inversely, decreasing NPL Ratio. In particular, we can see a large rise in cash from 2020 to 2022. We have also seen an increase in previous years, although to a smaller extent.

The only exception is the change in cash from 2019 to 2020; cash is reduced by 11%. From the 2020 balance sheet of Banca Valsabbina, we infer that this reduction comes from the difference in the operating part of the cash flow statement. Cash generated from operations is much lower in 2020, due to the value of net adjustments / reversals for credit risk; in 2019 this value was equal to €17.941 thousand, while in 2020 the value stands at -€26.301 thousand. The latter refers to the balances of adjustments and writebacks related to the impairment of financial assets, which weighs enormously on cash flow, leading to a lower final Cash&Cash eq. result than in the previous year. In any case, between 2020 and 2021 the recovery was remarkable, as well as in 2022.

In conclusion, the securitization transactions that Banca Valsabbina has supported in recent years have certainly improved its liquidity by providing cash injections within the institution.

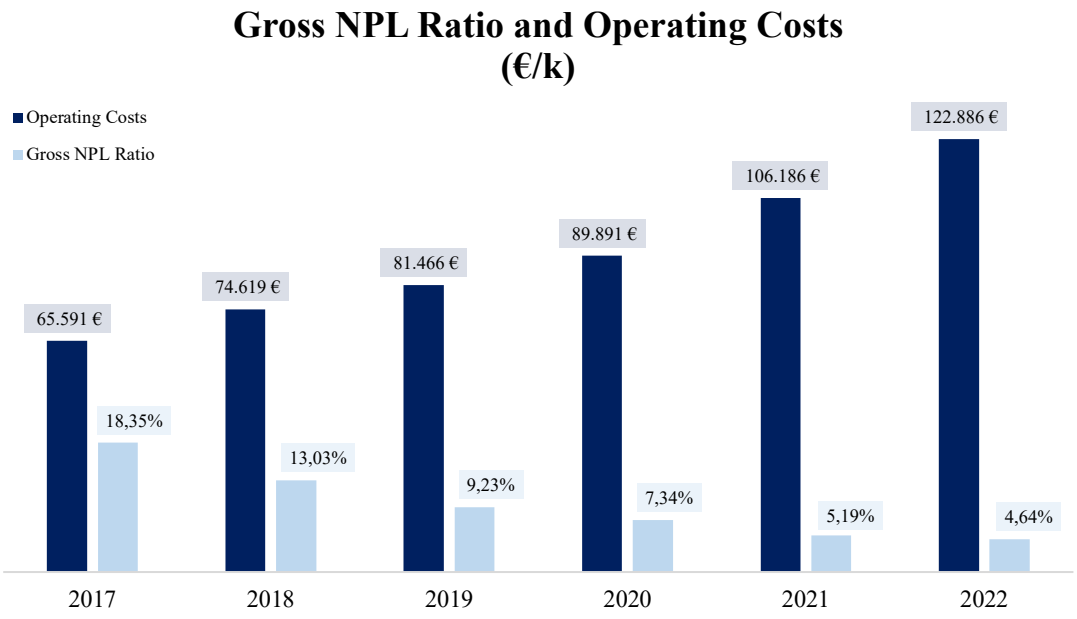

Chart 23: Evolution of Gross NPL Ratio and Operating Costs, Banca Valsabbina. *Source: Financial statements 2017-2022*

Lastly, the relationship with operating costs is also reversed: as we stated earlier, NPLs disposals lead to a reduction in the corresponding ratio but represent an expense for the bank. In fact, part of the growth in operating costs is associated with the implementation of the transaction. This is easily observed from chart 23; as the NPL Ratio steadily decreases, operating costs increase linearly from year to year, peaking in 2022.

In conclusion, over the time horizon considered, all the assumptions made for Banca Valsabbina seem to be accurate. Successive securitizations over the years have contributed to the improvement of important items in the institution's balance sheet, albeit with an increase in expenses.

To sum up, we highlight a strengthening of equity and liquidity: the sale of impaired loans freed up capital, which was reinvested in banking, increasing the bank's resilience. Another important factor is the improvement of the risk profile, through the reduction of credit risk exposure and the transfer of the latter to third parties. Finally, securitizations enabled the bank to achieve greater efficiency and profitability: securitizations generated stable and predictable cash flows, helping to improve the institution's profitability.
Ultimately, securitizations proved to be an effective tool for Banca Valsabbina to improve its financial performance.

CONCLUSIONS

The centerpiece of this thesis has been the comprehensive exploration of the securitization of NPLs and its impact on bank performance, with a particular focus on the "BCC NPLs 2022" transaction. Through a scrupulous investigation, which ranged from an analysis of the macroeconomic and legislative context to an examination of possible resolution and management alternatives for non-performing loans, to a detailed analysis of the specific transaction, this study sought to provide an overview of the securitization phenomenon.

This research showed that securitization is not only a strategy for repairing bank balance sheets, but also an important tool for supporting and sustaining the real economy. As demonstrated, a well-structured securitization enables banks to relieve their balance sheets of non-performing loans, improving the bank's financial, soundness and profitability indicators, and optimizing its ability to provide new credit to households and enterprises.

The econometric analysis showed the existence of the relationship between NPLs and bank performance, demonstrating the high probability of mutual influence between the two metrics. The case of Banca Valsabbina has confirmed the analysis, proving how a securitization transaction can actually turn into a significant benefit, allowing the institution to free up economic and operational resources previously tied up in the management of non-performing loans. However, the success of these transactions is closely linked to the ability to efficiently balance the expected benefits and the costs associated with the transaction.

Despite the clear opportunities, this thesis also pointed out some significant challenges and limitations. These include the volatility of the NPL secondary market and the complexity of securitization structures, which can represent obstacles for banks.

In conclusion, securitization of non-performing loans is undoubtedly a useful tool for improving bank performance and supporting the economy. However, this study emphasizes the critical insights and considerations of the challenges involved in this strategy, with a particular focus on high costs.

To sum up, the main implication is the need for structured and prudent management of both non-performing loans and securitization transactions; the key for banks is to be able to identify opportunities, use them to their advantage, and know how to balance the benefits and costs associated with such operations.

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