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Impact of Prudential NPL Regulations on European Banks

(Public Version)

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Executive Summary

In this report we examine how recent regulatory developments in the accounting and prudential frameworks are affecting the management of Non-Performing Loans (NPLs) to Small and Medium Enterprises by European banks which are under the supervision of the SSM (ECB & National Supervisors). 'Non-Performing' is a regulatory classification which refers to loans on which payments are more than 90 days past due, or of which the debtor is classified as being unlikely to pay back its full obligations. Loans to SMEs are at increased risk of turning non-performing when an obligor encounters financial peril or liquidity issues. Banks are required under the accounting regime to make loan loss provisions based on the expected credit loss associated to these loans.

In the years following the global financial crisis, European banks experienced a sharp increase in their NPL levels, which have remained elevated in the years thereafter. NPLs are broadly considered to be detrimental to banks profitability and economic stability; NPLs generate no income, yet banks incur financial costs and lock up capital and human resources by retaining these loans, which can potentially lead to restricted lending to the real economy. These detrimental effects make the management of NPLs a focal point of European banking supervision.

In order to accelerate the reduction of NPL levels in Europe, and to prevent future build-up of bad loans, the European Commission announced an 'Action Plan to Tackle NPLs in Europe' in 2017. This set of regulatory initiatives aims to create a favourable economic and judicial environment for the workout of NPLs by: introducing time-bound minimum provisioning levels for NPLs, developing a secondary market for NPLs and the acceleration of out-of-court procedures for the workout of NPLs.

The regulations of the European Commission apply to all SSM-supervised banks regardless of individual or national circumstances. Due to the heterogeneity of European banks, we expect banks to be affected differently by these regulations based on their individual circumstances. But as of yet it is not clear from the literature how these differences will manifest themselves. This thesis therefore aims to answer the question:

"How will European banks be affected by the recent NPL regulations, and how these effects differ based on their individual circumstances?".

Prudential regulations require banks to cover their NPLs with provisions based on the time these NPLs spend in a defaulted state. These requirements linearly increase over time, at a rate which is dependent on the presence and type of underlying collateral. Newly originating NPLs have to be fully covered with provisions in 3, 7 or 9 years, depending on whether they are either; unsecured, secured by movable collateral, or secured by immovable collateral respectively. Failing to meet these levels of provisioning will result in a deduction of the bank's CET1 capital with an amount equal to the difference between the required coverage level and the actual amount provisioned.

Banks differ significantly with regards to the degree they provision their loans. We note the connection between high levels of collateral pledged to NPLs, and low provisioning rates. The presence of collateral generally lowers the LGD associated to NPLs, which lowers the result of ECL-calculations of which IFRS9 provisions are based. We illustrate how CET1 deductions stemming from the gap between banks' supply and regulatory demand of provisions result in rapidly increasing capital costs in the case that banks choose to retain these loans on their balance sheets.

Several different cases are analysed on individual loan level and on bank's portfolio level. For the analysis on the portfolio level, these scenarios are calculated with two methods of provision allocation. The first assuming an equal provisioning rate of loans regardless of collateralization type, and the second method which prioritizes provisioning of unsecured exposures. Capital costs are highest for banks with high degree of collateralization, and low rates of provisioning. We note how these CET1 deductions act as an financial incentive to workout NPLs.

We explain how workout options available to European Bank's depend on their economic and judicial environment, as well on their individual capacity to work out these NPLs. We note that the time to recover NPLs varies dramatically between European countries. In cases where internal workout times are at the far end of the spectrum, the minimum coverage requirements will increase at a faster rate a portion of loans than the bank can work them out internally. This will incentivize them to dispose of their ageing NPLs through external workout measures.

We argue that the workout of SME NPLs by means of sales to external investors is most suited for NPLs associated to SMEs which have no reasonable perspective of becoming healthy corporations again, whereas internal workouts would in many cases be preferrable when ailing SMEs have a sufficient chance to return to performing status. We

note that prudential regulations do not take into account the differences in viability of SME NPLs.

We discuss the phenomenon of conflicting frameworks of the accounting and prudential treatments of provisions. We note that, most particularly in the case of fully secured exposures, the full provisioning of these NPLs might not be warranted from an accounting perspective. NPLs which are fully covered with provisions do not reflect the value associated to the recovery perspectives of these NPLs, leading to artificially low book values. We note that this conflict arises from differing purposes of the accounting and prudential framework; the accounting framework is primarily concerned with attempting to objectively valuation of banks' loans and provisions, whereas the prudential framework is mostly concerned with economic stability.

We conclude this thesis with examining some considerations for economic policy. We note that the stability benefits of the minimum coverage requirements depend on how the adequacy of bank's provisioning can be judged. The literature does suggest evidence that bank's NPL disposal is beneficial to banks' credit supply to the economy. But that overprovisioning of NPLs can lead to the unnecessary liquidation of companies, and to restricted lending to the real economy.

Keywords; Non-Performing Loans, Calendar Provisioning, Coverage Ratio, Prudential Backstop, Collateral, Recovery Rates, Workout Options

Preface

This thesis was written at the Financial Restructuring & Recovery department of Rabobank and marks the end of my time as a master student at the University of Twente. I thank my co-workers at Rabobank for assisting me with their knowledge and advice throughout the writing of this thesis. My colleagues at FR&R made me feel a part of the team, despite us being in the midst of a pandemic which required everyone to work from home.

I would like to give special thanks to Paulien Kosters, who acted as my external supervisor and mentor at Rabobank during this project. She was always willing to help me whenever needed, and available for a call whenever requested. I've come to known her as a dear colleague and I wish her all the best of luck in the completion of her PhD studies.

Furthermore, I would like to thank Berend Roorda, my first supervisor, for providing me with valuable feedback throughout the entire process of writing this thesis, and for providing valuable advice whenever the way forward became unclear. I also want to thank Bert Bruggink, my second supervisor, for his insightful comments and suggestions during the finalization of this thesis.

Finally I would like to give my thanks to my friends and family, whose unwavering support helped me during the past few month more than they know.

Jeroen Hidding

Enschede, 23 April 2021

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Abbreviations

ABS – Asset-Backed Security

AMC – Asset Management Company

AQ – Asset Quality

CDS – Credit Default Swap

COREP – Common Reporting

EBA – European Banking Authority

ECB – European Central Bank

EL – Expected Loss

EL_{BE} - Expected Loss Best Estimate

ECL – Expected Credit Loss

FBE – Forborne Exposures

FINREP – Financial Reporting

GAAP – Generally Accepted Accounting Principles

IAS 39 – International Accounting Standards 39

IFRS 9 – International Financial Reporting Standards 9

JGS – Junior Guarantee on Securitisation

LGD – Loss Given Default

LLP – Loan Loss Provision

MCR – Minimum Coverage Requirement

MRY – Most Recent Year

NPE – Non-performing Exposure

NPL- Non-performing loan[1]

NNPL – Non-Performing Loan net of Provisions

PPB – Pillar 1 Prudential Backstop

SAM – Special Asset Management

SPV – Special Purpose Vehicle

SSM – Single Supervisory Mechanism

TiD – Time in Default

[1] Throughout this paper, the terms Non-Performing Loans and Non-Performing Exposures are used interchangeably.

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1. Introduction

1.1 Non-Performing Loans

The issuing of credit to individuals and corporations is at the core of banks' business operations and their function in the financial system. Cash is transferred from the bank to a debtor, and in return the debtor pays interest and repayments, most often in several instalments. After all instalments have been repaid the debt is cleared and contract is settled. However, banks are not always being fully repaid on their outstanding loans, due to factors such as financial distress, debtors can fail to make timely payments on their instalments.

When a debtor fails to make payments on its loans for a certain amount of time, the loan is classified as non-performing. The definition of Non-performing loans (NPLs)[2] varies over countries and jurisdictions (Bank for International Settlements, 2016), but the term colloquially refers to loans on which a debtor is past due on its payments for over 90 days.

NPLs yield no return, and banks have to allocate financial and human resources to manage these loans. As an asset, NPLs are opaque in terms of cash-flow prospects which makes them difficult to value. To cover the risk of not being repaid in full by their debtors, banks are required by accounting regulations to make a deduction on their balance sheet based on the loss they expect to make on a loan in the form of a loan-loss provision (LLP). In the accounting framework, a loan is considered to be 'impaired' when the book value of a loan exceeds the expected amount that can be expected to be collected from the loan. (Bholat, Lastra, Markose, Miglionico, & Sen, 2018) The IFRS9 accounting framework knows three levels of impairment, with stage 1 loans being highest and stage 3 being the lowest level of impairment. Impaired loans are similar to NPLs, but differ in the sense that impaired loans are an accounting concept, whereas NPLs are regulatory term. In practice however, there is great overlap between these loans.

[2] The European Banking Authority (EBA) defines NPLs as loans other than held for trading that satisfy either or both of the following criteria: (a) material loans which are more than 90 days past-due; (b) the debtor is assessed as unlikely to pay its credit obligations in full without realization of collateral, regardless of the existence of any past-due amount or of the number of days past due. The assessment of whether a debtor is unlikely to pay is itself subject to its own set of technical standards. (ECB 2017 p.99)

1.2 NPLs and Workout Departments

The management of NPLs to corporate clients is typically under the responsibility of the workout department of the bank. Clients that default or are deemed to be unlikely able to make full repayments on their loans are transferred to this department. The clients encompass clients which are bankrupt (i.e. gone-concern clients), as well as clients which are ailing but still have perspective to return back to performing status. When possible, the workout department will work together with the client to alleviate financial distress, and aid the client in its return to going-concern (GC) status. Oftentimes, this is done with the aid of forbearance measures such as term extensions. When there is no reasonable perspective for the client to return to GC status, the bank will often opt to abolish the loan, and will attempt to recover the remainder of the outstanding amount to minimize its losses. If the loan is at least partially collateralized, the liquidation of said collateral will be an important part in the recovery proceedings of that loan. The amount of the outstanding loan that is not recoverable will be written off the bank's balance sheet. Recoveries on defaulted corporate and SME loans are in practice often bimodally distributed i.e. it is often the case that either a loan can be fully recovered, or is not recovered at all. (European Banking Authority, 2020)

1.3 SME-Financing in Europe

SME[3]-financing is vital to the European economy. SMEs account for 99% of all companies (of which 93% are micro-SMEs with fewer than 10 employees), and are responsible for creating two-thirds of jobs in Europe., (Muller, et al., 2019; European Commission, 2015) SME-financing in Europe can be considered to be particularly dependent on bank financing in comparison with other regions in the world. European SMEs rarely have access to capital market funding. (Kaya, 2014) In comparison to other developed economies, Europe does relatively to the US have a less developed credit market outside of banks. One factor that plays a part in this is the way counterparty credit risk is assessed by financing companies. In the U.S. there is a relatively low threshold for investors to invest in corporate debt, because of the widespread availability of external risk ratings by agencies such as Moody's, S&P, and Fitch. In Europe, this calculation is most often done by complex internal mathematical models proprietary to the financer, which are typically

[3] Companies can be classified as a micro, small or medium enterprise according to the EC definition when they comply to the following three criteria: 1) employ fewer than 250 persons; 2) have an annual turnover not exceeding EUR 50 million; and/or 3. an annual balance sheet total not exceeding EUR 43 million. https://eba.europa.eu/single-rule-book-qa/-/qna/view/publicId/2013_309

too expensive to develop for smaller parties. The importance of SMEs to economic growth, and the dependency of SMEs on banks for external financing, causes the topic of SME-financing to be a priority of economic policymakers.

1.4 The concerns of European Regulators towards NPLs in Europe

High NPL-stocks are widely considered to be detrimental for banks, their clients, and the economy. An IMF paper by Aiyar, et al. (2015) describes a threefold interrelated mechanism of channels in which NPLs negatively affect banks' lending: 1) LLPs which have to be made for NPLs curtails banks' profitability via the decrease in net income. 2) NPLs tie up capital on banks' balance sheet due to the extra regulatory capital that banks' are required to keep on balance because of the higher risk weights[4] of impaired loans (net of LLPs) compared to performing exposures (PEs). 3) NPLs are associated with a low asset quality (AQ). This makes a bank with a high NPL-ratio seem more risky from an investor's perspective, increasing funding costs for banks as investors demand a higher return for riskier investments. (Serrano, 2020) found that higher rates of NPLs are associated with lower growth rates of performing loans, and that banks which show a larger reduction in their NPL-portfolio tend to lend more to the real economy.

The potential negative effect of a high NPL stock on banks' credit supply to the real economy is one of the main concerns the European Central Bank (ECB) aims to address with its prudential policy towards NPLs. (European Central Bank, 2017)

Several research papers have studied the effect of NPLs on bank lending and indeed found a negative effect of NPLs on banks' credit supply. (Accornero, Alessandri, Carpinelli, & Sorrentino, 2017) An accompanying concern with this is the view that NPLs clog up the banking system, and make them a less efficient transfer mechanism for monetary policy. This could incur when e.g. central banks lower the interest rate, but that this reduction of interest rate does not translate adequately to a reduced interest rate banks charge to their customers due to having a large stock of NPLs. Recent research on this topic however, sketches a more mixed view. On the relationship between bank lending interest rates and NPLs, Bredl (2018) states that this relationship is positive in some cases but mostly rather ambiguous. On the case of bank lending growth to economy, Angelini (2018) states that while a negative correlation can be observed between NPLs and credit growth, conclusions about causality between the two are unwarranted: stating that exogenous

[4] Banks are required to keep capital on their balance sheets proportional to the amount of Risk-Weighted-Assets (RWAs) they have, assets are assigned a higher weight when they are classified as higher risk, making riskier assets require more on-balance capital. (Hull, 2007)

increases in NPLs can reduce credit growth, but that credit growth is not affected by NPL ratio by itself. Angelini furthermore states that the negative impact NPLs cause on banks' balance sheets are mainly caused through their negative impact on profitability stemming from higher provisions. Thornton & Di Tommaso (2020) found that the effect of NPLs on credit loan growth is mainly an indirect one, a negative influence on capital and profitability. The authors state that regulations aimed at tackling NPLs can only be effective in its goal of increasing credit supply to the economy if they account for the effects these regulations have on banks' capital and profitability.

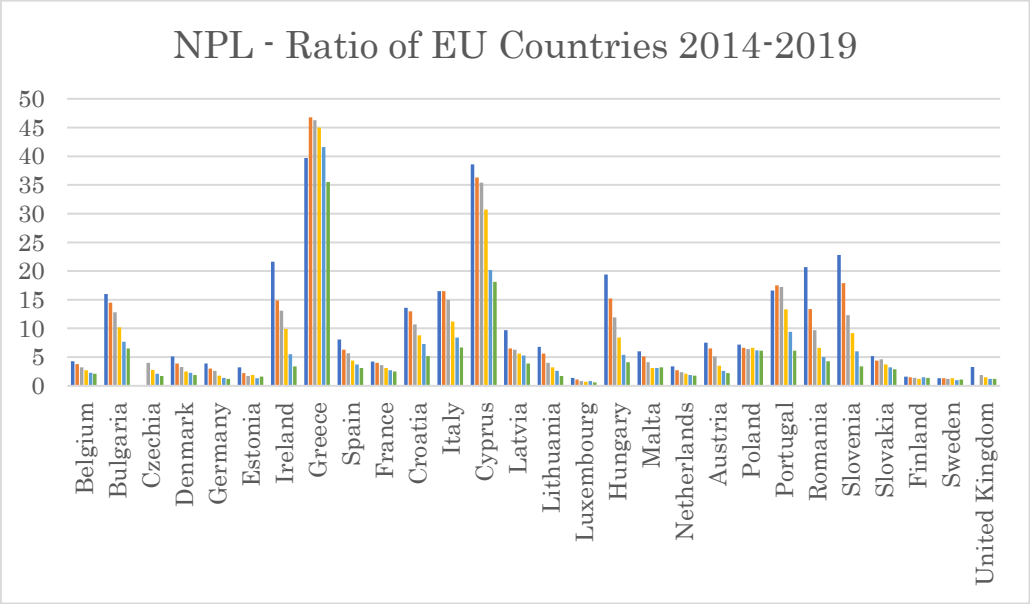

Figure 1:NPL ratios of EU-countries 2014-2019 (Data source: Eurostat)

In the years following Global Financial Crisis (GFC) of 2007-2008, banks worldwide have seen a sharp increase in the amount of NPLs on their balance sheets, in many cases, the levels of NPLs have remained elevated for many years thereafter. An ECB paper by Ari, Chen, & Ratnovski (2020) found that elevated levels of NPLs, and unresolved NPLs, are strongly associated with the severity of post-crises recessions. The authors stress the importance of adequate resolution of NPLs in order to prevent crises for being more deep and severe than necessary. The European Commission (EC) has made the tackling of NPLs in Europe a subject of paramount importance in recent years. The EC has conceived a multi-facetted approach in developing new regulations and supervisory expectations in conjunction with the European Banking Authority (EBA) and ECB, which resulted in the

EC's 'Action Plan to Tackle NPLs in Europe' (European Council, 2017), (Grasmann, Aspegren, & Willems, 2019). This set of regulations and initiatives was largely implemented over the years since. The ECB continues to state the tackling of NPLs as a supervisory priority in 2021 to ensure banks' financial stability, and to progress the completion of the European banking union. (European Central Bank, 2020)

2 Research Proposal

2.1 Problem Statement

Recent developments in the regulatory and economic environment of banks are going to impact banks' management of SME NPLs. European regulators aim to treat all banks under their supervision equally, even though these banks are subject to significant individual differences. Banks vary in their business model, risk appetite, products they sell, ownership structure and several country-specific factors such as national regulation and economic circumstances. These factors can have opaque and complex interactions with any new additional European regulations. The business of SME-lending adds another layer of complexity due to the dependence of local and individual characteristics. It can therefore be expected that banks are bound to be affected differently according to their unique set of individual characteristics and conditions to which they are subject. However, it is currently not known in the public literature how this heterogenous impact on banks manifests itself, and whether this heterogeneity in in how banks are affected is a warranted or desirable outcome.

2.2 Research Goal

The goal of this research is to investigate how the recent developments in changing accountancy and prudential rules and regulations with regards to the management of non-performing loans are affecting European banks. The goal is to discover how the most relevant prudential and accounting parameters concerning regulatory developments differ between European banks, and how these differences will affect the way recent regulations impact banks. Special focus will be given to the implementation of the prudential backstop, and the measures being taken concerning the treatment of collateral of ageing NPLs. After the differences in prudential and accounting parameters have been mapped, a predictive analysis is performed to estimate the quantitative impact of new developments. After these quantitative insights have been obtained, peculiarities will be pointed out concerning the differences between how certain types of loans and banks will be affected, and indicate whether these differences are warranted or desirable from the banks and regulators perspective.

2.3 Research Question

The research question and corresponding sub-questions of this thesis are formulated as follows:

"How will European banks be affected by the recent NPL regulations, and how these effects differ based on their individual circumstances?"

To answer this research question we formulate the following sub-questions:

- What recent and future accounting and prudential regulations are currently affecting NPLs and SAM and what are the most relevant parameters concerning these developments?
- What are the differences between European (peer) banks of these parameters?
- How can from this data be determined what the potential impact of regulatory developments will be?
- What are the implications of this impact on banks' policy towards workouts of NPL SMEs?
- What are potential economic implications of the prudential NPL regulations?

3. The regulatory environment affecting the management and workout of NPLs

3.1 Regulatory bodies concerned with the governance of NPLs in Europe

European banks are supervised and regulated by the European System of Financial Supervisors (ESFS), and the Single Supervisory Mechanism (SSM). The ESFS consists of the European Banking Authority (EBA), the European Insurance and Occupational Pensions Authority (EIOPA), the European securities and Markets Authority (ESMA), the European Systemic Risk Board (ESRB) and national supervisory authorities. The SSM consists of the European Central Bank (ECB), and the supervisory bodies of the participating countries. The parties most important to the prudential regulations concerning NPLs, are the ECB and the EBA. Besides prudential regulations, there are also accounting regulations to which European Banks are subject.

The current set of accounting rules to which European banks must comply is the International Financial Reporting Standards 9 (IFRS9), which was introduced in 2018 as the successor to IAS 39. Additionally, European banks which are also operating in the United States must also comply to the Sarbanes-Oxley Act (SOX) which is anti-fraud regulation for financial reporting, which was introduced in 2002 after major fraud cases such as the Enron scandal.

The Basel Committee of Banking Supervision (BCBS) creates international regulatory frameworks in which countries can participate. These Basel Accords provide international standards for the regulation of banks' capital position, risk management and stress testing. The current iteration of the frameworks is Basel III, but it should be noted that these accords are in perpetual states of development and implementation. Basel IV is currently scheduled for implementation in January 2023. The Basel accords form the basis for the most important regulations for banks in the European union, which are the Capital Requirements Directive (CRD), and Capital Requirements Regulation (CRR).

3.2 Regulatory measures to tackle NPLs

In order to reduce the NPL-stock on banks' balance sheet, and to improve the resolution mechanics of NPLs for banks, European institutions – most notably EBA and the ECB – have launched several packages of rules and regulations. These rules and regulations find their origin in the ECOFIN Council's 'Action Plan to Tackle NPLs in Europe'. (European Council, 2017)

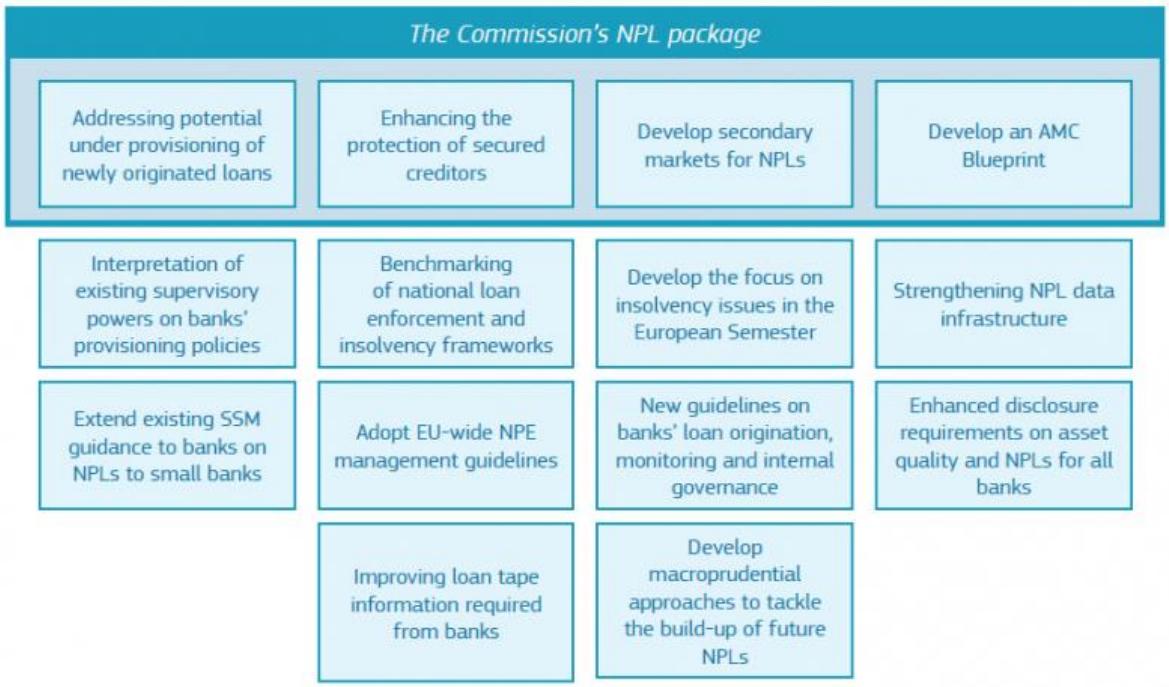

Figure 2: The EC's NPL package Source: European Commission Factsheet on Non-Performing Loans (2017)

The individual initiatives in the package of regulations to tackle NPLs aim to achieve improvement of the stability of Europe's banking sector by contributing to the following points: (European Comission, 2019)

1. Improving the solvability of banks, and bettering their leverage and liquidity-positions.
2. Improving the internal governance of banks, and improvement of banking supervision.
3. Improve the resolvability of banks.

Different European jurisdictions previously had different approaches and rules to classify NPEs. The introduction of a uniform definition of NPEs for European banks ensures that all European banks recognize, define and calculate Non-performing exposures in the same way. This benefits banks in their internal governance by ensuring recognizing of these exposures are according to adequate standards, and allows for better supervision by making NPEs comparable across different banks and countries.

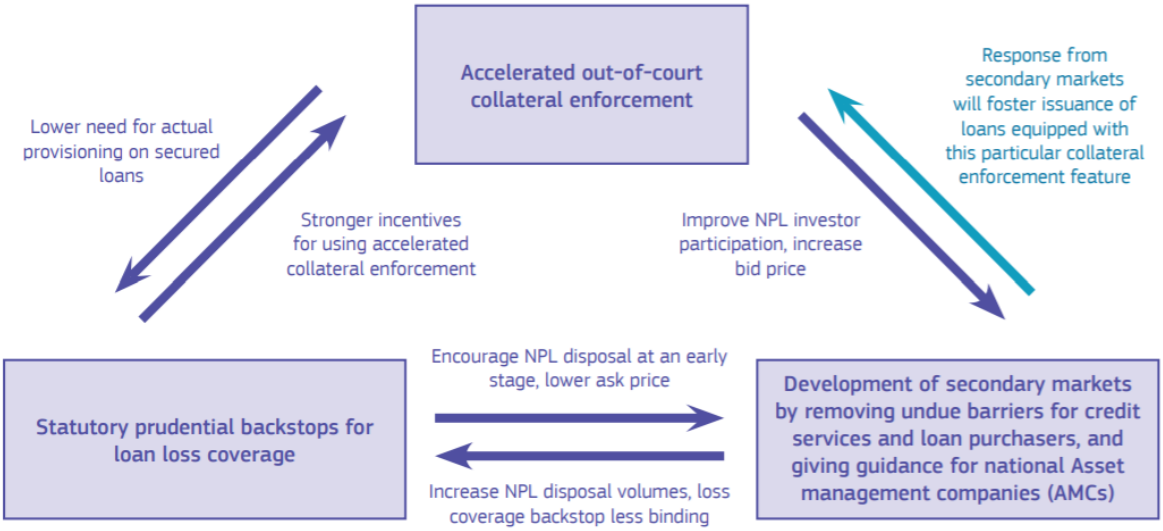

Figure 3: The three pillars of NPL Regulation (Source: European Commission Factsheet on NPLs)

3.3 Development of Secondary Markets for NPLs

The sale of Non-Performing Loans is a potential method for banks to achieve lower NPL ratios. NPLs can be sold to other parties, which then typically have the right of the future proceedings and recoveries of these loans. NPL sales can be in the form of single ticket sales, the sales of entire portfolios, or in the form of securitisation of NPLs. There are many potential barriers for an efficient market in the realm of SME NPLs. The cash-flow prospects of SME NPLs are subject to large uncertainty, which causes them to be a risky asset class. Potential investors require a steep discount on NPLs to compensate for the often time-consuming recovery process, often as high as 40%. (Constâncio, 2017) In addition, there is significant information asymmetry between the selling party and the investor, leading to lower bid prices from the investor, since only the selling party can adequately value the corresponding.

The secondary market for NPLs is not developed to the same degree in every European country. NPL transactions are as of yet largely focussed in southern European countries. Santander (€43 bln.), Intesa Sanpaolo (€28 bln. and BBVA (€22bln.)[5] are the largest sellers of NPLs from the peer group. The largest buyers of NPLs, are Cerberus (€102 bln.) , Blackstone (€55 bln.) and Lone Star[6] (€42 bln.), each of which are private equity firms. Cerberus and Lone Star specialize in distressed assets, targeting markets which have

[5] Amounts over the period 2014-2019.
[6] https://www.lonestarfunds.com/about-us/our-business/

suffered economic/banking crises in order to capitalize on dislocations in pricing and value opportunities. Alessi, Bruno, Carletti, & Neugebauer (2020) finds that coverage ratios[7] are higher in countries where the markets for NPLs are larger. Requiring banks to hold more provisions against their NPLs would make NPL disposals more likely.

Angelini (2018) states that the sale of NPLs disposes banks of zombie firms, but also of ailing firms which are insolvent but not yet bankrupt. If the buying party is primarily focused on the extraction of the outstanding loan by means of liquidation of the assets of the defaulted corporation, it could lead to the termination of businesses which have a reasonable chance to cure. In the worst cases this would result in the unnecessary bankruptcy of firms that are potentially still viable when given proper guidance, management and/or forbearance measurements. This would result in unnecessary damage to the real economy. Banks therefore should make necessary efforts to identify and distinguish firms which are ailing, yet viable, from firms which are certain to be considered gone-concern.

3.4 Accelerating Out-of-Court Enforcement of Collateral

Enforcement of collateral is part of the resolving of secured NPLs. The efficiency of the judicial framework concerning this enforcement is an important determinant in the resolution time of NPLs. There is significant disparity between resolution time of secured SME NPLs between European countries, with average resolution times ranging from a few weeks, to several years. (European Banking Authority, 2020) Time of judicial procedures can negatively be influenced by factors such as the absence of out-of-court procedures for collateral enforcement, presence of prior rank of certain kinds of debt collectors, and the presence of moratoria which can prevent the collection of collateral. (Alessi, Bruno, Carletti, & Neugebauer, 2020) found that stronger contract enforcement, and more efficient courts help banks resolve NPLs.

[7] Coverage ratio refers to the degree of which NPLs are covered by provisions.

3.5 Current State of EC NPL Reduction Plan

In the latest progress report of the European Council's approach to the reduction of NPLs, the European Council acknowledges the reduction of NPLs and associated risks in EU member states. The majority of the initiatives of the ECOFIN Council's Action plan has already been formalized into legislation.

Table 1:Progress of the implementation of the ECOFIN Council's Action Plan as of 2019 (EC 2019)

No.	Initiative of the Action Plan
1	Interpretation of existing supervisory powers in EU legislation as regards NPL provisioning
2	Addressing potential under provisioning, via automatic and time-bound provisioning
3	Extend Single Supervisory Mechanism NPL guidelines to small banks
4	Adopting EU-wide management guidelines for non-performing exposures
5	New guidelines on banks' loan origination, monitoring and internal governance
6	Develop macroprudential approaches to tackle the build-up of future NPLs
7	Enhanced disclosure requirements on asset quality and NPLs for all banks
8	Improving loan tape information required from banks
9	Strengthening data infrastructure for NPLs, including potential transaction platforms
10	Develop a Blueprint for asset management companies
11	Develop secondary markets for NPLs
12	Benchmarking of national loan enforcement and insolvency frameworks
13	Develop the focus on insolvency issues in the European Semester
14	Enhancing the protection of secured creditors

Accomplished
Imminent
Ongoing

Not every initiative that is marked as accomplished is affecting the banks under the SSM's supervision as of yet. For example, initiative 3 – which is concerning the pillar 1 prudential backstop – is finalized in terms of rules, but will only take into effect starting January 2021. (European Comission, 2019)

3.6 Loan Loss Provisioning & Financial Incentives given to Banks to Reduce NPLs

The primary financial incentive with regards to NPL management for banks investigated by this report is the introduction of prudential regulation for minimum loan loss coverage by the ECB. (European Central Bank, 2018) To fully comprehend how these financial incentives materialize, we first must understand how Loan-loss provisions affect banks under the current accounting and regulatory frameworks and how these frameworks

interact in their current state. And then analyse how the introduction of the prudential backstop alters the banks' capital position from an accounting and regulatory perspective.

3.7 Potential Issues considering Minimum Coverage Requirements

The implementation of the prudential backstop is criticized by parties such as the European Banking Federation (EBF). It's main arguments against the prudential backstop is that it would lead to a more restricted and risk-averse lending policy towards SMEs. And voice their concerns about the lack of proportionality in the application of the prudential backstop. The measure is taken to aim at banks with high NPL levels, but also applies mandatory provisioning levels to banks which have low loss levels.

The Association for Financial Markets in Europe (AFME) also voices their concerns towards the European Commission's approach towards the minimum loss provisioning of NPLs. AFME argues that the heterogeneous nature NPLs makes a "one size fits all approach" in the form of a pillar 1 backstop inadequate. And that a Pillar 2 approach is better equipped to take into account the specific nature of Banks' NPL portfolio and economic environment. (AFME, 2018) They also state that with the introduction of IFRS9, provisions would already increase under the expected loss approach. Potentially making additional coverage requirements unnecessary. A singular prudential backstop would take insufficient consideration for the differences in recovery perspectives of NPLs between countries and institutions in terms of recovery rate and recovery time. Further concerns are voiced that calendar provisioning for NPLs will have pro-cyclical effects, as banks will be incentivized to dispose NPLs at an early stage. As high levels of NPLs often occur at the bottom of an economic cycle, a pro-cyclical affect could occur when supply of NPLs – or associated collateral - increases in the secondary market at a moment in time when market values are already low.

3.8 Loan Loss Provisioning under IFRS9

The introduction of the prudential backstop will first take into effect in 2021, as of yet loan-loss provisioning is mostly done under the accounting regime of IFRS9, which was introduced in 2018 as an improvement of the old regime of IAS39. Some European banks – particularly smaller ones – can also use national GAAP regulation.

LLPs are accounting deductions which banks have to make to account for the difference between the book value of a loan, and the amount the bank expects to collect from the debtor. Under IAS 39 banks had to provisions when loss events had occurred. This approach was criticized in the wake of the Global Financial Crisis due to its potential pro-cyclical effect on the economy.

Banks have to apply a forward-looking approach under IFRS9 regulations, and calculate LLPs based on ECL. Loans are either classified as stage 1, 2 or 3 under IFRS9 definitions – stage 1 being performing loans without increased credit risk, stage 2 loans being subject to increased credit risk, and stage 3 being impaired loans. When a loan is classified as Stage 1, the LLP is based on the 12-month ECL. When the loan is classified as stage 2 or 3, the LLP is based on the loans lifetime ECL. For stage two loans, interest income is still considered in determining lifetime ECL whereas for stage 3 loans it is not.

An important distinction to make is the difference between impaired loans, and Non-Performing loans. 'Non-Performing' is a regulatory concept, whereas 'impaired' is an accounting term. In general, all loans which are considered to be stage 3 impaired can also be considered to be Non-Performing, but the opposite is not necessary the case.[8]

3.9 Regulatory capital requirements

European banks are regulated according to the CRR/CRD IV, which is the European implementation of the Basel accords. One of the pillars of CRD IV is that banks will have to reduce their risk of becoming insolvent by being sufficiently capitalized. Basel III recognizes three tiers of capital: these are: 1) Common Equity Tier 1 (CET1), 2) Additional

[8] Differences in the amount of impaired loans vs. Non-Performing loans are caused by the way the EBA defines Defaulted exposures and specific conditions under which loans are classified as Non-Performing Exposures. Examples include: 1) The 'Pulling Effect' of the EBA guidance to banks on NPLs, which states that if more than 20% of loans outstanding to an obligor are classified as non-performing, all other loans to that client will be classified as non-performing as well. 2) The 'cure-period' of at least 12-months which applies to loans that turn non-performing to exit their non-performing status. Upon which previous NPLs enter a probation period of at least 2 years. 3) Automatic classification of loans as non-performing if they enter a forbearance measure or have a 30 days-past-due during their probation period. (European Banking Authority, 2017b) In contrast the IFRS9 framework does not know these specific measures.

Tier 1 (AT1) Capital and 3) Tier 2 Capital. CET 1 capital includes the most stable parts of a bank's capital, such as cash, common stock and retained earnings. AT1 capital mainly includes hybrid debt instruments such as contingent convertible bonds (CoCos). (Deloitte, 2016) Tier 2 capital includes items such as certain kinds of long term subordinated debt, and excess provisions.

Regulatory capital is intended to cover the unexpected losses banks risk due to their exposures, whereas provisions are intended to cover the expected losses of the exposures. Unexpected Loss (UL) is calculated as the difference between the 12 month $VaR_{99,9\%}$ and 12-month regulatory EL.

Figure 1: The meaning behind capital and provisions

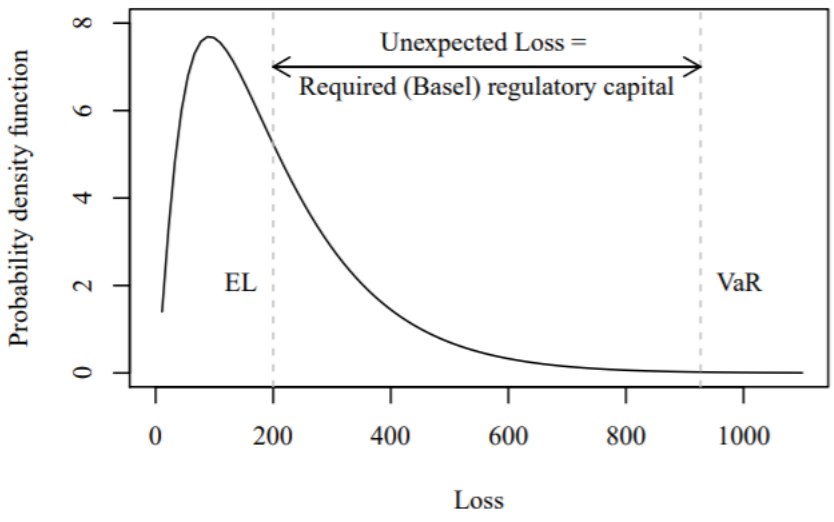

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Figure 4: Illustrative relationship between provisions and regulatory capital from (Krüger, Rösch, & Scheule, 2018)

A key metric to which banks have to comply is a minimum CET1 ratio. Which is calculated by dividing the total eligible common equity tier 1 capital of a bank over its risk weighted assets. The minimum CET1 ratio consists of a regulatory minimum plus some add-ons dependent on factors such as systemic importance of a bank and countercyclical capital buffers. Banks that are undercapitalized i.e. have an insufficient CET1 ratio, are obliged to apply a Minimal Capital Conservation Ratio on their earnings which varies between 0%-100% depending on how much banks deviate from their target CET1 ratio. This MCCR then restrains banks in the amount of capital they are allowed to distribute in e.g. the amount dividends and discretionary bonuses paid. (Basel Committee on Banking Supervision, 2019)

3.10 Provisions & Regulatory Capital

LLPs are how the accounting framework accounts for expected losses made on loans. These calculations are based on ECL. Basel III has its own measure of expected loss on loans, which we refer to as regulatory Expected Loss (EL). Which is calculated by the formula for 12 month EL = PD*LGD*EAD. Large banks calculate the majority of their SME EL under the A-IRB approach. The A-IRB approach allows banks to use internal models to estimate the values for PD, LGD and EAD. When accounting ECL is lower than regulatory EL, then there is a case of an so-called IRB-shortfall. This shortfall has to be deducted from banks' regulatory capital. If the accounting provisions exceed the Basel measure, the entirety of the accounting provisions are deducted from the CET1 capital, and the excess i.e. ECL minus EL, is added back to the bank's Tier 2 capital. For defaulted exposures, a different measure of EL is used, for which the RWA is the maximum of $\{0, 12.5*LGD-EL_{BE}\}$.

If the reduction in CET1 capital threatens a bank to become incompliant with the required CET1 ratio, they will be burdened to source sufficient CET1 capital. Because of the asymmetry between the IFRS9 – Basel EL shortfall vs. Tier 2 add-back, it is more detrimental for the banks' CET1 ratio to have an excess as opposed to having a shortfall.

3.11 Prudential treatment of Loan-Loss Provisions

The EC's action plan to tackle NPLs in Europe has resulted in several regulatory measures to ensure banks to provide minimum coverage on their non-performing exposures. These regulations are formulated in several documents of which the 'EC proposal for Statutory Backstops', the 'ECB addendum to the ECB guidance on Non-Performing Loans' and the ECB's 'Communication on supervisory coverage expectations for NPEs' are the most relevant. These regulations describe similar methods of requirements for minimum loan loss coverage by prescribing a minimum percentage of loan-loss coverage based on the vintage of the NPE and the degree to which an exposure is secured. The regulations differ in the scope of exposures to which they apply to, which is based on the exposure origination date, and whether the requirement is binding (Pillar 1), or advisory. (Pillar 2).

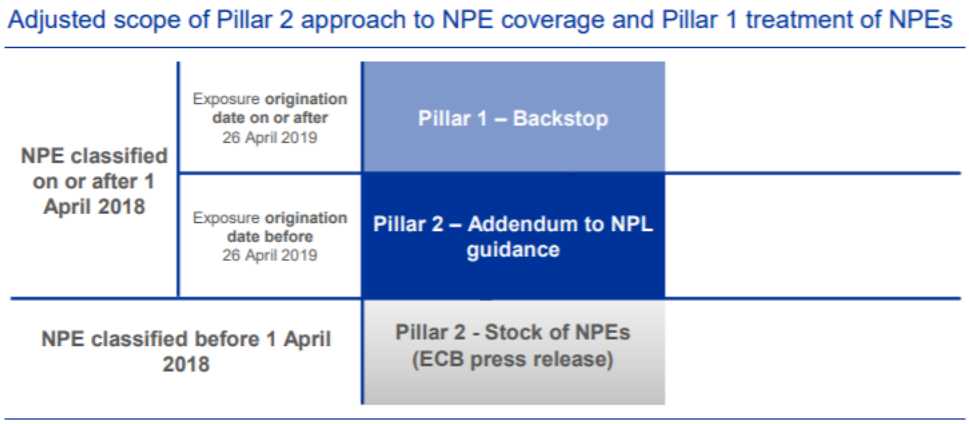

Figure 5: Scheme of applicable frameworks of prudential coverage requirements and expectations

3.11.1 Coverage Expectations on Stock-NPEs

The ECB communication on supervisory coverage expectations (European Central Bank, 2019) for NPEs describes a Pillar 2 measure which applies to European banks stock of NPLs, which originated before 1 April 2018. The pillar 2 nature of this measure means that it is non-binding, but will serve as a basis for supervisory dialogue based on the Supervisory Review and Evaluation Process (SREP). Banks either have to comply with the supervisory expectations, or be able to explain why they are deviating from them.

The minimum coverage amount is based on two factors: first a bank is categorized in either group 1, 2 or 3, based on its NPL ratio. Banks with an NPL ratio below 5% are placed in group 1, banks with an NPL ratio between 5% and 12,5% are placed in group 2, and banks with a NPL percentage higher than 12,5% are placed in group 3. Banks have to target an initial coverage ratio for unsecured loans with a vintage of over 2 years, and secured loans with a vintage of 7 years, depending on their group.

Phase-in paths for NPE coverage recommendations

		Group 1	Group 2	Group 3
Secured loans > 7 years	Policy starting date	2020	2020	2020
	Initial coverage target (%)	60	50	40
	Annual increase in coverage (pp)	10	10	10
	Full applicability (i.e. 100%)	2024	2025	2026
	Linear path before 7 years	No	No	No
Unsecured loans > 2 years	Policy starting date	2020	2020	2020
	Initial coverage target (%)	70	60	50
	Annual increase in coverage (pp)	10	10	10
	Full applicability (i.e. 100%)	2023	2024	2025
	Linear path before 2 years	No	No	No

Figure 6: Pillar 2 backstop for Stock NPLs - Source: (European Central Bank, 2019)

For example, a bank in group 1 has to target an initial coverage ratio on 60% for unsecured NPEs with a vintage > 2 years, and this percentage increases with 10 percentage points annually, such that the entire exposure is covered after 4 years. It is worth noting that the supervisory expectations are relatively more strict for banks which have a lower NPL-ratio, whereas high NPL banks have a lower coverage target.

3.11.2 Coverage Expectations of the Addendum to the ECB guidance on NPLs

The loan loss coverage requirements described in the ECB's 'Addendum to the ECB guidance on Non-Performing Loans' apply to non performing exposures originating between 1-4-2018 and 26-4-2019. As a non-binding pillar 2 measure, the loan loss coverage requirements as described by this measure will primarily serve as a basis for supervisory dialogue, based on SREP. Actual supervisory measures will only be taken when the bank's deviation from the coverage is non-justifiable.

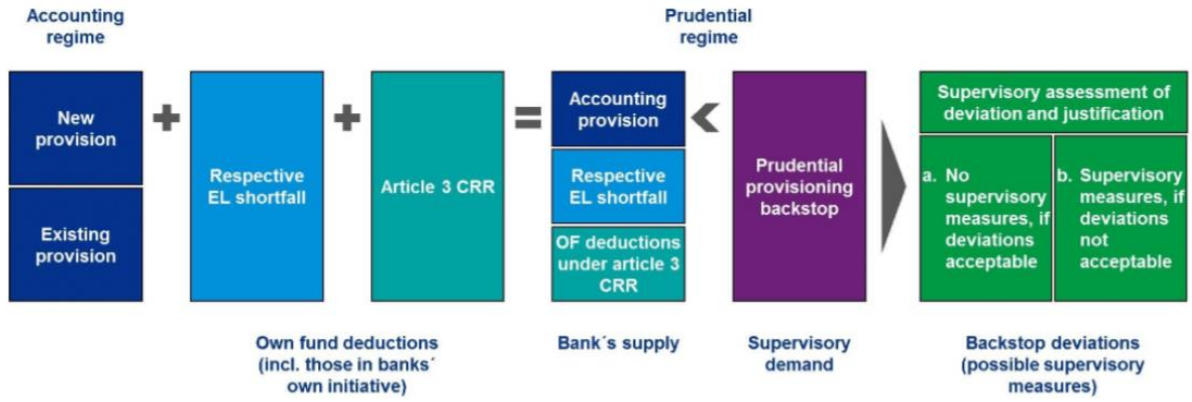

Figure 7: Elements of pillar 2 backstop

The minimal provisioning requirement is based on the vintage of the NPL, and the type of collateralization (if any). The coverage requirements scale with the vintage of the NPL: the unsecured part of a NPL has to covered for 35% after 2 years of vintage, and 100% thereafter. The secured part of the NPL has an increasing coverage requirement between 3 and 7-9 years, based on whether the security is based on movable or immovable collateral.

Table 2: Coverage expectations of the pillar 2 backstop

Adjusted calibration of the coverage expectations calendar for new NPEs subject to the Addendum

Number of years as NPE	Unsecured part	Secured part	
	Pillar 2 – Addendum (adjusted calibration)	Pillar 2 – Addendum (adjusted calibration)	
		Secured by collateral other than immovable property	Secured by immovable property
More than 1	-	-	-
More than 2	35%	-	-
More than 3	100%	25%	25%
More than 4	100%	35%	35%
More than 5	100%	55%	55%
More than 6	100%	80%	70%
More than 7	100%	100%	80%
More than 8	100%	100%	85%
More than 9	100%	100%	100%

3.11.3 Pillar 1 Prudential Backstop

The EC Pillar 1 Prudential backstop is similar to the pillar 2 backstop in its functioning. The major difference here is that, being a pillar 1 measure, the PPB is a binding regulation. Due to the fact that this regulation will replace the previous two measures – applying to all newly originated NPEs after 26-4-2019 – and the binding nature of this regulation, this will be the regulatory measure concerning minimal loan loss coverage that will have to most impact on banks which have to comply with this measure. The pillar 1 backstop obliges banks to deduct the amount that is insufficiently covered from their own capital automatically.

Table 3: Minimum coverage requirements of the pillar 1 backstop.

Minimum coverage level (in %)									
After year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Unsecured	0	35	100						
Secured by other CRR eligible collateral	0	0	25	35	55	80	100		
Secured by immovable collateral	0	0	25	35	55	70	80	85	100

The above table 3 describes the minimum coverage amount for loan loss coverage under the Pillar 1 Backstop, these are the same values as the pillar 2 backstop due to retroactive alignment of both measures after the introduction of the pillar 1 backstop[9].

3.11.4 Interaction effects between regulatory NPE-coverage requirements and IFRS9 provisioning on banks' capital

When observing the minimum coverage level requirements of the pillar 1 backstop, it becomes apparent that the coverage requirements of unsecured exposures are more strict than for unsecured exposures: unsecured exposures have to be fully covered after 3 years of NPE vintage, while secured NPEs only have to be fully covered after 7 or 9 years of vintage depending on collateral type. When looking at these values in isolation, it would seem that the introduction of the pillar 1 backstop would have the greatest impact on capital for unsecured NPLs which banks carry. But it is the secured part of the NPE

[9] The Pillar 2 backstop used to have slightly different values coverage requirements in terms of vintage and collateralization. With the introduction of the pillar 1 backstop these values have been adjusted to match with the Pillar 1 backstop (European Central Bank, 2019)

portfolio that could account for the greatest capital deductions for banks which emphasize on collateral based financing. This is due to the way IFRS9 provisioning works. For unsecured non-performing loans, the expected-loss based IFRS9 provision will be close to the minimum coverage requirement of the Pillar 1 backstop. Whereas for secured NPEs, there will be a larger difference between minimum PPB coverage requirement and the IFRS9 provision due to the fact that IFRS9 provisioning would be lower due to the consideration of the value of the collateral irrespective of the NPL vintage. The European commission reasons that this is a fair effect: its main reasons is its argument that the recoverability prospects of collateral securing a NPE would decline as its vintage increases. (European Parliament, 2019)

4. Differences between European peer banks of Rabobank

4.1 General Overview

This chapter explores different characteristics of European banks within the peer group of Rabobank with regards to SME-financing, asset-quality, NPL-ratio's and stocks, and behaviour with regards to provisioning and collateralization.

The peer group on which our analysis focusses consist of 15 banks, which have total assets on their balance sheets in the range of €291 billion, to €1,7 trillion euros as of 31-12-2019[10]. The banks are located in different European countries. Three banks are located in France, three in the Netherlands, two in Spain and Germany. Denmark, Great Britain, Finland and Belgium each seat one bank of the peer group.

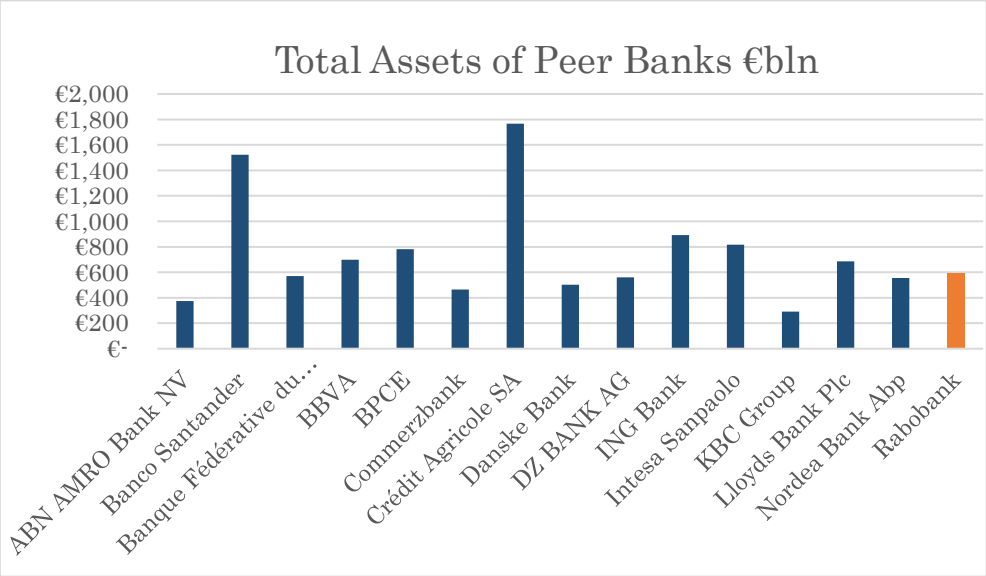

Figure 8: Amount of total assets of peer group banks (Source: S&P SNL)

The peer group consists of the following European banks:

1. ABN AMRO N.V.
2. Banco Santander S.A.
3. Banque Fédérative du Crédit Mutuel S.A.
4. Banco Bilbao Vizcaya Argentaria, S.A.
5. Groupe BPCE S.A.
6. Commerzbank A.G.
7. Crédit Agricole S.A.

[10] All data and figures in this chapter are with reference date 31-12-2019 unless stated otherwise.

8. Danske Bank A/S
9. DZ A.G.
10. ING Groep N.V.
11. Intesa Sanpaolo S.p.A.
12. KBC Group N.V.
13. Lloyds Bank PLC.
14. Nordea Bank Abp.
15. Coöperatieve Rabobank U.A.

The Banks in the peer group consist mainly of large retail banks, some with a significant portion of revenue stemming from insurance activities. In Appendix B, a more detailed description of each bank is given. SME-financing is of varying significance. With Crédit Mutuel being largest SME-financer in relative terms with 27,46% of total assets being SME loans[11]. Crédit Agricole is the largest financer in absolute terms, with €159 bln euros gross carrying amount of SME loans. DZ has the smallest ratio of SME loans to total assets. This can be at least partly attributed to the fact that DZ predominantly acts as the centralized institution of a large group of cooperative German banks, and therefore does not partake in a significant amount of SME financing itself.

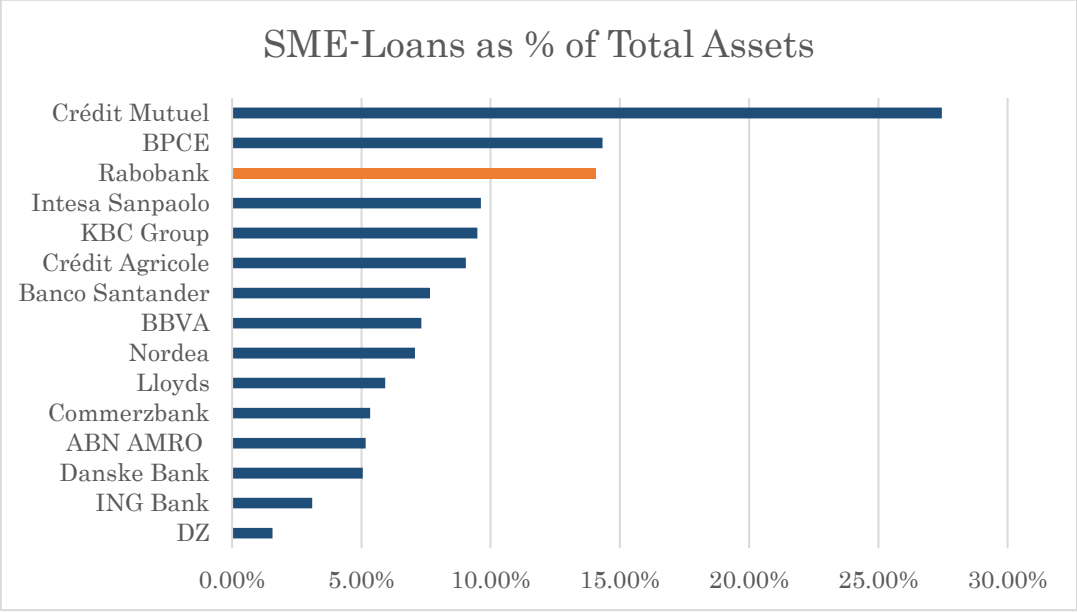

Figure 9: SME- Loans as % of Total Assets (Source: EBA Transparency Exercise data, S&P SNL Market Intelligence & author's calculations.)

[11] According to the COREP values following the EC definition of SME, see also footnote 3. FINREP figures such as reported in banks' annual reports can use different definitions of SME, thus being less suitable for intra-bank comparison.

Figure 8 in appendix E shows the distribution of the loans to non-financial companies for each bank. It can be noted that most banks do not seem to be specialized in specific sectors. Some banks, such as Danske, Nordea and Crédit Mutuel have a significant portion of their loans outstanding in real-estate activities. BBVA, Intesa Sanpaolo and Commerzbank have large stakes of their loan portfolio in the manufacturing industry. Rabobank is a clear outlier with regards to its specialization in the category of agriculture, forestry and fishery, which accounts for over 33% of its portfolio. Lloyds follows as a distant second in this regard, with 7.9% of its loan portfolio in this category.

4.2 Asset Quality

As shown in figure 1: NPL ratio's vary significantly between European countries. These differences are also reflected within the peer group. with the median value of NPLs being below 5%. Italian bank Intesa Sanpaolo is a clear outlier with 21.43% of its SME portfolio being non-performing.

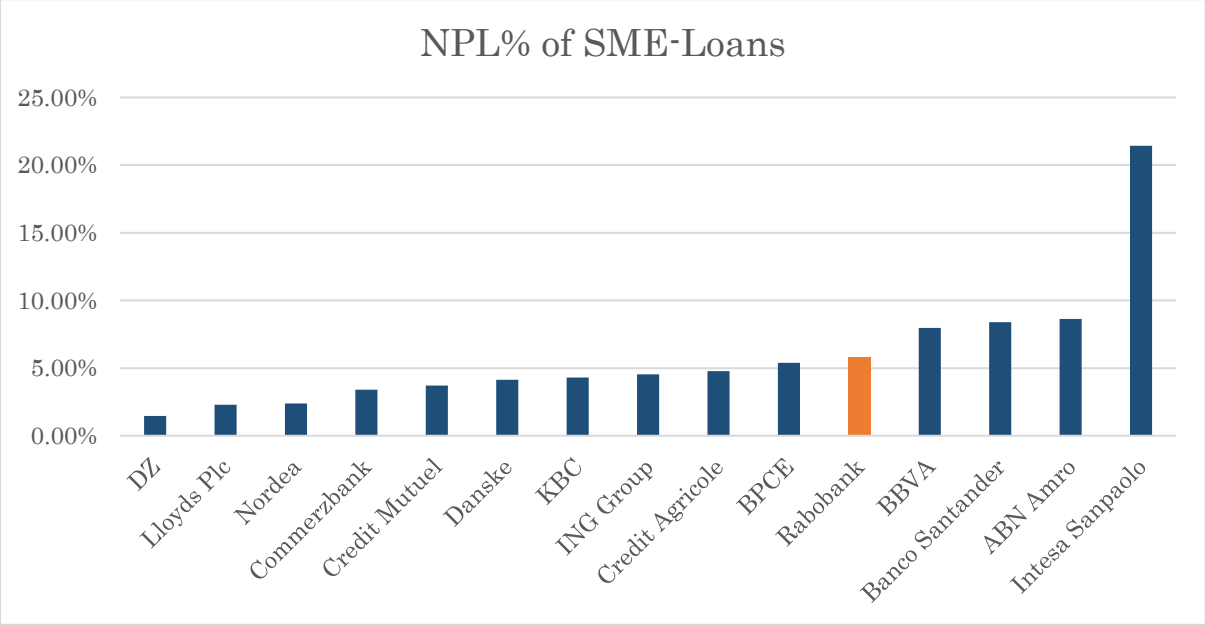

Figure 10: Non-Performing SME-loans according to the EBA definition as a percentage of gross SME-loans. (Source: EBA Transparency exercise)

Vintage of Stock NPEs

The effects of the impending MCRs pertaining to the stock-NPEs (pillar 2 backstop) are dependent of the vintage of current stock of NPEs (i.e. the spent time in defaulted state (TiD)), data about the vintage of the stock of NPLs is manually retrieved from the banks' pillar 3 disclosure documents. Banks report this information in with varying quality of data. Banks which did not provide full disclosure of the NPLs vintage in adequate granularity were excluded from the selection.

Table 4: Vintage of Stock NPLs (Source: Banks' Pillar 3 Disclosures)

x €mln	NPLs	<90	90-180	180-1yr	1-2yr	2-5yr	5-7yr	>7yr
ABN	6,987	5,434	356	174	421	345	179	78
BBVA	15,957	8,107	1,323	1,930	2,329	1,970	148	149
ING	10446	5621	1191	1025	1097	1119	191	203
Intesa Sanpaolo	31617	5746	593	1910	2973	8006	4648	7741
KBC	1657	830	127	75	74	148	120	284
Lloyds	11789	6427	2084	1187	1068	813	151	59
Nordea	5329	4293	131	248	272	216	216	43
Danske	44146	40644	945	1178	453	432	183	311
Rabobank	15705	12201	926	639	610	987	169	174
Santander	33309	11925	4345	4390	3370	4778	4253	248

Exposure amount of total NPLs by vintage as of 31-12-2019

Table 5: Vintages of Stock of SME NPLs

x €mln	NPLs	<90	90-180	180-1yr	1-2 years	>2 <5	>5 <7	>7
ABN	1,674	1,191	70	27	108	163	74	41
BBVA	4,078	1,719	203	504	878	719	23	31
ING	1256	750	49	83	147	155	28	44
Intesa Sanpaolo	16852	2149	229	647	1179	4478	3015	5155
KBC[12]	9	7	2					
Lloyds	789	550	207	8	19	3	2	
Nordea	1287	1011	27	65	37	50	88	10
Danske	12721	12035	119	111	93	122	84	157
Rabobank	4800	3624	400	309	194	201	40	33
Santander	9787	3010	731	1166	1028	1827	1969	57

[12] Belgian law only differentiates between small companies and large companies. Belgian companies that are classified as SME under the EC definition, are defined either as small or large under local law. (EY, 2015)

For SME loans, it can be noted that for most banks, the part of old NPEs with TiD of larger than 5 years is a small minority of total NPLs. Intesa Sanpaolo is an outlier in this with almost half of NPEs being older than 5 years. Santander has 40% of its loans in the 5 to 7 year bucket. For Rabobank, only about 1.5% of all SME NPLs are older than 7 years. These figures are indicative to the amount the degree of which these banks are impacted by the pillar 2 MCRs.

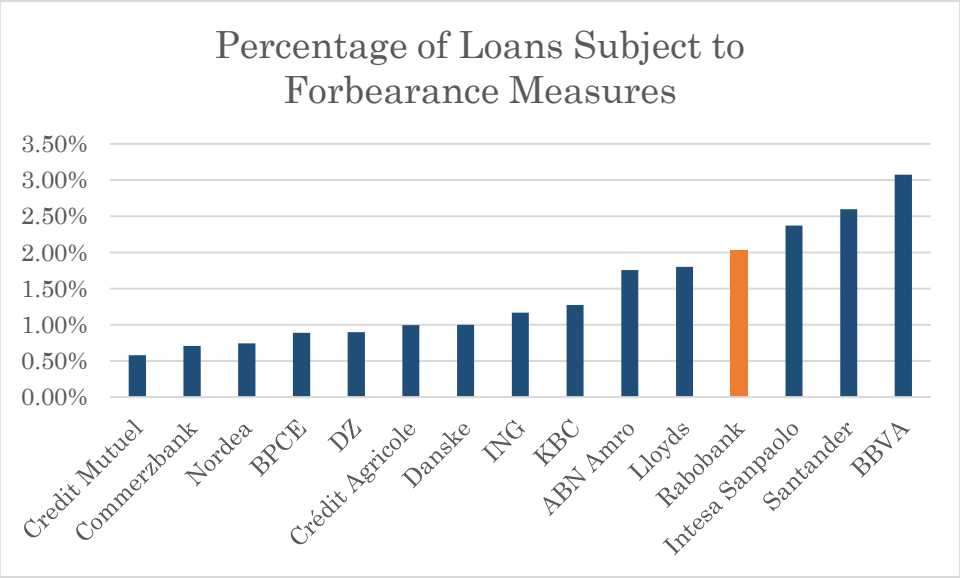

Figure 11: FBL percentage of Rabobank and its peers, considering SME-loans according to the COREP definition of SME as of 31-12-2019 (Source: EBA Transparency Exercise Data)

4.3 Provisions, Coverage and Collateralization

To mitigate credit risk, banks cover their loans with provisions according to the expected loss associated to these loans. Securing a loan with collateral is another way of mitigating credit risk, as in a case of default, the bank can claim the pledged collateral and the associated cash-flows. The ratio of provisions on NPLs divided over the total amount NPLs is known as the coverage ratio. The coverage ratio is an important measure which European supervisors determine bank stability. Insight in the provisioning behaviour of banks in the peer group is obtained by consulting EBA Transparency Exercise data. Retrieving the gross carrying amount of NPLs and the reported amount for accumulated impairment, accumulated changes in fair value due to credit risk and provisions, and then calculating the ratio between them. This is done for the total amount of loans and advances outstanding by the bank, as well as specifically for SME-loans.

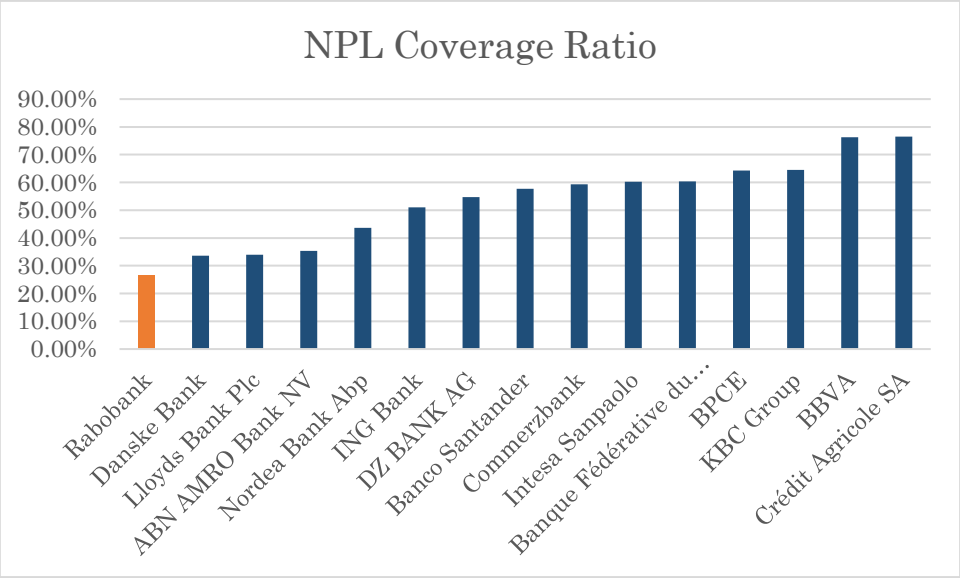

Figure 12: Coverage ratio of NPLs to Non-Financial Corporations (Source: EBA Transparency Exercise & Author's own calculations)

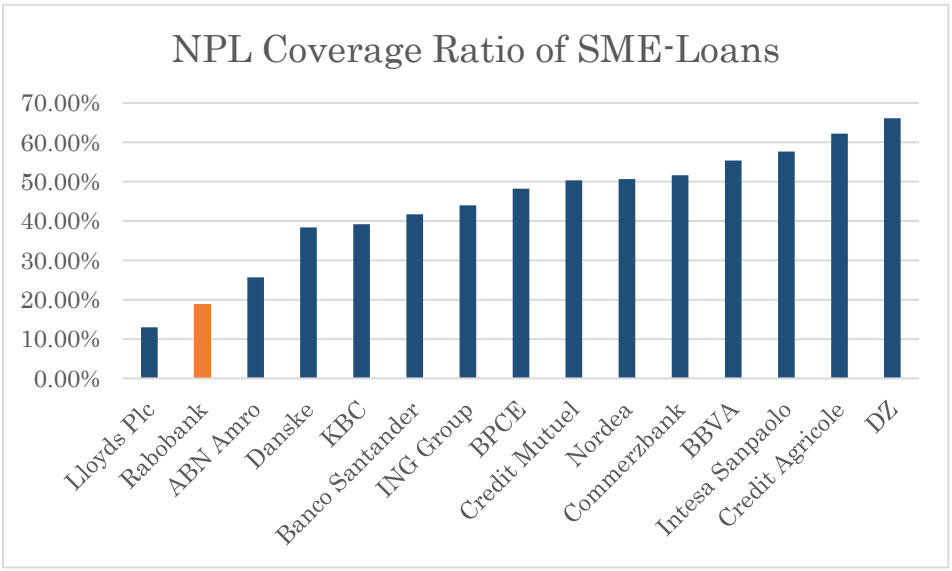

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Figure 13: NPL Coverage ratio of NPLs to SMEs (Source: S&P Market Intelligence, EBA Transparency Exercise Template and own calculations)

It is apparent that there is a large discrepancy between provisioning behaviour between banks. For normal loans, the coverage ratio varies between 26.5% and 76.53%. With Rabobank being the lowest and Crédit Agricole the highest. For SME-loans, this value is 12.95% and 66.09%. Table 10 of appendix E shows the coverage ratio per industry.

For collateralization data is obtained from the EBA transparency exercise, which is reported as 'Collaterals and financial guarantees received on non-performing exposures'. Then the collateralization rate is obtained by dividing this number over the amount of NPLs. An important caveat to this data is that the reported amount of collateral may not exceed the gross carrying amount minus the amount of provisions. Therefore in reality, it is possible that there is more collateral pledged to these loans than reported.

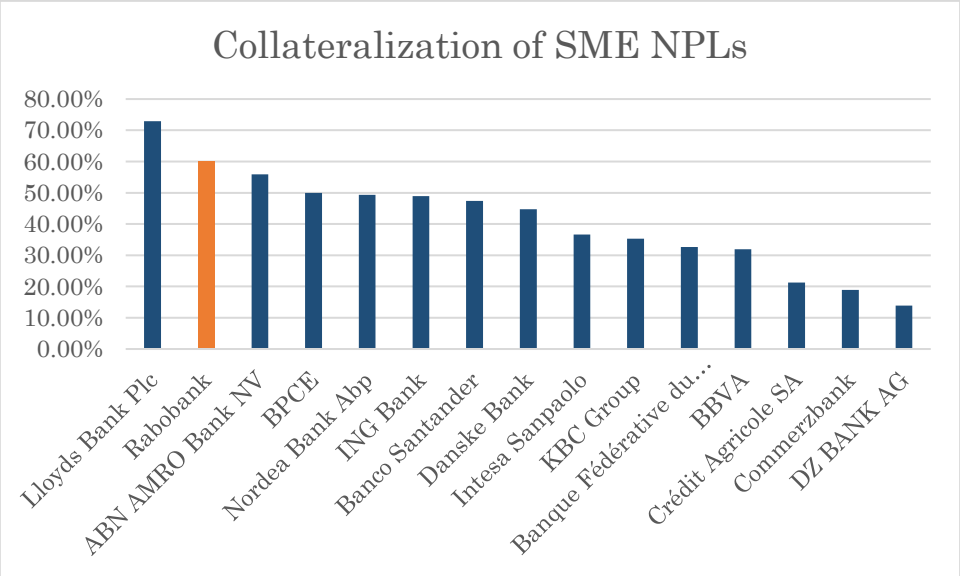

Figure 14: Collateralization of SME NPLs (Source: EBA transparency exercise)

An inverse relationship is visible when comparing the rate collateralization rate of banks with the coverage rate i.e. it appears that banks with a high collateralization rate make lower provisions for their loans than banks with low collateralization rates. To see whether this trend holds a further statistical analysis is made.

4.4 The relationship with between banks provisioning and collateralization rates

It is hypothesized that banks SME NPL coverage ratio is highly correlated to the amount of collateral pledged to the concerning SME NPLs. To test this, data is gathered from all 135 banks covered by the EBA transparency exercise with reference date 31-12-2019. Summary statistics are provided in appendix C. Banks reporting null values for SME loans are removed from the dataset, resulting in a final sample of 108 banks.

The collateralization percentage is calculated by dividing the total collateral and financial guarantees received on non-performing exposures, and dividing this over the total amount of non-performing loans and advances to Small and Medium Enterprises at amortised cost value. The coverage ratio is modelled as the ratio of the 'Accumulated impairment, accumulated changes in fair value due to credit risk and provisions' and the total of loans and advances to SMEs at amortised costs. It should be noted that the value of collateral in the supervisory reports are capped by the value of the net exposure. Therefore it should be expected that the actual value of the collateral pledged is higher in some cases. (Constâncio, 2017)

The coverage ratio is then regressed against the collateralization percentage by means of a simple linear regression:

$$y = \beta_0 + \beta_i X + u_i$$

In this equation, y is defined as being the dependent variable, which in this case is the coverage ratio. β_0 is the intercept, the independent variable being the collateralization rate. And u_i as the error term. (Woolridge, 2012)

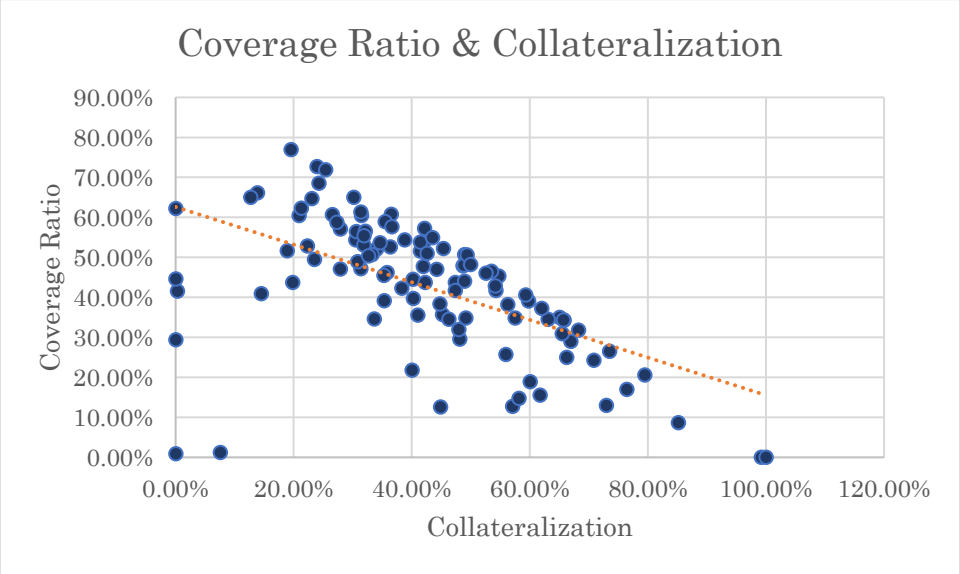

Figure 15: Graph of regression of coverage ratio and collateralization of SME Loans.

Statistical details of the regression can be found in Appendix C, where a significant negative relationship between coverage ratio and collateralization can be observed with a p-value of $3{,}96*10^{-9}$.

4.5 IRB-Shortfall

Banks have to deduct the difference between the expected loss and the impairment on their loans from their CET1 capital. This difference is known as the IRB-shortfall. If the expected loss is lower than the impairment, then there is an IRB-excess, which is added back to the bank's tier-2 capital.

To assess the disparity between the banks provisioning amount to the Basel measure of expected loss, data is consulted from the EBA transparency exercise database. The IRB shortfall in accordance to Articles 36(1) point (d), 40 and 159 of CRR, is reported under COREP C0.01.

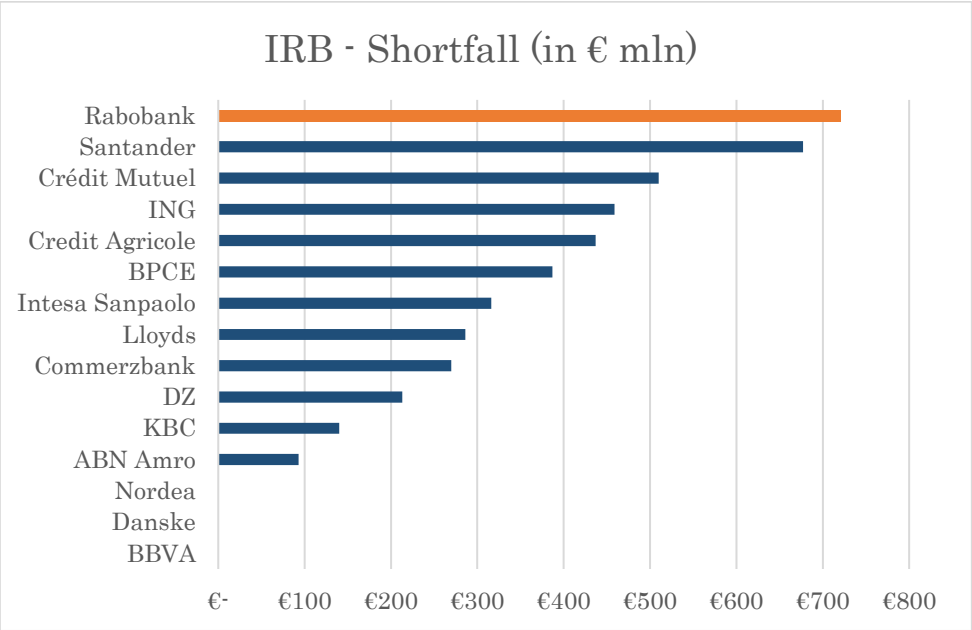

Figure 16: 1IRB -Shortfall due to Credit Risk adjustments to Expected Losses as of 31-12-2019 (Source EBA Transparency Exercise Spring 2020)

It can be noted that Rabobank has the highest IRB-shortfall of the peer group both in relative terms when compared to total assets, as well as absolute terms. When further analysing the data from all 130+ EBA reporting banks, it can be noted that Rabobank has the 3rd highest absolute IRB-shortfall, trailing only Standard Chartered and HSBC. This can in part be explained by the low impairment of Rabobank, as shown in figure 8 on coverage ratios.

5. Quantitative impact of MCRs

5.1 Effects of Minimum Coverage Requirements

The financial effects of the minimum coverage requirements are based on the costs of the extra amount of CET1 capital that is required to cover the difference between the amount of provisions and the required amount of coverage. To calculate the costs associated with the MCRs, the following four input parameters are required:

1) The amount of exposure of the loan prior to write-offs
2) The date of default of the exposure
3) The type and amount of collateralization of the exposure
4) The amount of provisions and other deductions allocated to the exposure

Using these parameters and comparing them to the corresponding MCRs, it can be determined how much extra CET1 capital is required in each year to be compliant, assuming that LGD equals EL_{BE} in all cases. This extra capital can then be multiplied with the % cost-of-capital of the bank to obtain the yearly funding costs. The negative future cash-flow of these costs can then be discounted to net-present value to calculate the financial impact of the MCRs. In this section, example cases will serve to illustrate the financial impact for individual NPLs. For both MCRs under the regime for stock-NPLs and newly originated NPLs, a case will be considered for a wholly unsecured loan and a loan fully secured by immovable collateral. In all cases, it will be assumed that incoming payments from the debtor has fully halted, the remains defaulted i.e. does not cure, and the loan is not written-off for the entire time-horizon considered.

5.2 Single Loan Effects of the MCR related to the Stock of NPEs

Case 1:

To illustrate the effects of the MCR with regards to the stock of NPLs of a bank, consider an unsecured loan which defaulted in January 2014, with an exposure value of 500.000 prior to write-offs, which is provisioned for 350.000, issued by a bank with an NPE-ratio of 3%.

Table 6: Input Assumptions: Pillar 2 Backstop - Unsecured Case

Exposure Value	€ 500.000
Loss Given Default	70%
Default date	1-1-2014
Collateralization	Unsecured
Provisions	€ 350.000
Cost-of-capital	8%
Risk-free Rate	2%
Bank NPE-percentage	3%

The 3% NPE-ratio of the bank places it in group 1, which for an unsecured asset corresponds to an initial coverage target of 70% for unsecured assets with more than 2 years of vintage. with an 10% increase yearly to a 100% coverage in 2024. With the loan being defaulted in 2014, it already has >2 years of vintage once the MCR regulation start to become applicable at the end of 2020.

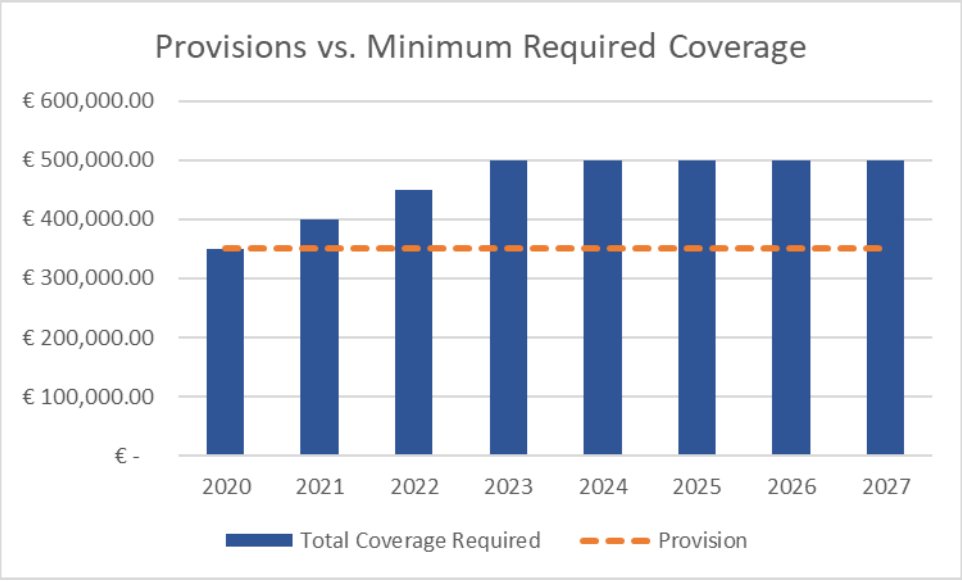

Figure 17: Case 1: Provisions vs. MCRs

The difference between the eligible amount of provisions and the minimum coverage requirement €50.000 in the first year, and increases to € 200.000 per year from year 4 onwards. This is the amount the bank has to deduct from its CET1 capital, which has to now be sourced elsewhere assuming the bank wants to keep its CET1 ratio constant.

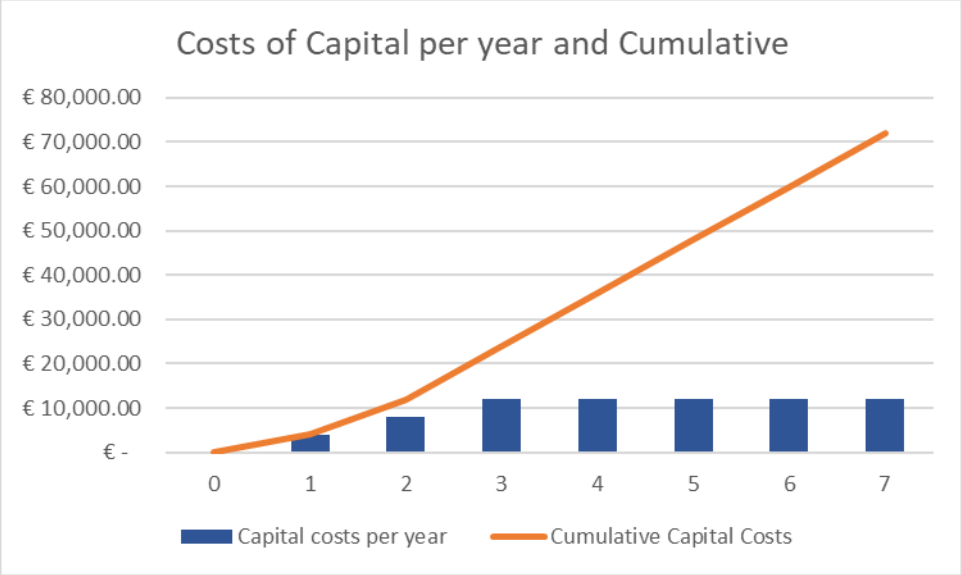

Figure 18: Case 1: Costs-of-Capital

Assuming a cost-of –capital of 8%, the associated costs are € 4000 in the first year, increasing to 16.000 per year from year 4 onwards. When using a 2% interest rate as discount factor, the NPV of the cumulative costs of capital will be € 94.864,04 over a 7 year horizon.

Case 2:

Considering a case of a loan with the same 500.000 exposure value, with the same default date, but with the difference in being fully secured with immovable property. And having a lower provisioning value to reflect the recovery prospects provided by the collateral.

Table 7: Input Assumptions - Pillar 2 Backstop - Secured Case

Exposure Value	500.000
Loss Given Default	20%
Default date	1-1-2014
Collateralization	500.000 Secured by immovable Collateral
Provisions	100.000
Cost-of-capital	8%
Risk-free Rate	2%
Bank NPE-percentage	3%

In accordance with the table for MCRs on stock-NPEs, for a bank in group 1, the MCRs start at 60% of total value in 2021 – when the collateralized loan reaches >7 years of vintage, increasing with 10% each year, until full coverage is reached from year 5 onwards. Assuming constant provisions of € 100.000, the gap between the current provisions and the MCRs start at € 250.000 and grow to €400.000.

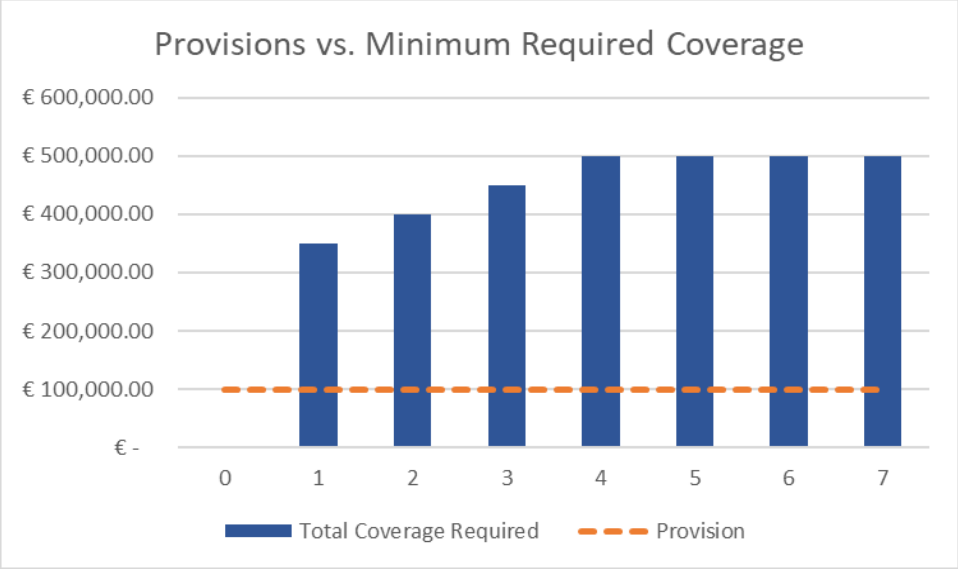

Figure 19: Case 2: Provisions vs. MCRs

Assuming 8% Cost-of-Capital, the costs associated to covering the gap between provisions and MCRs start at € 20.000 in year 2, linearly increasing to € 32.000 in year 5 and onwards. Accumulating to a total cost of € 200.000 over an 8 year horizon.

Discounting with a 2% interest rate yield a NPV of the costs of € 183,880 over a 7 year horizon.

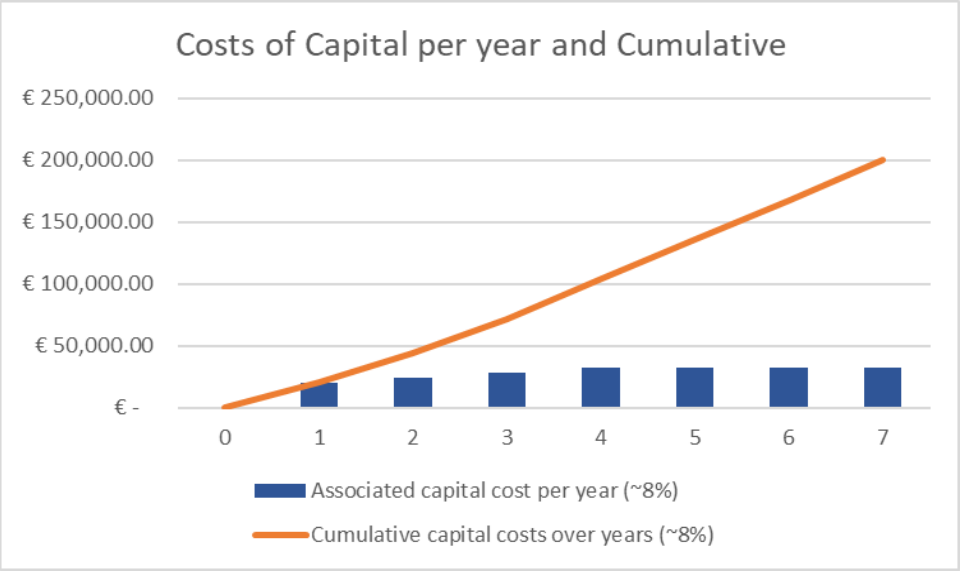

Figure 20: Case 2: Costs of Capital

7.3 Effects on the Loan-Level of the Pillar 1 Prudential Backstop

Under the pillar 1 prudential backstop, the NPL-ratio of the bank becomes irrelevant to the degree of MCR. Instead, the same MCR scales apply to all complying banks regardless of the current level of NPL-stock.

Case 3:

Consider the same unsecured loan as in case one, except for the date-of-default which is set to 31-12-2019. Which makes it subject to the pillar 1 prudential backstop.

Table 8: Input Assumptions: Pillar 1 Backstop - Unsecured Case

Exposure Value	500.000
Loss Given Default	70%
Default date	31-12-2019
Collateralization	Unsecured
Provisions	350.000
Cost-of-capital	8%
Risk-free Rate	2%

Applying the MCR scales related to unsecured NPLs originated after 26-04-2019, the minimum coverage requirements are then 35% of the exposure value in 2022, and 100% from 2023 onwards.

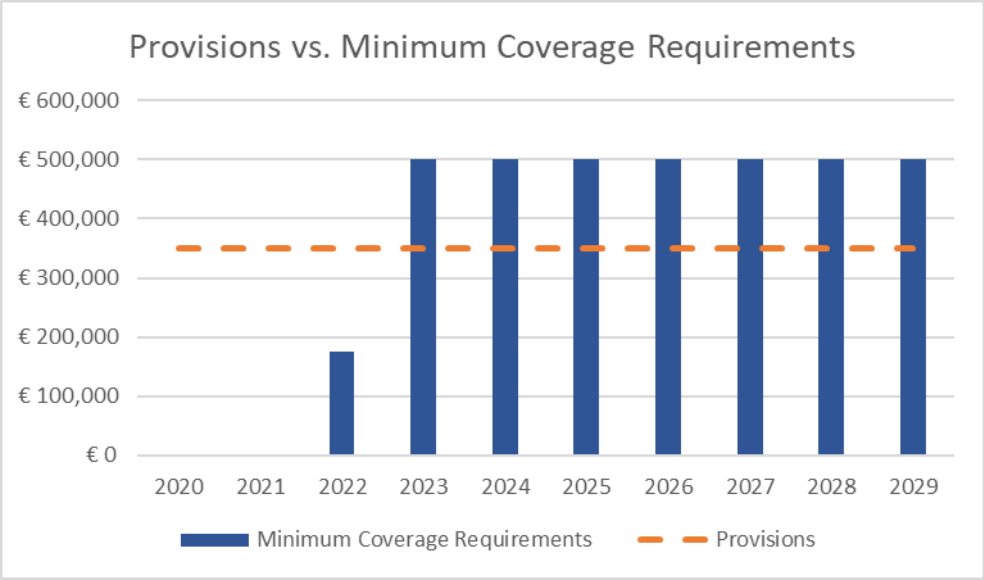

Figure 21: Case 3: Provisions vs. MCRs

Due to the MCR being below eligible provisions, there are no capital costs associated with the year 2022. From the third year onwards, the gap between provisions and MCRs equal € 150,000. Which are associated with a yearly capital cost of € 12,000. The summation of the discounted cash-flows over a 9-year horizon equals € 74,648.

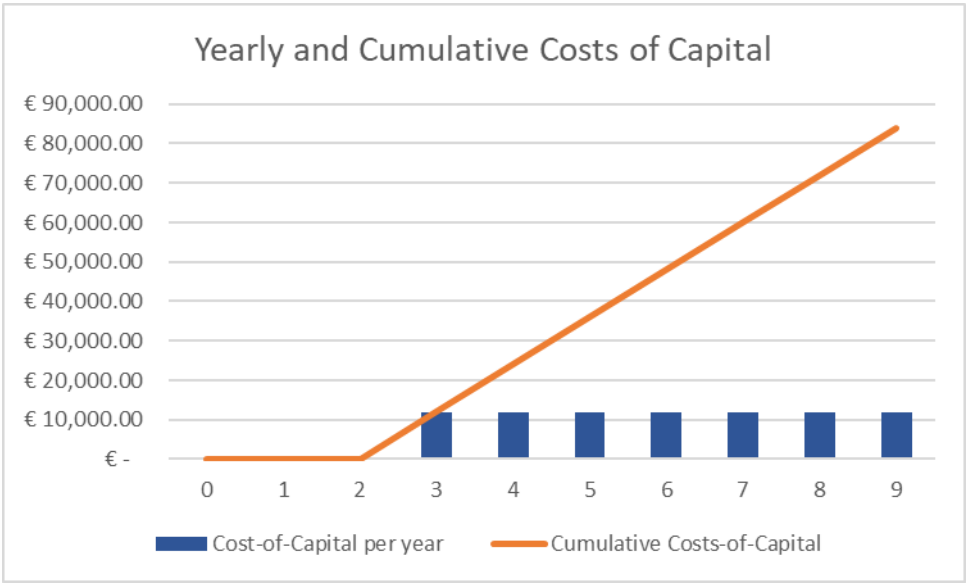

Figure 22: Case 3: Costs of Capital

Case 4

Consider the same NPL as in case 2, but with the exception of the date-of-default being 31-12-2019.

Table 9: Input Assumptions: Pillar 1 Backstop - Secured Case

Exposure At Defaut	500.000
Loss Given Default	20%
Default date	31-12-2019
Collateralization	500.000 Secured by Immovable Collateral
Provisions	100.000
Cost-of-capital	8%
Risk-free Rate	2%

MCR kicks in at 25% of exposure after 3 years of vintage, increasing to 100% after 7 years, resulting in a gap between MCR and provisions of € 25,000 in 2023 increasing to € 400,000 in 2029 onwards. Comparative to the previous case the magnitude of the MCRs are lower, but the shortage of capital is higher during the lower provisioning amount.

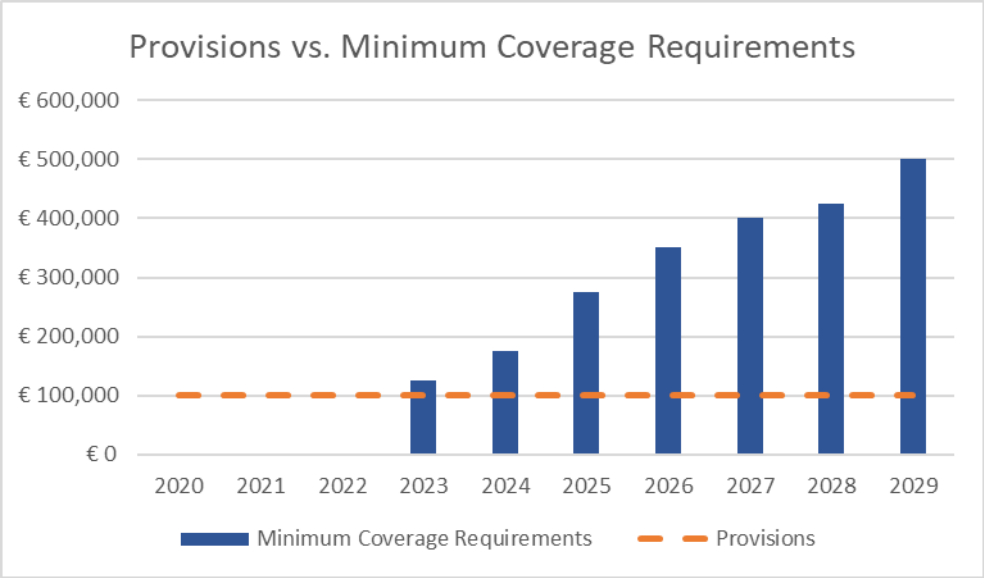

Figure 23: Case 4: Provisions vs. MCRs

The associated yearly cost of capital increase from € 2,000 after 3 years to € 32,000 after 9 years and onwards. Over a 9-year time horizon, the net-present-value of the cumulative costs of capital equal € 107,728.

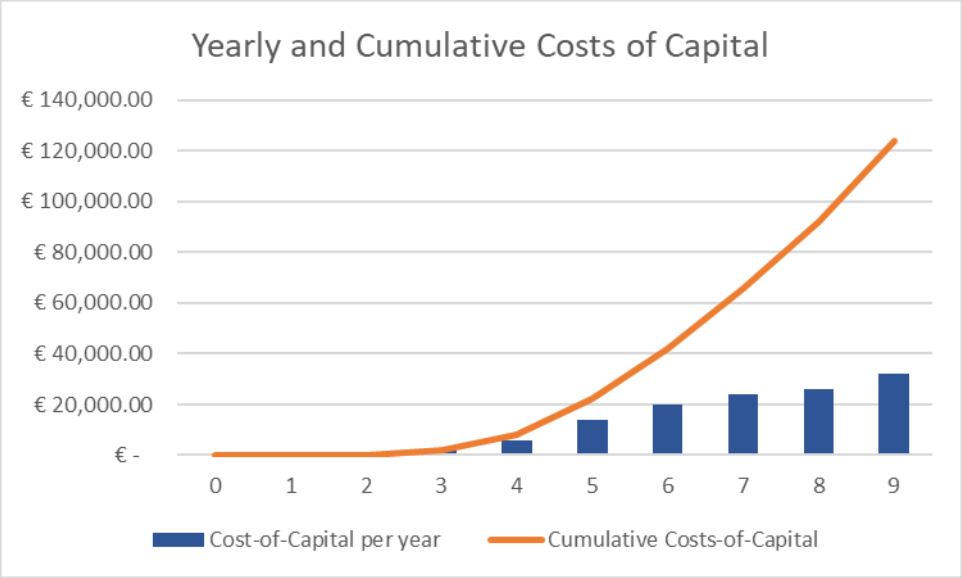

Figure 24: Case 4: Costs of Capital

5.3 Modelling the Pillar 1 Backstop on Portfolio Level

In order to assess the effects of the pillar 1 prudential backstop on banks on a portfolio level, a model is constructed to simulate the dynamics of NPL-flows and corresponding minimum coverage requirements. The goal of the model is to construct a forward looking projection the quantitative impact the prudential backstop has on a banks' CET1 capital and associated capital costs. A similar approach of simulation was followed as in the 2017 EBA Report of Prudential Backstops (European Banking Authority, 2017) in order to make a comparable assessment of the quantitative impact from a supervisory perspective. With this method, a simulation NPL dynamics is modelled under static balance sheet assumptions i.e. the most recent values for the model parameters are obtained from the latest available FINREP and COREP documentations, and are assumed not to change during the time horizon of the projection. An important deviation from the EBA-approach to be made is to incorporate the effects of the mandatory probation-period for recently cured NPLs – which obliges banks to consider NPLs that have returned to performing status as Non-Performing for a minimum of another 12-months.

5.3.2 Model Dynamics

To adequately model the dynamics of NPLs, MCRs, provisions and associated CET1 deductions, a construction is made of the inflow and outflow of NPLs on a banks' sheet considering the following events: 1) The total yearly inflow of loans of a bank proportionally to the total loans of a bank's balance sheet. 2) The inflow on NPLs multiplying the total loan inflow with a default rate. 3) To account the fact that a fraction of the defaulted loans cures, and returns to performing status, a cure rate is applied which reduces the exposure amount of NPLs 4) Loans that are cured, are given the status of loans under probation, and will be considered Non-Performing for an additional 12 months. 5) To account for (partial) recoveries on NPLs by e.g. repayment or realization of collateral, a recovery rate is applied which deducts the recovered amount from the total exposure value of NPLs.

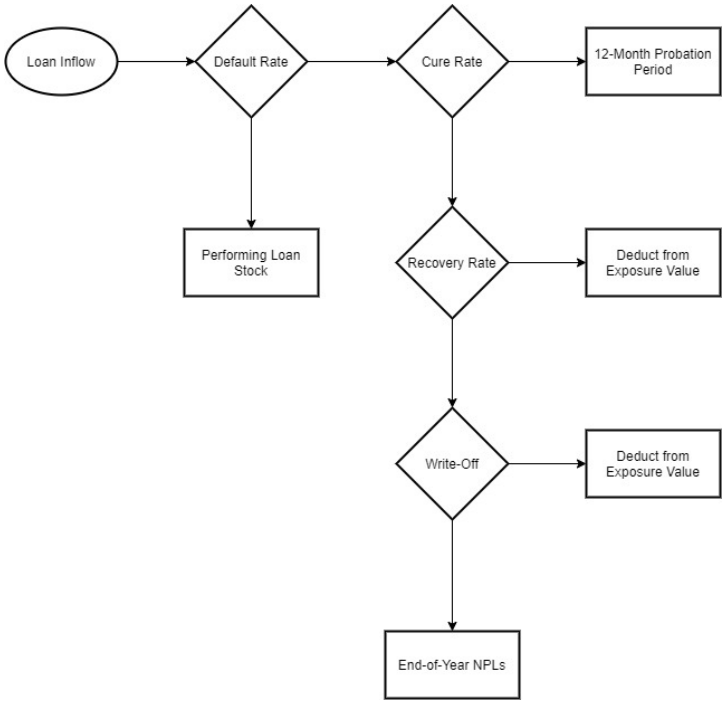

Figure 25: Schematic overview of NPL dynamics

NPLs that did not cure, have not recovered or have not been written off during a year, are summed with the loans under probation and the total is considered to be eligible for the associated MCRs for NPLs of their vintage and collateralization type. The MCRs are compared against the provisioning rate employed by the bank, and from there the accompanying CET1 deduction is calculated. Hereafter, these loans are transferred to the next book-year as NPLs of an increased vintage. It is assumed in this model that NPLs that have cured, will not default again during their probation period, and therefore will always return to the stock of performing loans of the bank. A detailed breakdown of the model components and underlying assumption is as follows:

Loan flow:

1. The minimum coverage requirements considering the pillar 1 prudential backstop affect loans that are classified as NPEs after 1 April 2018, and have originated after 26th of April of 2019. To isolate this subset of loans, a construction is made of the future loan inflow of the bank. The yearly loan inflow is modelled as a percentage of the current stock of loans.

$$LF_t = \frac{1}{tf} * TL$$

Where LF_t is the loan flow at time t, TL is the total customer loans on a bank's balance sheet, and tf is the time factor which the portfolio will be built. To model the stock of loans eligible to be subject the Pillar 1 backstop when defaulting, it is assumed that the stock of eligible loans grows to the amount of the total loans in tf number of years. After the amount TL is reached, the value is kept constant over the entire rest of the time horizon of the simulation.

$$LS_t = \min\left\{\frac{TL}{tf} * t, TL\right\},\ t \in \mathbb{N}$$

NPL dynamics:

To adequately model the NPL-dynamics of a bank with regards to MCRs and loan loss provisioning, it is required to be able to assess the two input variables of the MCR calculations, 1) Time the loan has spent in a defaulted state, 2) The type of collateralization associated to the loan. To obtain the required granularity of data, the NPL dynamics are modelled in three parts.

2. Model the total amounts of NPLs of each vintage for all years of the encompassing time horizon by multiplying LS_t with the probability of default, correcting for loans that cure, are written-off or are recovered.

$$NPL_{v,t} = \begin{cases} LSt * PD_t(1 - (CR_{v,t} + W_{v,t} + R_{v,t})), & v = 0, \quad v, t \in \mathbb{N} \\ NPL_{v-1,t-1}(1 - (CR_{v,t} + W_{v,t} + R_{v,t})), & v \geq 0, \quad v, t \in \mathbb{N} \end{cases}$$

Where $NPL_{v,t}$ is the exposure amount of Non-performing loans of vintage v at time t, PD_t is the proportion of loans that defaults at time t. $CR_{v,t}$ is the percentage of loans of vintage v that cures at time t, $W_{v,t}$ is the percentage of exposure value of loans of vintage v at time t that is written off. And $R_{v,t}$ is the percentage of the exposure value of NPLs that recovers of vintage v at time t.

3. The amount of loans that are considered to be 'under probation' at time *t,* is modelled by multiplying the amount of NPLs of each vintage of the previous year by the exposure value of the amount of loans that cured in the prior year. It is assumed that all loans that are under probation return to performing in the next year.

$$PL_{v,t} = NPL_{v-1,t-1} * CR_{v-1,t-1}, v, t \in \mathbb{N}$$

Summing the two components yields $TNPL_{v,t} = NPL_{v,t} + PL_{v,t}\ v, t \in \mathbb{N}$ as the total amount of loans to be considered for comparison the MCRs of each vintage *v* at time *t*.

4. The total amount of loans subject to the PPB MCRs is evenly divided by collateralization type according to the current division of collateralization types of the bank. It is assumed that loans are either wholly secured or unsecured.
5. The loan loss provisions associated to the defaulted loans are modelled by multiplying the exposure amounts of TNPL with a provisioning factor $PF_{c,v}$, dependent on the type of collateralization *c* and the vintage of the associated NPL exposures *v*.
6. MCRs are compared to the provisioning amounts to compute the CET1 shortfall/excesses. Loans which are provisioned below the required amount, yield a shortfall, whereas loans with surplus provisions yield an CET1 excess. Regulations dictate that loans with an CET1 excess, cannot compensate for loans with a CET1 shortfall. Therefore negative amounts for CET1 deductions are not considered for the calculation of the total CET1 deduction for a bank's portfolio over that year.

$$SF_t = \sum_{s} \sum_{v=0}^{t} \max\{0, MCR_{s,v,t} - P_{s,v,t}\}$$

For each year *t* the positive values of the differences between provisioning values and minimum coverage requirements summed up for NPLs of all vintages of that year, to obtain the total amount of CET1 shortfalls for NPLs of each collateralization type by which the exposure is secured *s,* which is either *Unsecured, Secured by Movable Collateral,* or *Secured by Immovable Collateral.* These components are then summed to obtain the total amount of CET1 shortfalls in year *t*.

7. Associated yearly capital costs are computed by applying a capital costs factor *c* to the amount of CET1 shortfalls in each year for the loans of each collateral type .

The net present value of the future cash-flows is calculated by discounting the flow of capital costs with the risk-free rate r_f over time horizon h.

$$CPV_h = \sum_{t=0}^{h} \frac{c * SF_t}{(1 + r_f)^t}$$

Where CPV_h is the net present value of the costs of capital over time-horizon h, which is obtained by summing the NPV of capital costs of each NPL type.

5.3.3 Data gathering and parametric inputs

To assess the variability of the pillar 1 backstop's impact on banks caused by the heterogeneity of their individual characteristics, case studies are be performed by calculating the financial impact of the prudential backstop on stylized examples which are created by examining the discrepancy of the factors which influence NPL-flow and provisioning behaviour of the peer group banks as reported in the most recent FINREP and COREP disclosures[13], upon which coinciding characteristics are grouped together to generate distinct cases. This method was chosen over the alternative method of calculating the impact of the PB for each individual bank for three reasons: 1) Data availability: model parameters are not publicly available for each bank, 2) to make the impact analysis and corresponding results more concise, and 3) to align the analysis with the research goal of revealing which characteristics of banks are driving the variability of the impact of the PB, rather than making forecasts of what the financial costs of the PB for individual banks would be.

5.3.4 Input parameters

Probability of default:

NPL inflow is modelled on the base of two factors: the stock of out outstanding loans that are eligible to the pillar 1 backstop upon default, and the proportion performing loans that defaults during a year. For this data, we use employ the data from the EBA report on statutory backstops (European Banking Authority, 2017)

[13] Data sources for banks' FINREP disclosures are primarily sourced from S&P's SNL platform and banks' annual reports of 2019. The COREP data-sources include data from the EBA spring 2020 transparency exercise, and banks' Pillar 3 disclosures. For all data sources the end-of-year values of 2019 were considered for the analysis unless stated otherwise.

Table 10: Default Rates SME Loans

	Quarterly Default Rate	Yearly Default rate
Corporates SME	0.54%	2.16%
Retail - Other SME	0.58%	2.32%
Retail SME Secured by immovable property	0.55%	2.20%

Cure rate:

The cure rate is constructed by taking the exposure amount of loans that have transferred from IFRS9 stage 3, to IFRS9 stage 1 during the period between 1-1-2019 and 31-12-2019 as reported in the annual reports of the peer group. This amount is then divided over the amount of stage 3 loans as of 1-1-2019 to obtain the percentage of stage 3 loans that was returned to stage 1. Banks do not report these figures on the granularity of asset classes i.e. they correspond to the values for the aggregate of all loans and advances. Therefore an assumption has to be made that the rates at which SME loans cure corresponds to the average rates of which all loans and advances outstanding cure. A second assumption made is that all NPLs are concentrated in IFRS9 stage 3 loans. In practice, we can expect a small portion of NPLs to be located under the IFRS9 stage 2 classification due to mechanisms such as the classification of loans as non-performing which are UTP <90 days, the pulling effect, and the probation period for non-performing loans which have exited IFRS9 stage 3 criteria but are still considered Non-Performing from a prudential perspective. From the available data it is not possible to isolate these, therefore this assumption has to be made.

Table 11: Observed cure rates

	n	Median	Min	Max	10th Percentile	25th percentile	75th percentile	90th percentile
Cure Rate	10	7.67%	1.08%	11.97%	1.12%	4.50%	9.87%	11.78%

Write off Rate:

The yearly rate at which defaulted exposures are written off is determined at the level of aggregate loans and allowances outstanding. Due to the granularity of the available data, the assumption has to be made that the rates of which SME-loans are written off correspond to the average write-off rate of all loans and allowances outstanding. For

consideration are only stage 3 loans which are written off are taken into consideration. In this sample this corresponds nearly the entirety of all loans being written off.

Table 12: Observed Write-Off Rates

	n	Median	Min	Max	10th Percentile	25th percentile	75th percentile	90th percentile
Write-Off Rate	11	10.33%	5.78%	44.13%	5.82%	8.18%	31.84%	42.83%

Collateralization:

The MCRs of the Pillar 1 backstop are specific to three different types of collateralization: unsecured, secured by movable collateral, and secured by immovable collateral. Data from the EBA transparency exercise of 2020 is consulted. For the sample of banks in the peer group, data is obtained of the outstanding amount of SME NPLs, in addition to the value of collateral and guarantees received on those NPLs. By dividing the latter value over the former the proportion of secured versus unsecured parts of the loans is determined.

Table 13: Collateralization Rates

	n	Median	Min	Max	10th Percentile	25th Percentile	75th Percentile	90th Percentile
% Unsecured	15	55.23%	27.07%	86.13%	34.80%	50.03%	68.09%	83.13%

To make the distinction of type of security pledged to the collateralized part, data from the peer groups pillar 3 disclosures is obtained. In particular template EU CR1-A. Since the data only provides figures considering retail SMEs, the assumption has to be made that the distribution of collateralization parts is similar for corporate SMEs as well. The ratio of NPLs secured by immovable property is calculated by dividing the exposure amount of NPLs secured by immovable collateral over the sum of NPLs secured by immovable Property and other SMEs.

	n	Median	Min	Max	10th Percentile	25th percentile	75th percentile	90th percentile
% Secured by Immovable Property	11	48.30%	8.23%	87.39%	9.49%	22.16%	58.25%	82.07%

5.3.5 Scenario construction:

In order to assess the effects of different collateralization and provisioning behaviours of banks, several scenarios are constructed in order to compare the quantitative impact of the prudential backstop on portfolio level. Parameters that are not of direct interest are fixed at the median value of the data sample. Whereas the parameters considering the provisioning and collateralization levels are chosen to be at either the 10th or 90th percentile. To be able to study relative effects, the NPL-flow is calibrated on a loan portfolio of €100 bln. Since no data is available on the type of collateral pledged to asset classes, we assume an even split between movable and immovable collateral. Since the calendar provisioning rules of movable and immovable collateral are small, it is not expected that the deviation from the true distribution of collateral types will have a significant impact on the outcome of the results.

Static Median Input Parameters

SME-Portfolio size:	€100.000.000.000
Default rate:	2,23%
Cure Rate:	7,67%
Write-off rate:	10,33%
Recovery rate[14]:	1,36%
Ratio Movable/immovable:	50%

5.3.6 Provisioning methods

The data available at the highest consolidation level yields information about the total provisioning of certain asset classes, but lacks granularity with regards to the coverage ratio per collateral type. Therefore, the scenario analysis is performed with two methods. The first method assumes a flat coverage ratio of NPLs regardless of collateralization

[14] Instead of employing a flat percentage of total NPLs that recovers each year, an alternative could be employed as proposed by (Fell, Grodzicki, Krušec, Martin, & O'Brien, Overcoming Non-Performing Loan Market Failures with Transaction Platforms, 2017) where 60% of cash flows are recovered in the first 3 years, 80% by year 5 and 100% in the next 10 years. This method however is more so based on the Italian experience of recovery rates and not necessarily reflective of other EU countries. This method also does not account for the percentage of NPLs that never enters a recovery process, due factors such as extended forbearance measures and backlog of the workout departments.

type. This method is expected to underestimate the coverage ratio of the unsecured part of NPLs, and overestimate the secured parts of the loans. The second method prioritizes the provisioning of the unsecured parts of the exposures, since calendar provisioning rates are the most strict in this regard. This is done by calculating the coverage rate for sub-types of NPLs when all provisions are allocated to the unsecured part first. This method possibly underestimate the coverage ratio of the secured part of the exposures. It is expected however, that in practice, most provisions would be concentrated in the unsecured part of the exposures.

Coverage Ratio & Collateral

The analysis will focus on varying banks on two dimensions. Coverage ratio and collateralization level. The banks of the peer group are divided among these dimensions in either low, medium or high categories:

Table 14: Categorization of peer banks

		Provisioning		
		Low	Med	High
Collateralization	Low		Crédit Mutuel	DZ Crédit Agricole BBVA
	Med		Commerzbank KBC Danske Bank Santander ING Nordea BPCE	Intesa Sanpaolo
	High	Rabobank ABN Amro Lloyds		

It can be noted that most banks can be categorized on the diagonal of either 1) low provisioning and high collateralization, 2) medium provisioning and medium collateralization, 3) high provisioning and low collateralization. These three scenarios

are therefore chosen for analysis. The full analysis of all scenarios is given in Appendix D. A single scenario is examined for explanatory purposes.

5.3.7 Results of Scenario Analysis

Following the dynamics as described in figure 5, the inflow of new NPLs is steadily increasing over the first years, after which it asymptotically approaches a value of €8 bln when considering a loan portfolio scaled at €100 bln. Which corresponds to a NPL ratio of 8%. Since the scenario analysis does not vary the NPL inflow or outflow factors, this curve will apply for all scenarios.

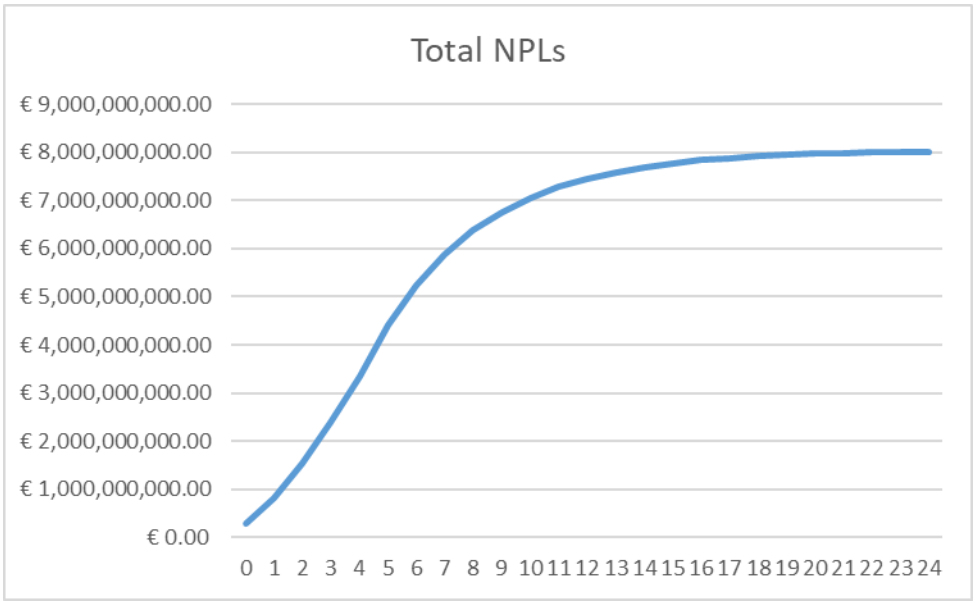

Figure 26: Simulated NPL inflow

The first scenario considers the most ubiquitous case of banks with standard behaviour towards collateralization and provisioning i.e. coverage and collateralization ratio of median value were chosen. Provisioning ratio is apply equally regardless of collateralization type, in this example this corresponds to a provisioning ratio of 48.20% for unsecured, secured by movable collateral, and the secured by immovable collateral parts of the exposures.

Table 15: Input parameters Profile 1

Scenario 1	
Method	Flat Provisioning
Coverage Ratio	48.20%
Collateralization	44.77%

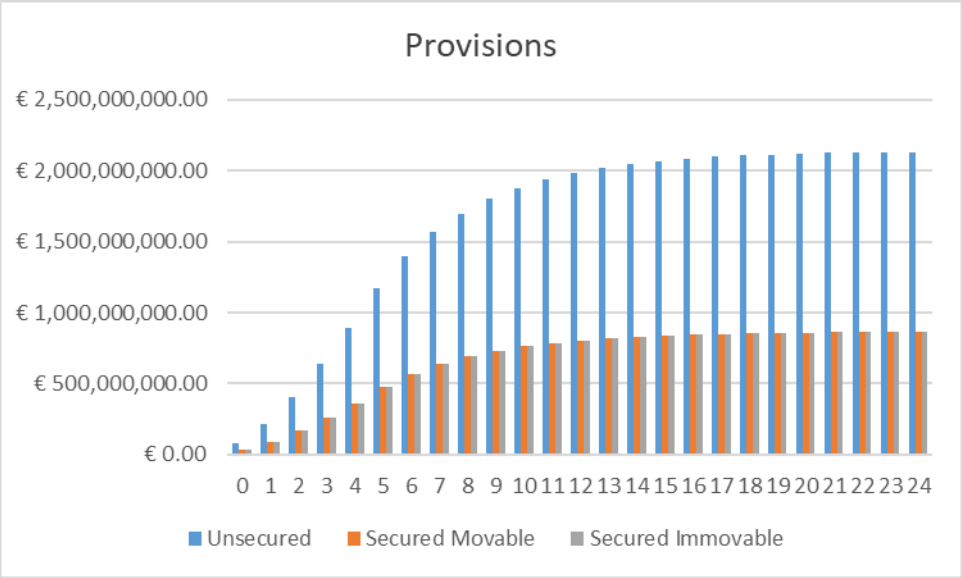

Figure 27: Simulated Provisioning levels for scenario 1

The difference between the eligible provisions and the minimum coverage requirements according to the calendar provisioning schedule given in table 2 have to be deducted from CET1 capital. In this scenario, this amount is highest for the unsecured part of NPLs, since these have to be fully covered after 3 years, in contrast to 7 to 9 years for the parts secured by movable and immovable collateral respectively. It can be observed that at the end of the projected time horizon the total CET1 deductions add-up to €1,4 bln.

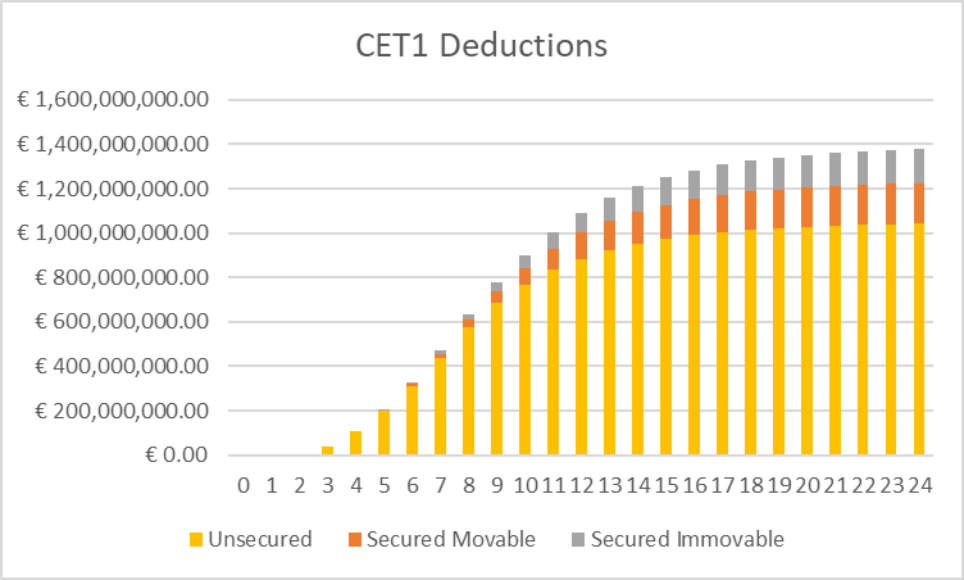

Figure 28: CET1 deductions of scenario 1

When applying a static 8% cost of capital on the CET1 deductions, the corresponding negative future cashflow is then obtained. Starting from a negligible amount in year three, after increasing exponentially to yearly costs surpassing €100 million.

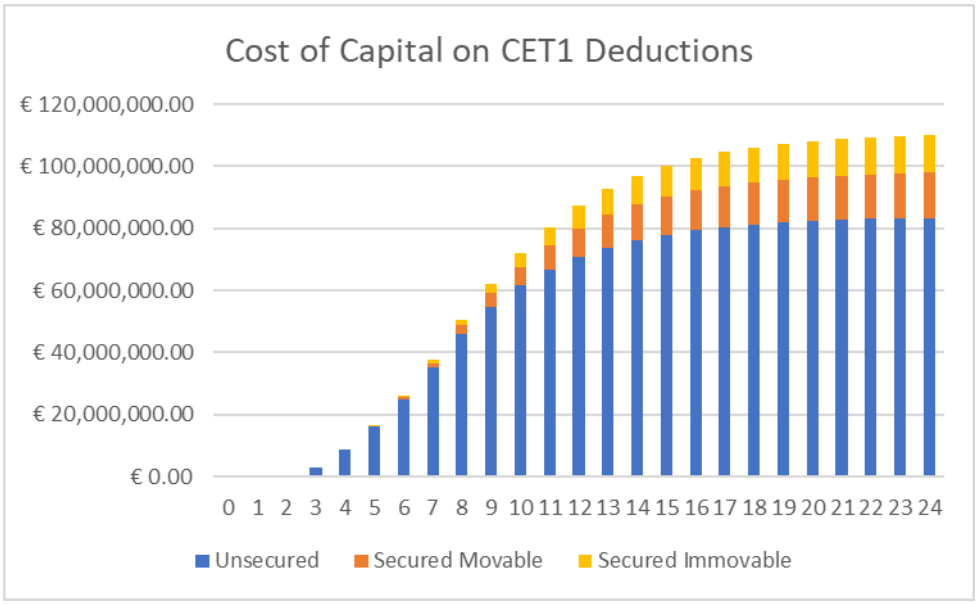

Figure 29: Costs of capital of scenario 1

The present value of the costs of capital associated with the prudential backstop is obtained using a discounting with a risk-free rate of 1%. The NPV can be considered for differing time horizons which are depicted in the table below e.g. when looking at the value of the costs of capital over a 20 year horizon, discounting that to it present value would yield approximately €1bln euros of costs.

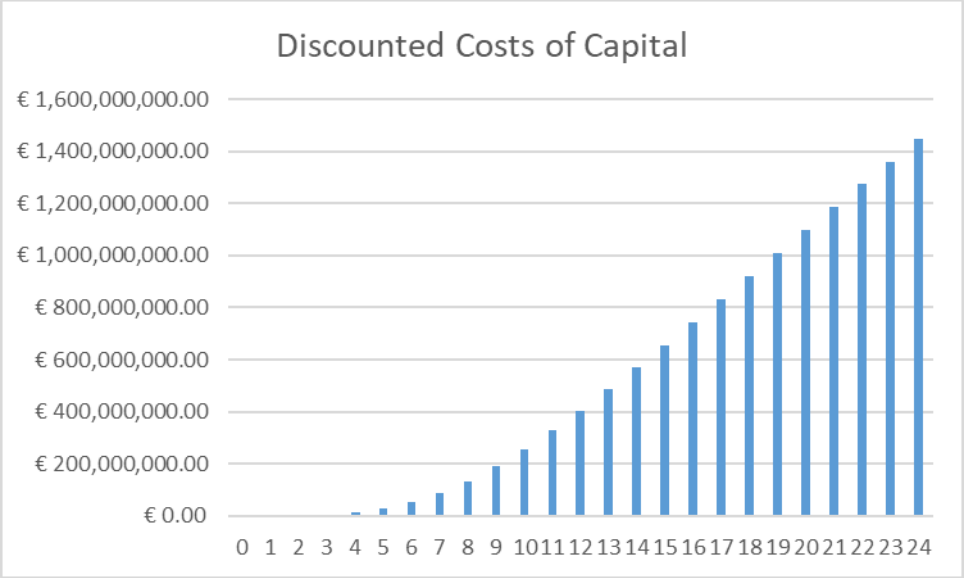

Figure 30: NPV of Costs of Capital over time horizons

5.3.8 Summary of Scenario Analyses

The results for all scenarios are plotted in the graphs below. We observe that banks falling into scenario 3, which corresponds to the high collateralization and low coverage group, is subject to significantly greater capital costs than either the medium collateral/provisioning scenario or the high provisioning and low collateralization scenario. This trend holds for both the flat provisioning method and the optimal provisioning method.

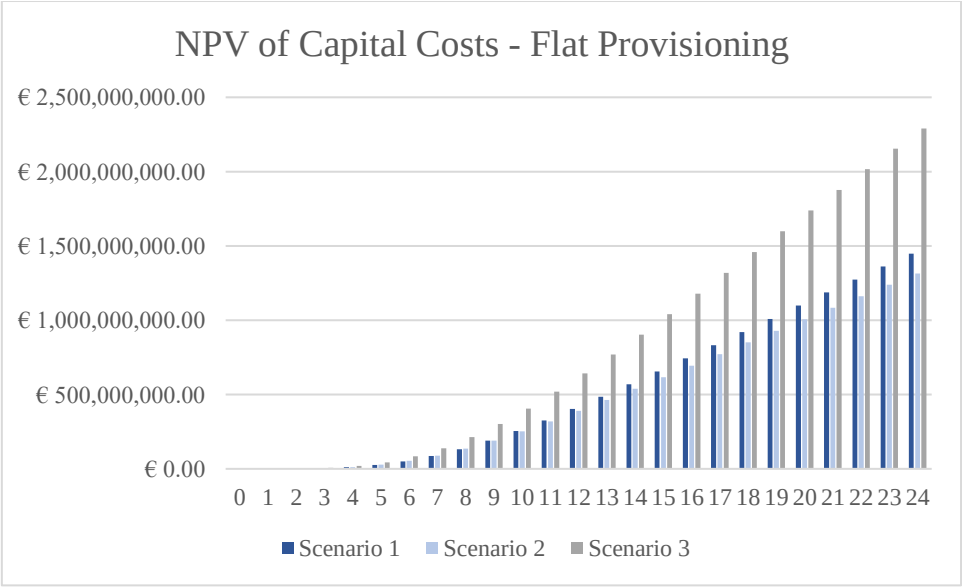

Figure 31: Summary results of flat provisioning method

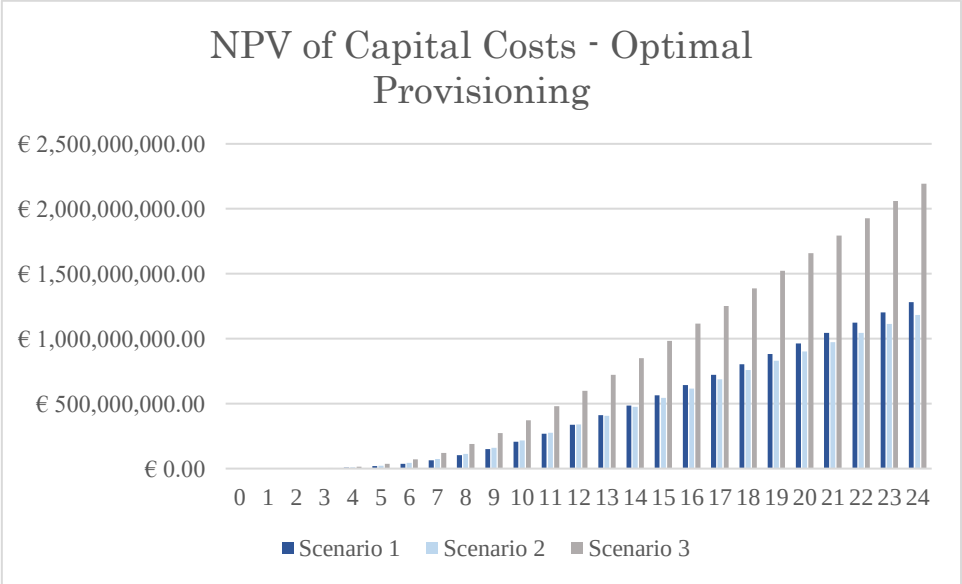

Figure 32: Summary results of optimal provisioning method

It should be noted however that neither provisioning methods in our models adequately corresponds to the provisioning practices we would observe in reality. As the optimal scenario would be more reflective of an ideal provisioning scenario where provisions can be allocated to any unsecured part of any NPL freely. As IFRS9 provisions are specific to individual loans, they cannot be netted or freely transferred between loans e.g. specific provisions allocated to a secured (part of an) exposure, cannot be transferred to cover an unsecured part of another exposure instead to decrease costs. The flat provisioning method instead would prove to be a more inefficient method of provisioning than what we would expect to observe in practice, as we would expect most specific provisions to be concentrated in the unsecured part of exposures.

6. Implications on banks' policy towards workouts of NPL SMEs

6.1 Workout Options for SME NPLs

In the previous chapter, we examined how banks have to incur increased capital costs by retaining Non-Performing Loans on their balance sheets. In this chapter we examine how banks will respond to these costs. It is noted that the MCRs - in addition to ensuring adequate coverage of NPLs - serve as an incentive to workout ageing NPLs. Due to the negative influence of the higher provisioning rates on the book value of NPLs, there will be an increasing pressure for banks to dispose of them. This is an intended effect of the European Supervisors (European Council, 2017). Segura & Suarez (2019) consider prudential provisioning requirements as a viable substitute for mandatory NPL disposal requirements. The urgency to which banks have to respond to these incentives is dependent of several factors among which; the size of their future NPL-problems[15] and the buffer these banks have on their CET1 capital in excess of the CET1 ratio that is required of them by regulators. (See figure 15, Appendix 1) Since banks with larger buffers have more leeway with their CET1 deductions before being required to set aside additional capital[16].

Banks can employ several workout mechanisms with each its different scopes of applicability. NPL workouts can either be internal or external solutions. Internal workouts for potentially viable clients can include among others: extension of repayment periods, (conditional) debt forgiveness, Debt-to-Equity and Debt-to-Asset Swaps, and Short-Term restructuring solutions. Internal workouts for non-viable clients include foreclosure and execution of a client, and liquidation of collateral. (World Bank, 2017) External workouts include: the sale of single NPLs, securitisation of pools of NPLs, the transfer of NPLs to national asset management companies (AMCs).

There are several characteristics of SMEs that make affect their suitability with regards to differing workout options. SME NPLs are less suitable candidates for workout via direct sale of single NPLs. Direct sale of NPLs is a labour intensive process, and due to the

[15] Since the stock of NPLs is treated under the pillar 2 recommendations, the scope to which they are affected by the pillar 1 backstop is entirely dependent on the future inflow of NPLs.
[16] Empirically, banks are reluctant to let their CET1 ratio drop, a significant reason for this is that banks' CET1 ratio serves as an important indicator to external investors of financial stability and credit worthiness (Gual, 2021)

typically small size of outstanding credit, these costs prove to be prohibitive for direct sales to be a cost-effective workout instrument. Due to the heterogenous nature of SME NPLs, the disposal via AMCs can prove to be problematic, since these often depend on standardized workout solutions, (Baudino & Yun, 2017) which are more appropriate for homogenous pools of loans such as unsecured retail loans.

Viable SME workout solutions include debt workouts, securitisation, write-offs, and asset protection schemes. (Baudino & Yun, 2017) Writing-off NPLs is the simplest form of internal workout, but is itself not an adequate solution in the case where there is any significant amount of recoverable value associated to the NPL, in which case it has to be accompanied with adequate recovery procedures.

An important factor to consider is the viability of internal workouts in the form of execution or liquidation of collateral is the efficiency of the judicial system of the home country of a bank. Figure 6 in appendix A show the mean times of recovery of SME NPLs. With values varying between 4 months in Croatia to 6.4 years in Italy. (European Banking Authority, 2020) In the latter case for example, the calendar provisioning requirements of the prudential backstop would accumulate faster than the average time-to-recovery in that country, making external workouts preferable in order to avoid capital costs associated to extra provisioning.

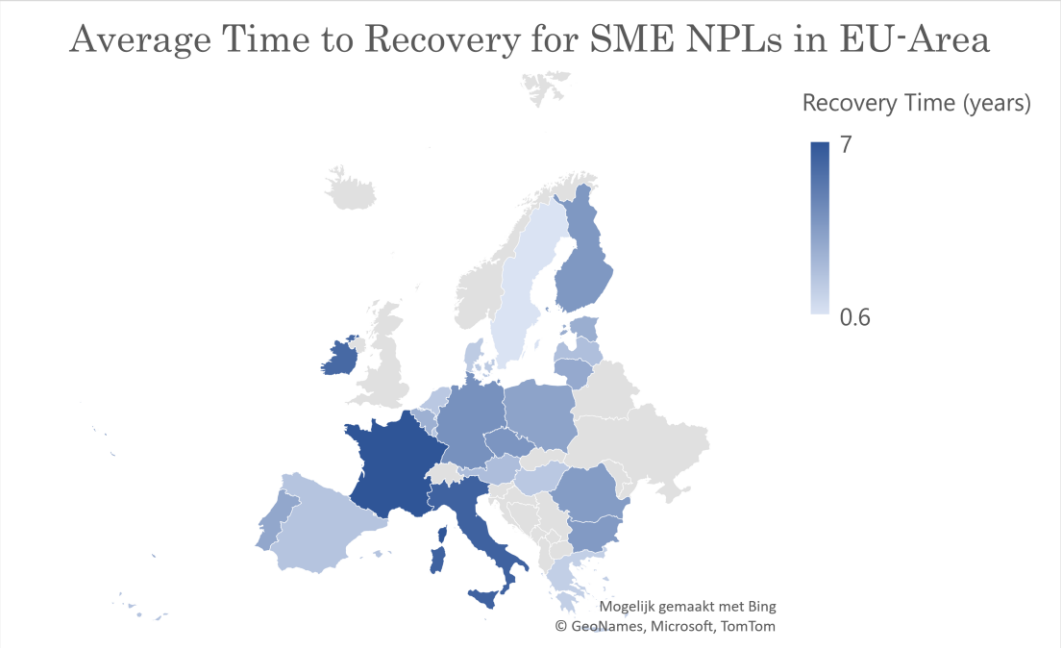

Figure 33: Average time to recovery for SME NPLs (Source: EBA 2020)

6.2 External workouts

External workouts in general depend on the transfer of NPLs from the bank's balance sheet to an external party. European regulators have been promoting the development transparent and liquid secondary markets for NPLs, but have so far only seen limited success. The NPL market in recent years has suffered from several market failures. Often, a large gap between banks' ask prices for NPLs and investors willingness to pay has been observed. One of the main contributors to this bid-ask spread is the fact that investors consider a significant portion of the workout and transactions costs up front, whereas banks recognize these costs only after the transaction have been occurred, and are therefore not reflected in the present book value of the NPL. Another important element contributing to the bid-ask spread of NPLs is information asymmetry. Especially in the case of complicated opaque NPLs, whose value can spread over a large range, the value of such an asset is often only appraisable by the originating bank. High-value NPLs are therefore difficult to sell to investors, since these investors cannot verify their quality. This leads to a market where only low-value NPLs are traded. (Constâncio, 2017) Efforts to improve the transparency of NPL transactions have been undertaken by measures such as the introduction of the NPL transaction template, which aims to improve transparency of the underlying characteristics of NPLs. Potentially narrowing bid-ask spreads by alleviating information asymmetry. (European Banking Authority, 2018) NPLs covered by collateral could alleviate some of the information-gap, if the value of the collateral is adequately verifiable. In such cases however, investors still require a steep discount on these NPLs to account for the recovery time and the uncertainty related to the eventual recovery rate. (Fell et al. , 2017) Banks with efficient internal workout capacities would therefore find it more economically feasible to opt for their internal workouts instead.

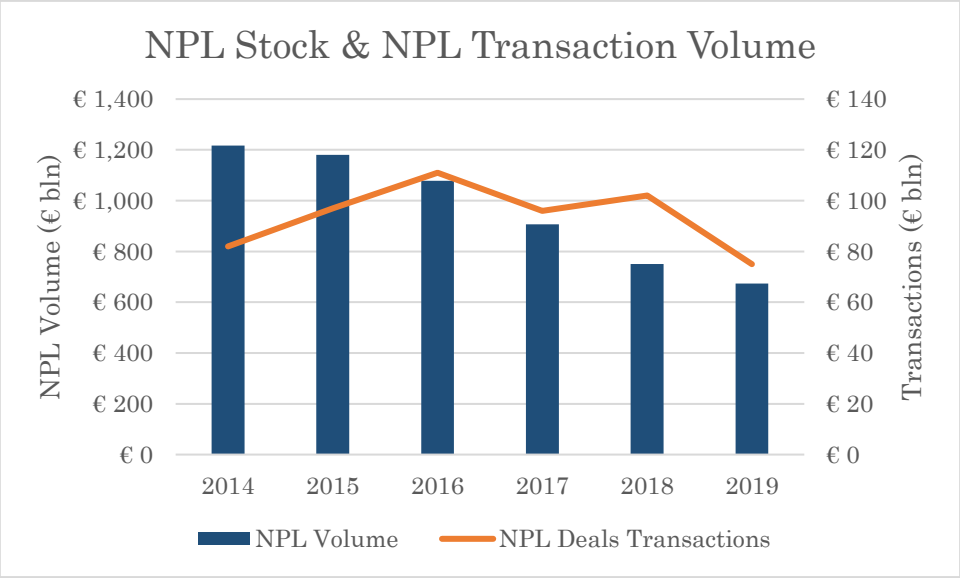

Figure 34: NPL stocks and transaction volume in EU-Area between 2014-2017 (source: PwC 2020)

Of the available external workouts, the most viable solutions for SME NPLs are the securitisation of NPLs, and the use of asset protection schemes, which are sometimes used in tandem.

The securitisation of NPLs is done by originating banks selling NPLs to a special purpose vehicle (SPV), which is in turn financed by selling NPL-backed securities which typically have differing types of seniority. Pay-outs are done via a waterfall scheme that first pays the senior notes, followed by the mezzanine and finally the subordinated junior notes. Bolognesi, Stucchi, & Miani, (2020) examined the price and risk/return of direct NPL sales versus securitized NPL sales, and found that the securitized NPL sales had a better balance between risk and return than the sale of individual NPLs from an investors perspective. Opting for securitized NPL sales would therefore lead to higher sales prices for banks. In addition, banks' capital position would benefit from the 0% risk weight on the senior notes in the case of government backed securities, which the bank often retains.

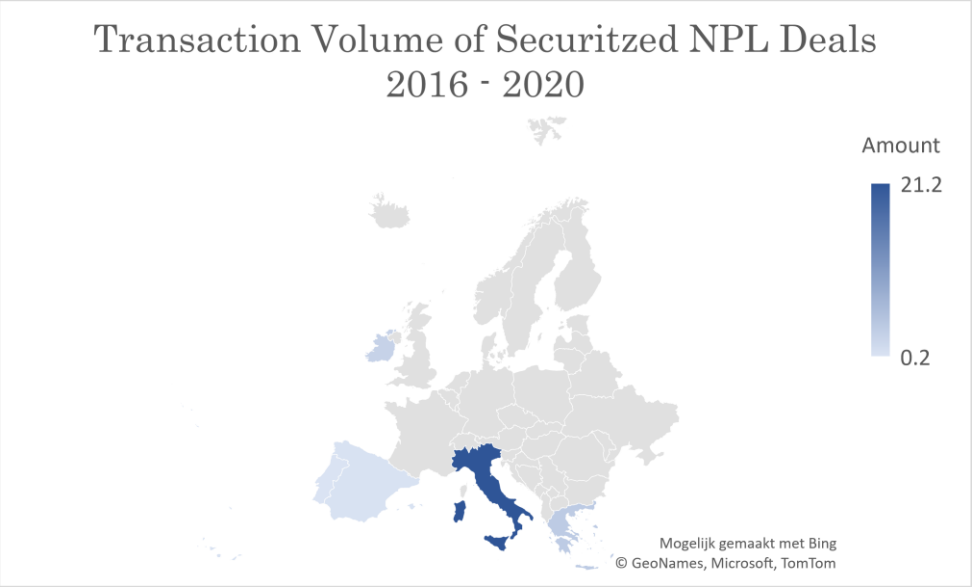

Figure 35: Transactions of securitized NPLs in Europe in the years 2016 – 2020 (Source: Deloitte 2020)

Securitized NPL sales in recent years have primarily been state-backed. The vast majority of securitized NPL transaction are originated from the Italian Garanzia Cartolarizzazione Sofferenze (GACS) scheme, and the Grecian Helenian Asset Protection Scheme (HAPS). This process has worked by guaranteeing the senior tranches of the ABS notes by selling credit-default swaps on the senior tranche to the SPV. More recently, there also has been an increase in activity in securitized deals that have not been state backed, in Portugal and Ireland, with transactions over 2016 amounting to €7.1 billion euros as opposed to the €21 billion euros in state backed transactions over the same period. (Deloitte, 2020) Fell, Grodzicki, Krušec, Martin, & O'Brien (2017) suggest that the optimal NPL securitisation strategy in terms of yield for banks would be structured in such a way that the junior tranche of the ABS would be partly guaranteed by a junior guarantee on securitisation (JGS). With this construction, the state would guarantee up to 50% of investors losses, in return for any upside return over the expected amount. This would benefit sales price by aligning governments' and investors' interests, and give a strong signal to the market that the government is interested in the best possible recovery of underlying NPLs. As of 2020 however, no such JGS backed transactions have taken place. (Deloitte, 2020)

There is risk of moral hazard in the mass disposal of NPLs using securitisation. Banks are able to exploit information asymmetry, to cherry-pick the highest quality NPLs and retain them, choosing to securitize only the bad apples. A second point of attention is that

banks that employ mass sales of NPLs, don't have to take those NPLs into account when calculating their LGD values[17], creating an incentive to primarily dispose of NPLs that would have otherwise resulted in higher LGD estimates.

6.3 Prudential backstop and Covid-19 NPLs.

The prudential backstop was introduced in response to the elevated NPL levels that had appeared after the GFC. The function of the prudential backstop is to keep banks from building up new stocks of NPLs, rather than trying to accelerate the disposal of NPLs that materialized after the GFC (since only loans that have originated after 26 April 2019 are affected). This begs the question of how regulation which was drafted in response to the previous crisis, is able to deal with crises in the future. European supervisors have stated that the main challenge in the banking sector is the impending rise of NPLs following the Covid-19 pandemic. Future 'Covid-19 NPLs' are expected to be heavily focused in the SME asset class for the majority of countries. Thus, an increased impact can be expected for banks that are heavily invested in SME-loans (see figure 2) The majority of NPLs are expected to materialize in the second half of 2021, after state-provided moratoria – which prevent loans from being classified as Non-Performing – have ended.

Financial pressure to dispose of NPLs in a time-bound manner are present regardless of the long term prospects of the client. Ari, Chen, & Ratnovski (2020) note that Covid-19 NPLs are likely to be different from GFC NPLs. If the economic downturn caused by the Covid-19 pandemic is temporary, than a major portion of upcoming NPLs could be considering viable corporations with liquidity issues, rather than non-economically viable 'zombie'-firms. Angelini (2018) previously warned that the forced sales of NPLs would indeed dispose of zombie firms, but likely also of temporarily ailing firms that are insolvent but not bankrupt.

Ari, Chen, & Ratnovski (2020) note that the potential upcoming increase in NPLs due to the Covid-19 pandemic and its corresponding resolutions cannot be equally compared to the NPL resolution issues that have arisen after the GFC. The authors state that if the economic downturn caused by the pandemic is temporary, the NPL stock of banks might be of a different nature: they might primarily consist of viable firms, instead of zombie

[17] Due to the discount demanded by investors in NPLs, the LGD for sold NPLs is generally higher than the LGD on NPLs that are retained, the mass disposal of NPLs would therefore have negative effects on banks LGD estimates and by extension its capital position. Article 500 of CRR2 aims to negate this negative effect on LGD by allowing banks in its LGD calculations to treat sold NPLs as if they would have had equal estimated LGD values as comparable exposures that have not been liquidated.

firms. Angelini (2018) states that the selling of NPLs indeed gets rid of zombie firms, but also of ailing firms that are insolvent but not yet bankrupt. The selling of NPLs could include NPLs that could return back to performing status if given proper guidance and management. Research on how to differentiate the two different types of companies however is scant. Affinito & Meucci (2021) find that historically there has always been an significant portion of UTP loans that return to performing status, and find that loans to smaller companies and of a smaller outstanding amount of debt, are positively related to the chance of returning to performing status.

The problem here arises that the prudential regulation offer no possibilities to discern between the two types of NPLs. Time-bound provisioning requirements call for a swift workout of NPLs once they are classified as such. Viable illiquid firms would benefit from different workout solutions than firms from which it is clear that they have no adequate perspective of continuing operations. While foreclosure and liquidation might often be most economical workout options, banks are usually hesitant to employ these methods if there is sufficient prospect of the company to cure. Banks tend to see these options as last resort methods because it destroys the relationship with the client, and can cause reputational damage. (AFME, 2018) Therefore the option of liquidation and sales of SME NPLs, should ideally be reserved for SMEs that are clearly gone-concern, whereas for viable SMEs a solution should be employed which aims at the return of the SME to going-concern status. Time-bound provisioning requirements can dampen banks' willingness to undertake restructuring activities with the client, which are often time consuming, because of the associated risk of triggering said provisioning requirements. Gual (2021) notes in an SUERF policy note that current regulations with regards to the classification of NPLs leave little room for a differentiated response, as loans that need refinancing or restructuring will be classified as Non-Performing in the majority of cases.

6.4 NPV of workout methods

We define the resulting value of a NPL workout process as the difference between the recovery proceeds, and the costs associated to funding and managing the NPL during its time in default. Funding costs are dependent on the amount provisioned and the cost of raising equity. Recovery proceeds are dependent on the workout method which is employed. We define; t_0 as the time a loan is classified as non-performing, t_w as the time the workout procedure is started and t_R as the time at which the NPL is resolved.

$$\pi_{t_0} = \sum_{i=t_0}^{t_r} \frac{R(t) - f_{t-t_0} - C_{t-t_0}}{(1+r)^{t-t_0}}$$

Where; π_{t_0} equals the NPV of the workout process, $R(t)$ is the discrete recovery function defined at: $t_w < t < t_r$, f_t is the funding costs at time t, C_t are the costs of workout, and r is the discount rate.

Most important to note is the sensitivity of the value function to the time dimension to the discount rate. Two simple example cases:

- Type of loan: SME unsecured
- EAD: €1.000.000,-
- Cost-of-capital: 4%
- Risk-free rate: 1%
- LGD: 60%
- Workout costs: €2000,- per year

Case 1: Workout is initiated immediately upon classification as NPL, workout time equals 2 years recovery equals EAD* (1-LGD) = €400.000,- paid at $t_r = 2$.

Case 2: Workout is initiated immediately upon classification as NPL, workout time equals 7 years recovery equals EAD* (1-LGD) = €400.000,- paid at $t_r = 7$.

The two cases are identical except for the recovery times, which correspond to cases in either the high or low end of the observed recovery times in figure 11. Yet we find significantly different values for π_{t_0}, which equal €370.429,- for the first case, and €265.821 for the second case.

6.5 Concluding remarks

Due to the prudential backstop, banks either have to face the funding costs associated to the extra provisioning of Non-Performing Loans, or dispose of these NPLs by means of a workout method. Banks will in many cases opt for the method that will result in the most economical value for the bank. The method that satisfies this outcome will depend on several factors. Workout options can broadly be categorized in internal and external workout methods. Banks who have the opportunity to efficiently and effectively workout their NPLs internally, will prefer this method over external disposal due to the discount demanded by external investors. Efficient internal workout of SME NPLs depends on the speed of which judicial and out-of-court procedures can be concluded, and on the internal capacity of banks workout units, which is for example dependant on the amount of experience the bank has with the specific industry of the NPL.

In any case due to the sensitivity of the time component of to the NPV of the workout procedure, it is of great importance to start NPL workout as soon as the loan is recognized as such. Both to avoid the additional funding costs, and to avoid time-discounting of the recovery proceeds. Due to the prudential backstop, funding costs accrue significantly especially for unsecured exposures. Factors that positively affect leeway in the choice of workout options are; secured loans – due to the slower increase of MCRs - , and time-efficient workout procedures. Due to the pressure of time associated to these costs, workout schemes for going-concern cases – which is often a slower method – could be disincentivized. This pressure is present for all NPLs regardless of their potential viability, resulting in a significant challenge for banks to adequately identify and assist companies which have potential to recover in order to prevent unnecessary foreclosure.

7. Potential economic implications of the prudential NPL regulations.

7.1 Provisions, Collateral & Bank Stability

The prudential backstop requires NPLs to be fully covered by provisions depending on their associated type of underlying collateral in 3, 7 or 9 years. The degree to which NPLs can affect bank stability is subject to several underlying characteristics. 'The rate at which NPLs are covered by provisions have a mitigating effect to the threat they pose to banks' stability. Provisions are however not the only variable to consider the risk associated to NPLs. Constâncio (2017) states that besides provisions, a significant portion of the value of NPLs by expected recoveries on NPLs, and that collateral could be a major source of value underlying NPLs. Accounting provisions are based on expected credit loss, which takes these factors into account. In figure 5 & 6, the large discrepancies between coverage ratios within the peer group are observed. Figure 7 shows the variability between the degree to which NPLs are backed by collateral within the peer group, showing an inverse relation to the rate at which they are provisioned. Figure 16 in appendix E shows a broader examination of this relationship with regards to a sample of 108 EBA supervised banks. It is apparent that the differences between provisioning and degree of collateralization which were present within the peer group can also be observed in the broader EBA sample. The percentage of NPLs covered by provisions can be noted to be between 0% and 72.6%. When adding the percentage of NPLs value covered by provisions with the percentage of NPL value covered by collateral, we observe that the great majority of banks exceed a combined value of 80%, with the average being 85.71%.

Due to the prudential backstop, NPLs have to be fully covered by provisions after a certain time in default, or deduct the shortfall between provisions and coverage requirements from their CET1 capital. Another option is to write-off these NPLs. If at this point, these NPLs do have actual value due to prospects of future incoming cash flows, this value will not be reflected on the balance sheet of the bank. In the case of full provision coverage, the provisions will be subtracted from the value of the loan NPL on the balance sheet, the only options for provisions to be lowered is when said loan exits its NPL-status. If a loan is written off, any value associated to that loan will disappear from the balance sheet, until a potential reversal of write-off can be made when value associated to that loan is captured. The crux here lies in cases where the minimum coverage requirements clearly exceed the amount of provisions that would seem to be economically necessary. In these

cases, the book value of these NPLs would be represented with artificially low book values, which lie well below the economic value of these NPLs. In these cases, banks would be under pressure to exit NPLs without there otherwise being an economic necessity to do so.

7.2 The role of collateral and provisioning

There is ample discussion on to what degree collateral should be recognized in the provisioning of defaulted assets, but research on the topic is scarce. The IMF describes a set of considerations and best practices when taking collateral into account when calculating provisions. (Song, 2002) At one end of the spectrum the IMF describes the practice of netting, where the gross value of an NPL is netted against the value of collateral pledged to the loan, which then will be provisioned. In the case of a fully secured defaulted loan, this would mean that no provisions would have to be made. Potential problems with this method arise in practice: collateral is often difficult to value, and can be overvalued in cases where the marketability or liquidity of the collateral is low. The IMF therefore states that collateral should only be netted to a degree which adequately reflects the true value it adds to the banks position of financial security.

The degree to which collateral can provide financial security to loans differs significantly between banks and countries. The direct effect of collateral on recovery prospects between individual banks is difficult to observe with the available data, but indirect effects can observed when noting that collateral has a direct effect on loans' LGD values. (European Banking Authority, 2017c) This is also reflected in banks provisioning rates for different SME asset classes as shown in table 1 in appendix 1. There is however ample evidence of heterogeneity between recovery prospects of SME loans as a whole. When looking at the exposure weighted LGD values for SME loans in European countries, significant differences are observed. With LGD values in Spain and Italy being around 40%, and under 18% in the Netherlands[18]. It should be noted that LGD calculations are at least under some degree under the discretion of banks themselves, and can be under influence of bias and modelling errors[19].

[18] This is lower than the proposed 25% LGD floor which will be introduced with Basel IV.
[19] A-IRB models that banks develop are audited and backtested by the ECB's Targeted Review of Internal Models.(TRIM)

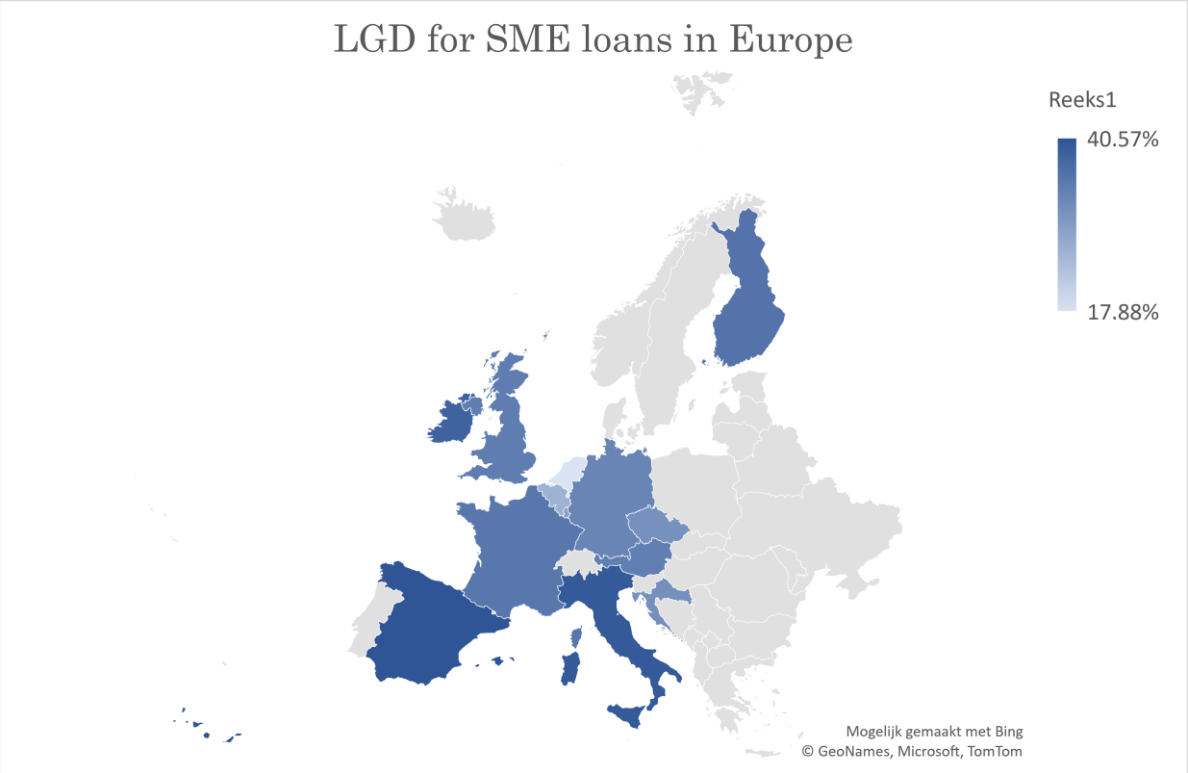

Figure 36: Exposure Weighted Loss-Given-Default values in EU countries (Source: ECB Supervisory Statistics)

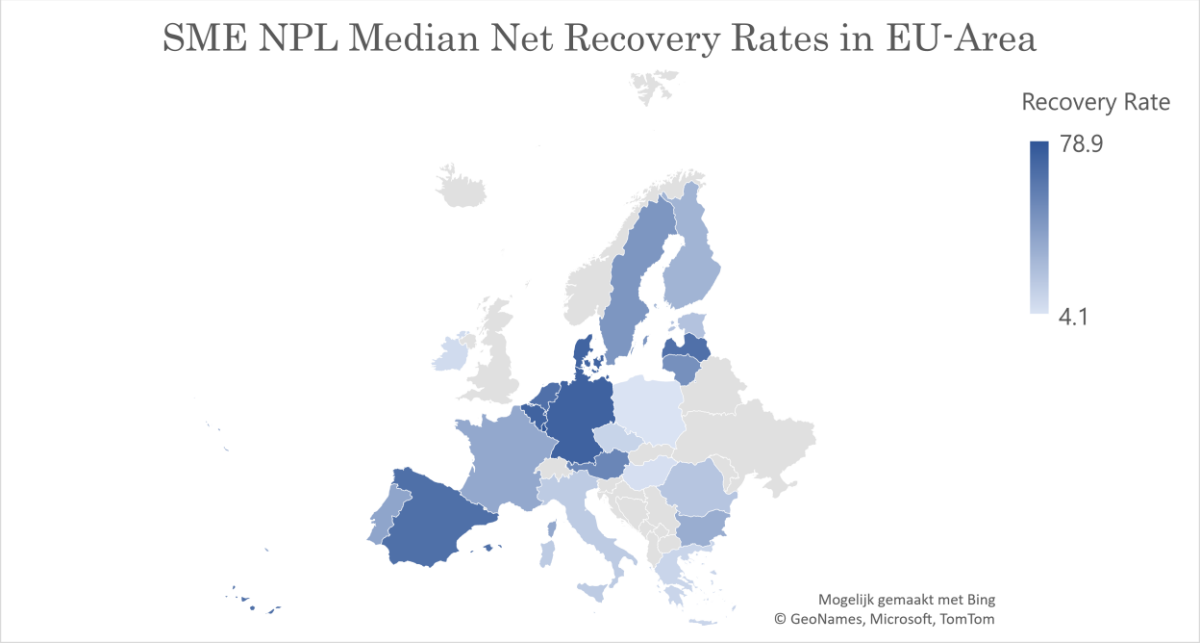

Figure 37: Median net recovery rates of SME loans in the EU-area Source: (European Banking Authority, 2020)

Data about the net recovery rate for SME NPLs shows the great disparity between recovery prospects of SME NPLs between EU-countries, with values ranging between 4.1% and 78.9%. These values correspond to the net percentage of the value of Non-Performing Loans that is recovered after all relevant costs have been factored in.

It is important to note that these figures consider the recovery prospects of NPLs regardless of their vintage. Since the minimum coverage requirements are based on the time in default of the exposures, it is important to assess the effects of the time dimension on the LGD of defaulted assets. Data on this however is of limited availability, and a comprehensive assessment of this relationship for SME loans between European banks. González, Ureña, & Fernández-Aguarda (2018) write in an ECB working paper about to positive correlation between LGD and time-in-default, based on analytic research on data on a credit French leasing portfolio, and an individual loan portfolio of a Spanish bank. If this relationship would hold for secured and unsecured SME loans over a range of EU-countries, then this would be a strong argument for the calendar based provisioning requirements of the prudential backstop. However, this cannot be extrapolated from this research, especially given the heterogeneous nature of other aspects of SME-lending, recovery and collateralization already observed previously in this report.

7.4 Effects of prudential backstop in macroeconomic context

Where the accounting regime is primarily concerned with the accurate valuation of provisions on banks' balance sheets, the prudential framework is primarily concerned with economic stability. To assess whether the European supervisors are successful with the prudential backstop in attaining their goals different views have to be considered.

A large amount of research performed prior to the drafting of the prudential backstop has noted the negative effects of NPLs of banks on the economy. In particular the negative relationship between NPLs and bank's lending to the real economy is an effect that has been stressed. (Aiyar, et al., 2015; Accornero, Alessandri, Carpinelli, & Sorrentino, 2017), (Serrano, 2020) also finds a negative relationship between NPL levels and bank lending, but interesting find a stronger negative relationship between lower profitability and bank lending, although with varying levels of statistical significance. (Thornton & Di Tommaso, 2020) find however that there is a strong link between bank's capital and profitability on credit growth. They find that the effect of NPLs on credit growth is mainly an indirect one, which is mediated through lowered profitability. They suggest that prudential measures to tackle NPLs can only be effective in aiding credit growth if they account for

the effects on capital and profitability. The link between low capital and decreased bank lending can have several causes; prudential CET1 ratio requirements cause banks to steer their capital position to be above this ratio, which is defined as the amount of CET1 capital divided over a banks risk-weighted-assets. When banks fall below this requirements, it is in certain circumstances more feasible to decrease the denominator than it is to increase the numerator of this ratio, hence causing restricted lending policies. This is testified by Cappelletti, Marques, Varraso, Budrys, & Peeters (2019), where it is observed that banks who get their CET1 requirements increased, slow down their lending practices until this new requirement has been met. Another factor mentioned by Gual (2021) is that banks are reluctant to let capital buffers drop in times of economic distress even when encouraged by supervisors due to market pressure and regulatory aspects. Through this view, it is clear how the introduction of the prudential backstop could have negative consequences on bank lending, since the CET1 deductions associated with the delta between the provisions which are required and the amount provided affect this directly. Bolognesi, Compagno, Miani, & Tasca (2020) state that increased provisioning requirements, or rushed disposal of NPLs, can also lead to reduced lending by banks due to more risk-averse selection of customers, in order to avoid the chance of having to make the costs of higher provisioning. This would especially be the case for unsecured lending, due to the rapid increase of the coverage requirements over time. It is furthermore argued that banks could translate the higher costs they have to make due to the prudential backstop to the consumer, reducing demand for these higher priced loans.

Angelini (2018) states that the mass sale of NPLs could lead to the unwanted disposal of viable NPLs which would have had the chance to recover. In the previous chapter we mentioned the indifference of the prudential regulations towards viable and non-viable SMEs. The unnecessary liquidation of viable SMEs could lead to unwanted damage to the economy. (Aiyar, et al., 2015) noted that one mechanism through which NPLs hurt banks, is increased financing costs caused by the increased risk premium banks would have to pay to external investors as a result of risks associated with high NPLs on their balance sheets. Manz, Kiesel, & Schierek (2019) analysed these effects of 140 NPL transactions but found that banks were not able to decrease their financing costs after the sale of these NPLs. Gual (2021) states in a SUERF policy notes that the current way of identifying and dealing with NPLs is too rigid, and leave not enough room for a differentiated response. For the tackling of NPLs to be in service of the broader economy, banks must be able to

focus on the restructuring on the viable subset of NPLs, otherwise aspects of the NPL reduction strategy can be counterproductive.

8. Conclusion

In this thesis we examined the effects of regulations considering the tackling of Non-Performing Loans in Europe on the management of SME NPLs by European banks. We found that major regulatory developments were implemented, with amongst the most significant ones the prudential pillar 1 requirements for minimum loan loss coverages, which requires banks to provision their Non-Performing Loans according to a calendar approach which gradually increases the required coverage of NPLs in either 3, 7 or 9 years depending on the type of collateral underlying the NPL. If banks do not cover their NPLs to this level with provisions, the difference between the amount of provisions provided and the amount of provisions required by the supervisor will have to be deducted from a the bank's CET1 capital.

To investigate how European banks are being affected by these regulations, an analyses was made based on comparisons of financial information from the bank's within the peer banking group of Rabobank, and of the characteristics of different countries. We find significant differences between banks within the peer group that affect how they will be affected by the NPL regulations on several levels. 1) The size of banks' NPL-problem: the banks with the largest share of SME NPLs on their balance sheet are located in southern-European companies. With the median value of SME NPLs being 4.55% within the peer group, whereas the largest NPL-ratio being 21.43% for a large Italian bank. 2) Significant differences can be found between peer banks due to the rate to which they provision their Non-Performing Loans, and the degree to which they guarantee them with collateral, with a clear inverse relationship between the two factors being observed.

When assessing the quantitative impact the minimum coverage requirements have on banks' capital position, it can be found that the banks in in the peer group can be grouped into roughly three categories; high provisioning/low collateral, medium provisioning/medium collateral; and low provisioning/high collateral. We find that, ceteris paribus, banks within the latter category are affected with the most significant CET1 deductions by the prudential coverage requirements under either a scenario where provisions are allocated equally across NPLs of all collateralization types, and an 'optimal' provisioning scenario where all provisions are concentrated in the unsecured parts of the banks' NPL-exposures, which have to be fully covered at a much faster rate than the collateralized parts.

To address how different banks within the peer group will be affected by package of NPL-regulations from the European supervisor, we investigate how country-specific circumstances affect how they respond to the financial incentives caused by the required CET1 deductions following the minimum coverage requirements. These CET1 deductions act as a financial incentive to workout NPLs, but the workout options available to European Bank's depend on their economic and judicial environment. We note that the time to recover NPLs varies dramatically between European countries, with the average value ranging from 0.6 to 7 years. In countries with swift workout times, banks have more leeway to find internal workouts for their NPLs. In cases where internal workout procedures are closer to the longer end of the spectrum, the minimum coverage requirements will increase faster for a portion of loans than the bank can work them out internally, incentivizing them to dispose of their ageing NPLs through external workout measures, such as the securitization of SME NPL portfolios. We argue that the workout of SME NPLs by means of sales to external investors is most suited for NPLs associated to SMEs that have no reasonable perspective of becoming healthy corporations again, whereas internal workouts would in many cases be preferrable when ailing SMEs have a sufficient chance to return to performing status. We note that prudential regulations do not take into account the differences in viability of SME NPLs. Ailing but viable SMEs are subject to the same financial incentives of workout as non-viable bankrupt SMEs which have no reasonable prospect of curing.

We discuss the phenomenon of conflicting frameworks of the accounting and prudential treatments of provisions. We note that, most particularly in the case of fully secured exposures, the full provisioning of these NPLs might not be warranted from an accounting perspective, as remaining value underlying these NPLs will not be reflected in banks' balance sheets. We note that this conflict arises from differing purposes of the accounting and prudential framework; the accounting framework is primarily concerned with attempting to objectively valuation of banks' provisions, whereas the prudential framework is mostly concerned with economic stability. The negative effect here lies in the fact that banks who do not see their fair value for NPLs reflected on their balance sheet, will be incentives to dispose of these NPLs, without there being an economic necessity to do so. In worst-case scenarios this can lead to unnecessary liquidation of SME companies.

We conclude this thesis with examining the economic stability benefits of the prudential NPL regulations. We note that the stability benefits depend on how the adequacy of bank's

provisioning can be judged i.e. are banks actually under-provisioning? The literature does suggest evidence that bank's NPL disposal is beneficial to banks' credit supply to the economy, especially when these NPLs consist of zombie firms which clog up banks' balance sheet. But that the minimum coverage requirements can also act as a double edged sword; overly cautious provisioning requirements can have negative impact on banks' capital ratios and profitability, and can furthermore lead to unnecessary disposal of potentially viable SME firms.

9. Limitations & Discussion

Data quality and availability, quantitative analysis is based on information published by banks through financial statements, with particular regards to FINREP data from annual reports, pillar 3 disclosures, and COREP data obtained from the EBA transparency exercise. These values reported cannot be regarded to be objective measures of reality, in particular with regards to data reported in banks' annual reports, there are different ways in which banks report data based on their own definitions and interpretations on what certain values should mean. For example: when comparing banks' levels of stage 3, banks X and Y can have significantly different methods to define what stage 3 loans are. This issue in differing definitions is of less severity in COREP data – where largely homogenized definitions are required – but underlying data quality issues of banks can still affect reliability of these figures here.

In our quantitative analysis the we focussed on the differences of the impact of the prudential backstop on portfolio level based on different provisioning and collateral levels. Since these impacts are based on the capital costs on the CET1 deductions on these Non-Performing Loans, we expect these results to be highly dependent on the individual bank's costs of capital.

Data on the collateralization and provisioning of Non-Performing Loans has severe limitations: reported data can only show collateral pledged up until the amount of gross exposures net of provisions. For example, if the gross carrying value of an NPL would be €100,- and the associated provisions would amount to €80,- then the bank would only be able to report €20,- of collateral and financial guarantees. Even if for example, the gross amount of collateral pledged to a loan would be €1000,-. This results in obfuscation of cases where banks would highly provision *and* highly collateralize their loans.

10. Recommendations for Future Research

The EC's reasoning for the full coverage of fully secured exposures is lacking in (public) empirical evidence. Current literature on recovery rates as a function of time-in-default on secured SME NPLs would be required in order to be able to argue for the full coverage of these NPLs with more certainty. Overprovisioned NPLs are undervalued on bank's balance sheets, in order to restore this value, banks could be led to dispose these (potentially viable) NPLs to capitalize on this value. Another point of interest is investigating whether the obligatory overprovisioning of collateralized assets would lead to in increase in unsecured lending, which could have negative implications for economic stability.

The current prudential regulations do not enable banks to treat viable non-performing companies different from bankrupt zombie-firms. Future research on how to identify the two from each other would help banks and supervisor to focus on the tackling of the latter category. This would aid banks in focussing their managerial efforts in the restructuring of viable NPLs, and faster disposal of the non-viable ones. This would seem to be beneficial to the broader economy as well, as it would prevent unnecessary liquidation of ailing but viable corporations, and improve focus on the firms that clog up banks' capital and restrict lending to the economy.

An potential interesting topic for a future thesis would be to extend the model of Pauer & Pichler (2020). This model mathematically describes conditions under which is it preferrable for rational banks whether to write-down, write-off or to sell NPLs, under forced sales or write-downs to fair value. Since mandatory write-downs are mechanistically similar to minimum provision requirements, this could lead to interesting insight in determining optimal rational behaviour for banks when considering NPL workout options. This model does not describe cases where value-adjustments have to be made at set targets, such as with the prudential backstop. Furthermore, the paper does not describe cases in which scheduled (increasingly strict) value adjustments are anticipated in decision making, such as is the case with the prudential backstop.

Another interesting point of attention is the observation that the recoveries of NPLs are predominantly bimodally distributed: i.e. for the majority of NPLs it is the case that either the full amount can be recovered, or that no recoveries are made.

Identifying the factors which drive the probability of loans that are fully recovered would enable banks to efficiently focus on these loans.

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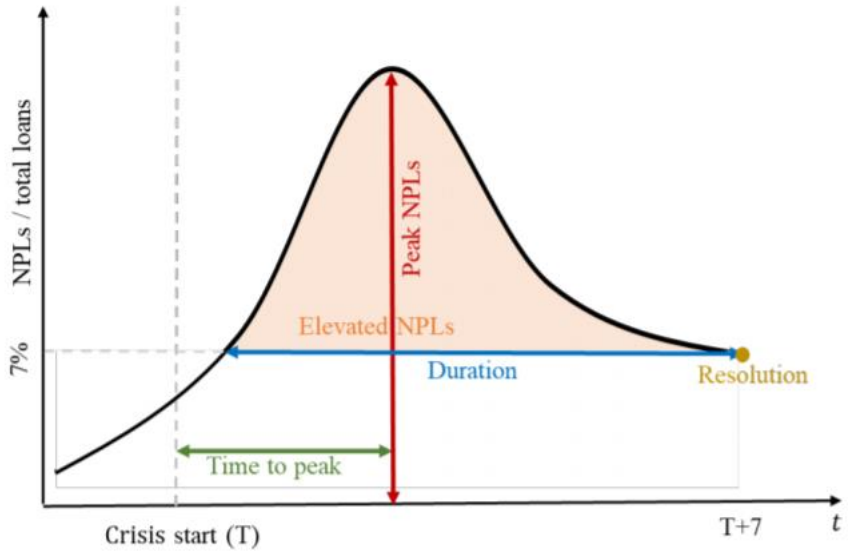
Appendix A

Figure 1: A typical NPL trajectory



Source ECB 2020: NPL dynamics during crises. Ari, Chen & Ratnovski

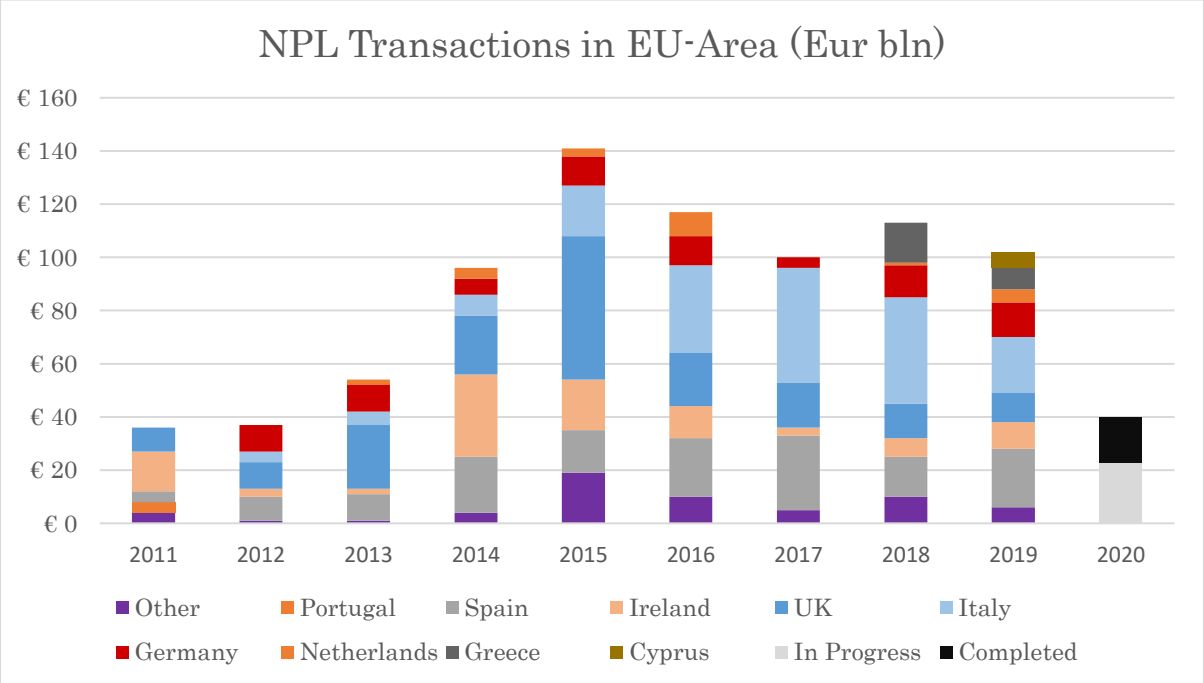


Figure 38: NPL transactions in EU Area by Country (Source: PwC 2020)

Figure 4: CET1 buffer over SREP requirement (2020) and RWA intensity, top European banks

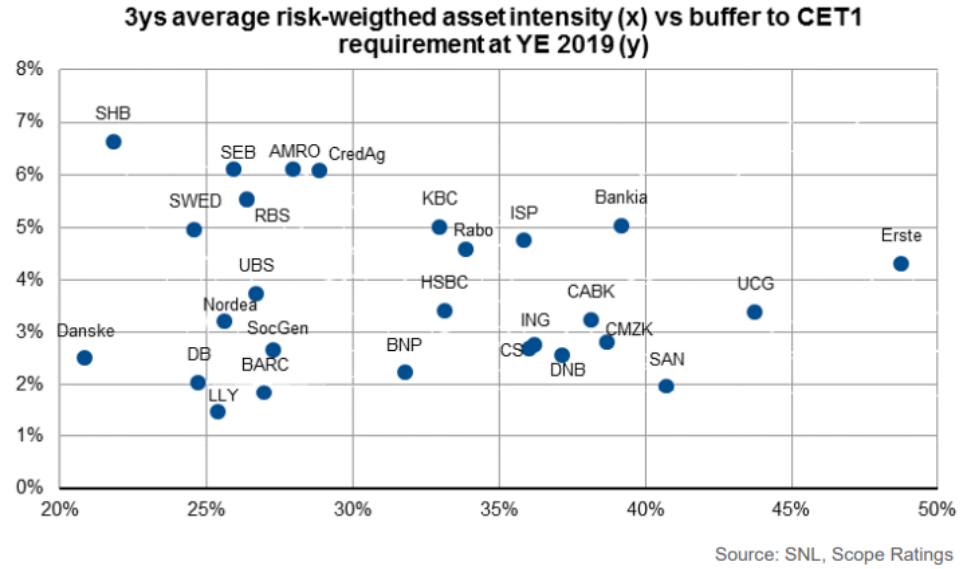
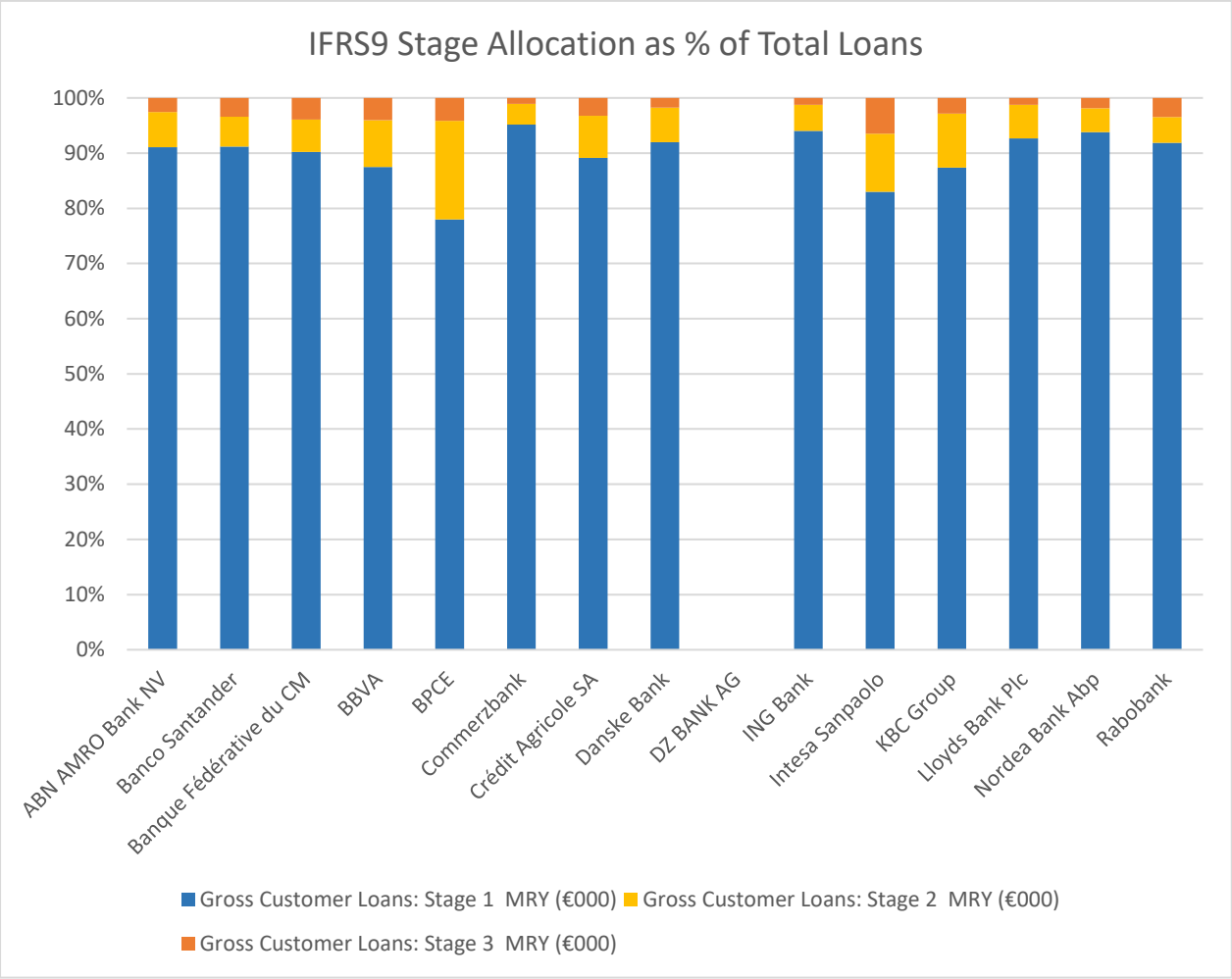


Figure 39: CET1 buffer in excess of SREP requirement versus RWA intensity



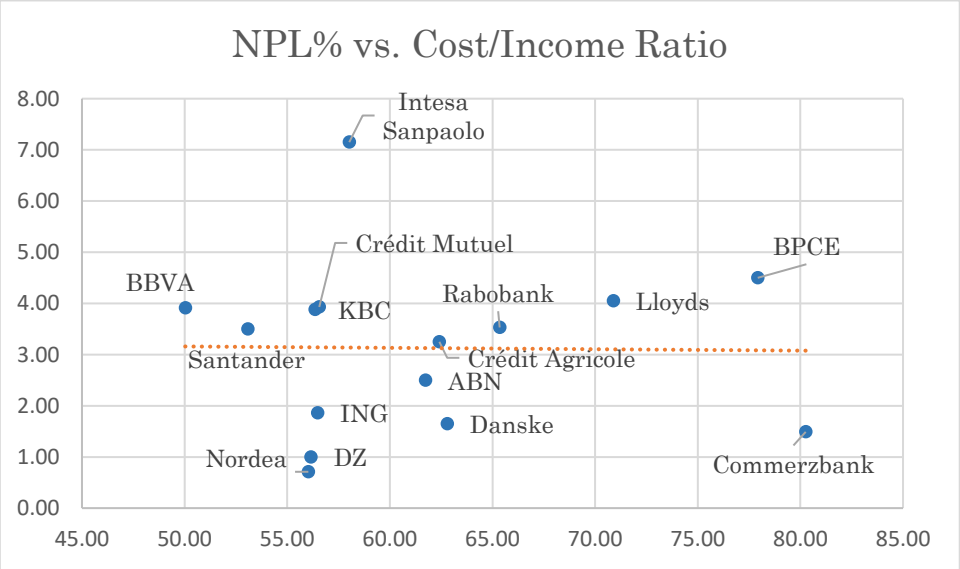
Source: S&P SNL

Provisioning level of Different Asset Classes.

Data of the provisioning behaviour of banks is obtained by consulting the EU CR1-A tables from the banks' Pillar 3 disclosures with reference date 31-12-2019. The gross carrying amount of the defaulted exposure value for the asset classes 'Retail SME – Secured by Real Estate Property', 'Retail SME - other' and Corporate SMEs is obtained, along with the values of the specific credit risk adjustments, which is the value of the provisions corresponding to these defaulted exposures. The amount of specific credit risk adjustments is divided over the total amount of defaulted exposures to obtain the percentage to which the defaulted exposures of each asset class are covered by provisions.

Table 16: Provisioning levels of different SME asset classes

	n	Median	Min	Max	10th Percentile	25th percentile	75th percentile
Corporate SME	13	46.83%	19.47%	98.93%	23.53%	37.42%	58.88%
Retail SME - Secured by Immovable Collateral	10	68.50%	26.67%	100.00%	27.08%	36.70%	79.22%
Retail SME - other	11	33.37%	8.70%	68.53%	11.92%	25.96%	50.00%



Appendix B: Peer Group Banks

ABN AMRO Bank N.V.

ABN AMRO is the third largest bank in the Netherlands with €406 bln total assets as of 31-3-2020. The bank in its current form exists since 2009 after splitting up from a consortium of banks including Santander, Fortis and RBS due to nationalization following the global financial crisis. The Dutch state still owns 49,9% of the shares through NLFI. Its key markets are: – besides the Netherlands – Belgium, France, Germany and the United States.

Banco Bilbao Vizcaya Argentaria, S.A.

BBVA is a Spanish Bank with €712 bln of total assets. BBVA is the result of the mergers of the banks Banco Bilbao and Banco Vizcaya in 1989, whereafter it merged with Argentaria in 1999. It is the second largest bank of Spain, after Santander. A large share of its corporate loans are towards Manufacturing companies, and Retail and Wholesale trade companies.

Groupe BPCE

BPCE is the second largest banking group of France, with 1251 bln of total assets as of 31-3-2020. BPCE provides a full range of banking and insurance services. It is active in over 40 countries, and employs over 100,000 people. It's subsidiary Nataxis provides asset management and investment banking services. BPCE is a cooperative bank, with 70% of its business coming from retail banking and insuring, 16% coming from asset management, and 14% coming from Corporate and Investment Banking. BPCE has no specific industry in which its non-financial corporate loans are focused, aside from significant investments in the real estate sector.

Commerzbank

Commerzbank is a German bank with branches in over 50 countries which focusses on corporate banking and mortgages. It has €517bln of total assets. It server 11,7 million private customers and business owners as well as over 70.000 large corporates and multinationals. A large portion of its corporate loans are in the manufacturing industry.

Groupe Crédit Agricole

Credit Agricole is the largest cooperative bank in the world with €1764 bln of total assets. Crédit Agricole aims to gain most of its revenue from financing Non-Financial

Corporations. It has 39 local banks and it actively promotes the benefits of cooperative banking.

Credit Mutuel

Crédit Mutuel is a cooperative bank and member of the International Raiffeisen Union (IRU). It has 71.000 employees, 12 regional banks with 4338 branch offices. It has 718bln of total assets. Crédit Mutuel focuses on retail banking and insurances, and private banking.

Danske Bank

Danske bank is the largest danish financial services provider with €411bln of total assets. It focusses on retail banking in the Nordic and Ireland. The dutchman Chris Vogelzang is the current CEO of Danske, appointed after being a board member of ABN AMRO.

DZ

DZ is a the central institution of over 900 cooperative banks in Germany. DZ itself also functions as a corporate and investment bank. It is part of the 'Volksbanken und Raiffeisenbanken' financial network.

ING Bank N.V.

ING is a multinational bank, and the largest bank of the Netherlands. It provides a full range of financial services including retail banking, commercial and investment banking, Insurances and Asset Management. ING holds 40% of Dutch retail deposits. It owns €944bln of total assets.

Intesa Sanpaolo

Intesa Sanpaolo is the second largest bank of Italy after Unicredit. The bank has significant insurance and asset management activities. Its main focus of operations lie in its home country of Italy, but also has major activities in the eastern Europe, the middle east and north-Africa.

KBC

KBC is a Belgian bank with its focus on banking and insuring in Belgium, the Czech Republic,

Slovakia, Hungary, Bulgaria and Ireland. KBC was criticized for its sizeable investments in coal as an energy source. In 2019, it also sold its residual corporate loan portfolio for about €260 million euros to concentrate fully on its core activities in the retail and micro-SME markets.

Lloyds PLC.

Lloyds is the largest retail and commercial financial services provider of the UK. Its main activities are retail and commercial banking and insuring. It is the parent company of – amongst others – Halifax and Bank of Scotland.

Nordea

Nordea is a Nordic bank which is based in Finland. It offers services in retail banking, corporate banking and asset management. Its credit portfolio is concentrated for 21% in Finland, 30% in Sweden, 21% in Norway, and 26% in Denmark. Nordea emphasizes its low volatility of profits and stable earnings generation, and the low credit losses it makes over a business cycle. For its business lending Nordea is not particularly skewed towards certain types industries.

Santander

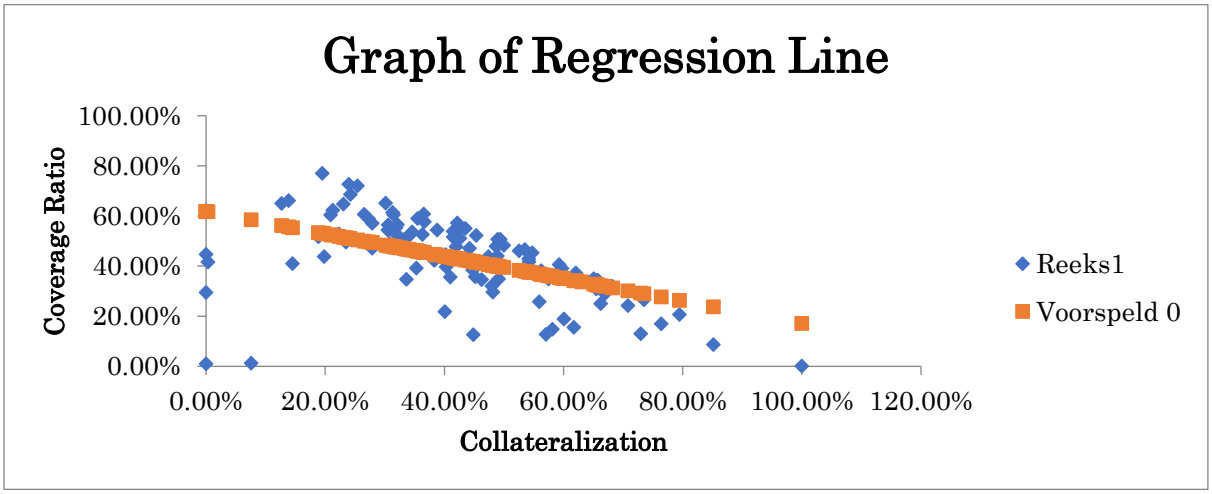
Banco Santander is a Spanish multinational bank that's primarily active in Europe, North-America and South America. It is by assets the second largest bank of the peer group after Crédit Agricole. In total, it has €942 billion of customer loans outstanding, of which €529 billion to households and €319 million to companies.

Appendix C: Regression results

Regression Data	
Multiple R	0.531159
R-squared	0.28213
Adjusted R-Squared	0.275293
Standard Deviation	0.136908
Observations	107

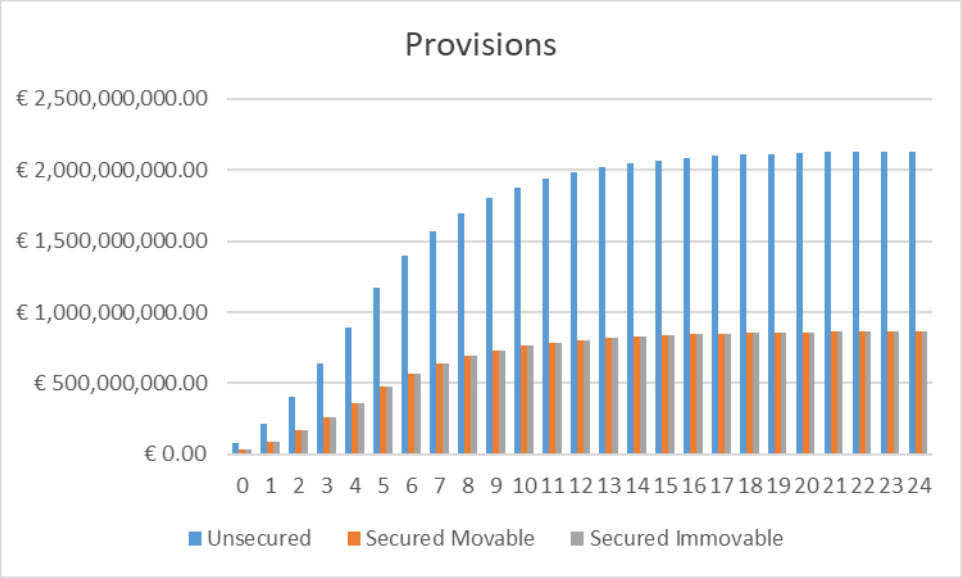
	Coefficients	Standard error	Statistical T Data	P-value	Lowest 95%	Highest 95%	Lowest 95.0%	Highest
Intercept	0.617729	0.03186	19.38881	1.76E-36	0.554557	0.680902	0.554557	0.680902
Collateralization	-0.44707	0.069596	-6.42386	3.96E-09	-0.58507	-0.30908	-0.58507	-0.30908

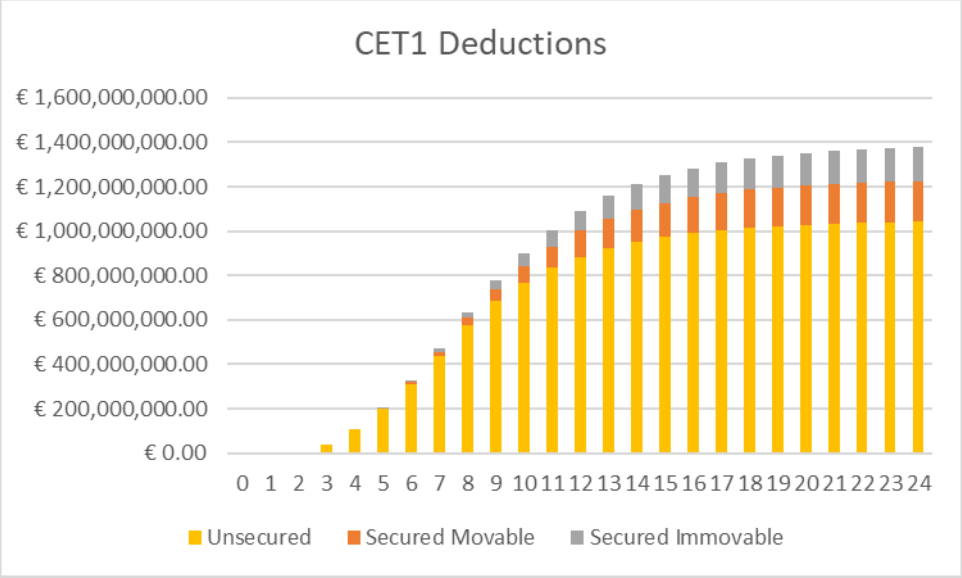
Plot of regression line

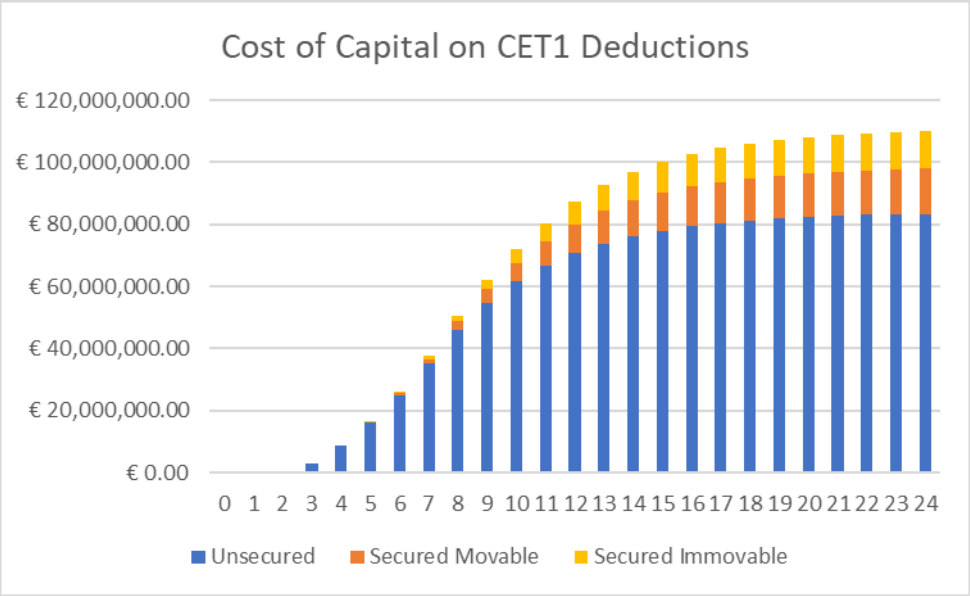


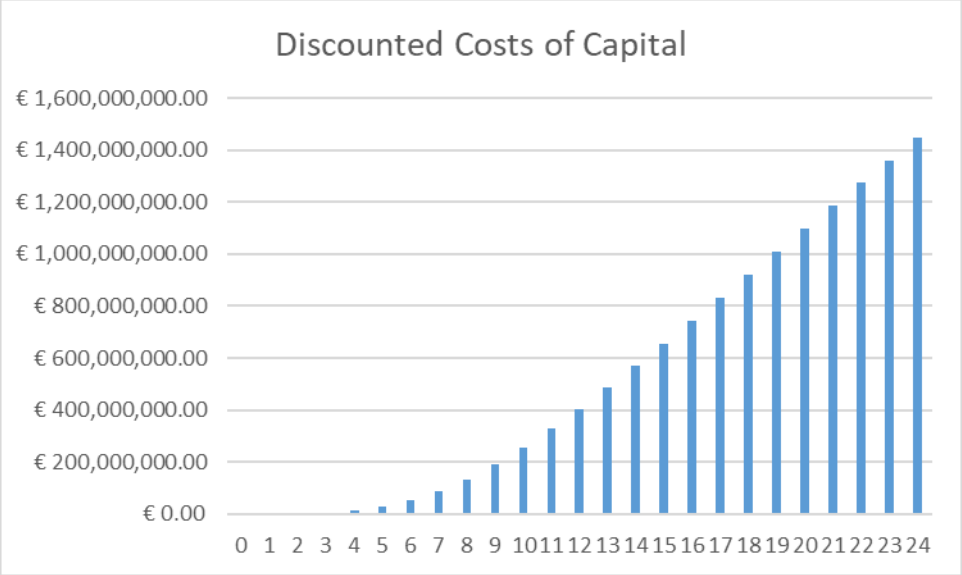
Appendix D: Prudential Backstop Calculations:

Profile 1	
Method	Flat Provisioning
Coverage Ratio	48.20%
Collateralization	44.77%

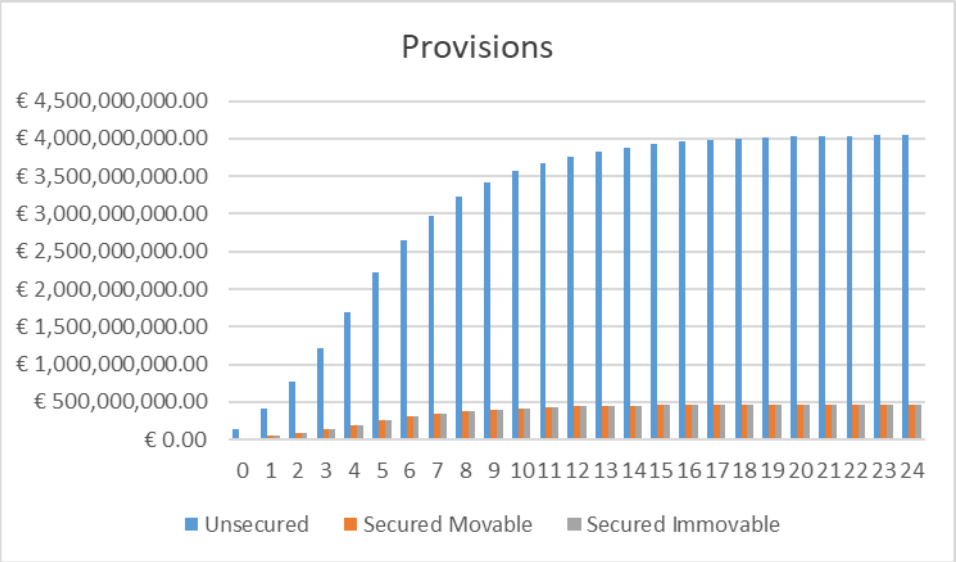








Profile 2	
Method	Flat Provisioning
Coverage Ratio	62.24%
Collateralization	18.87%


Provisions
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€ 2,500,000,000.00
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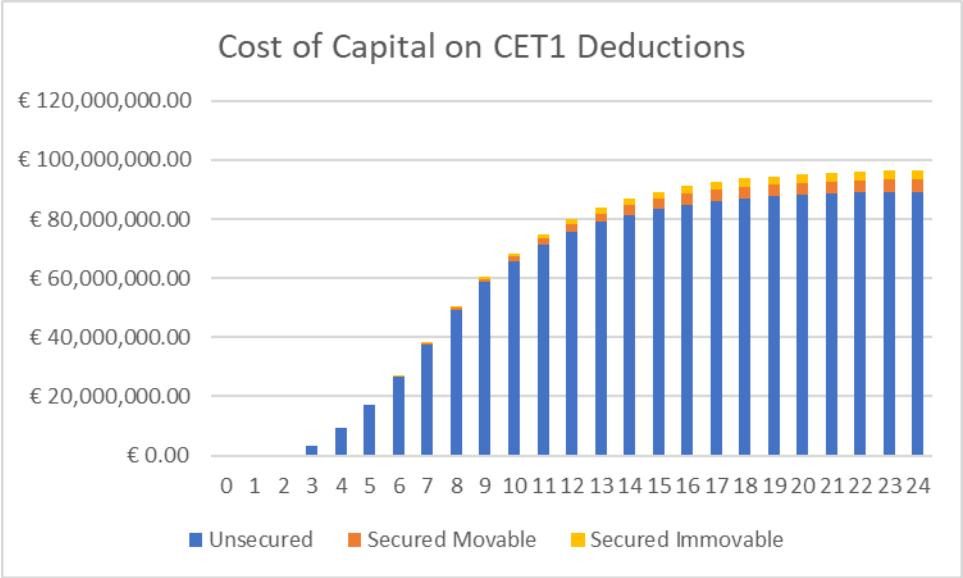
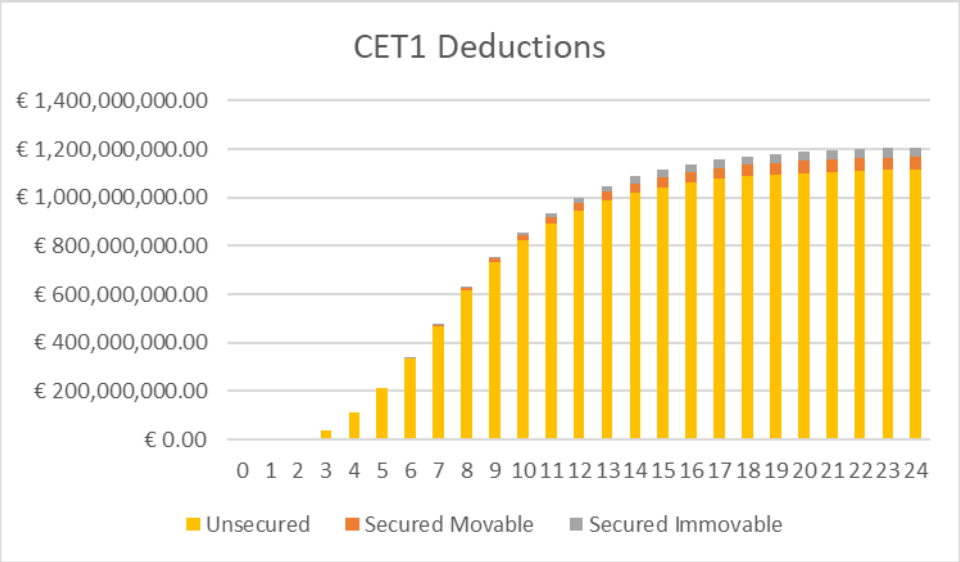
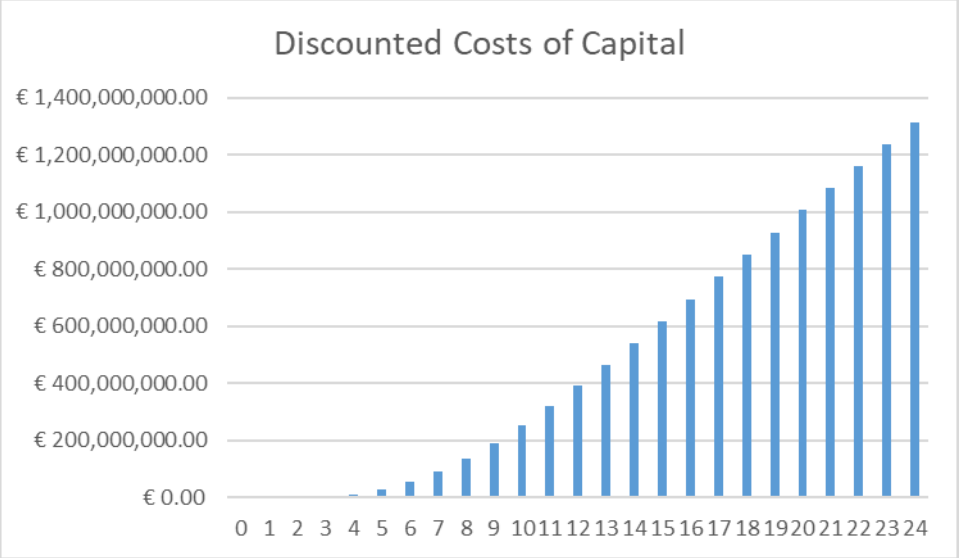
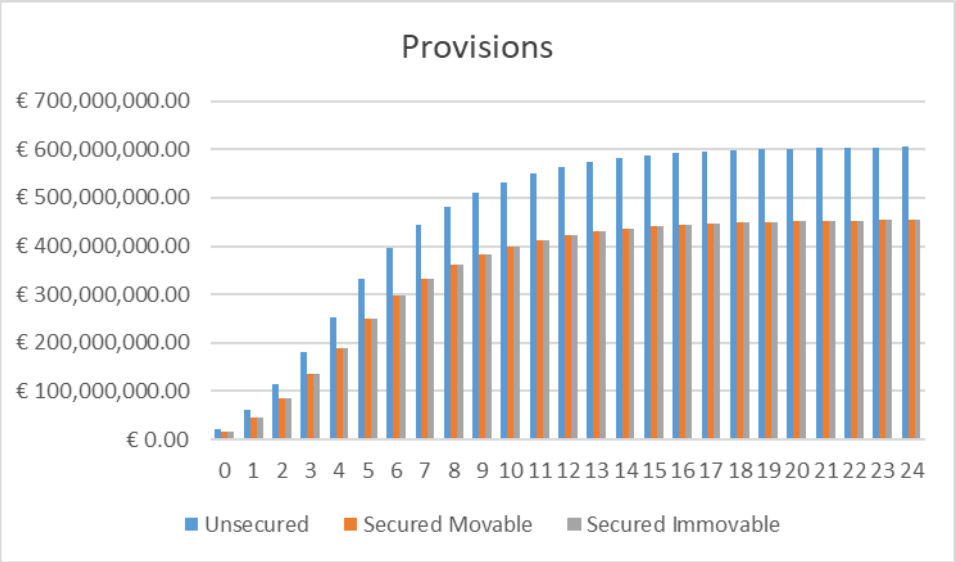
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable


Cost of Capital on CET1 Deductions
€ 120,000,000.00
€ 100,000,000.00
€ 80,000,000.00
€ 60,000,000.00
€ 40,000,000.00
€ 20,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable





Profile 3	
Method	Flat Provisioning
Coverage Ratio	19%
Collateralization	60%


Provisions
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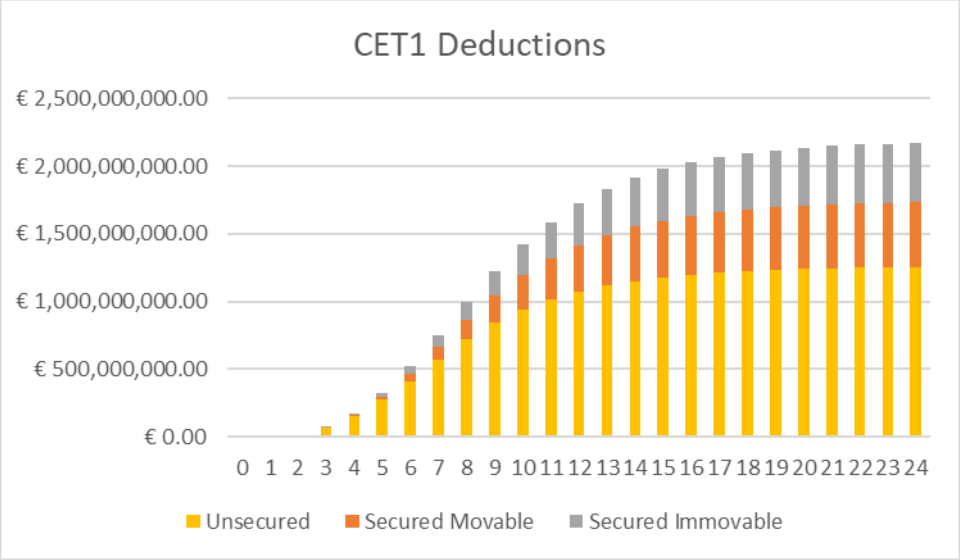
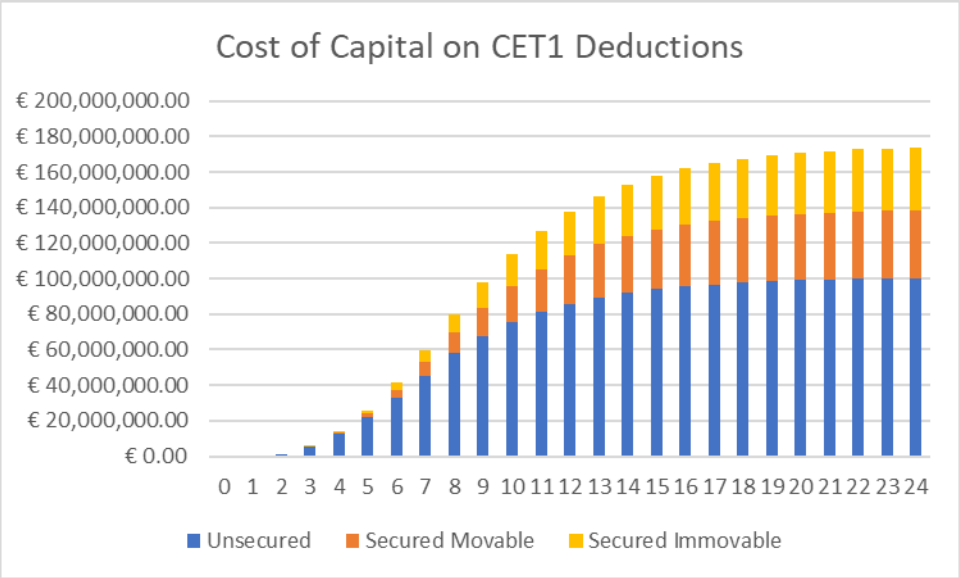
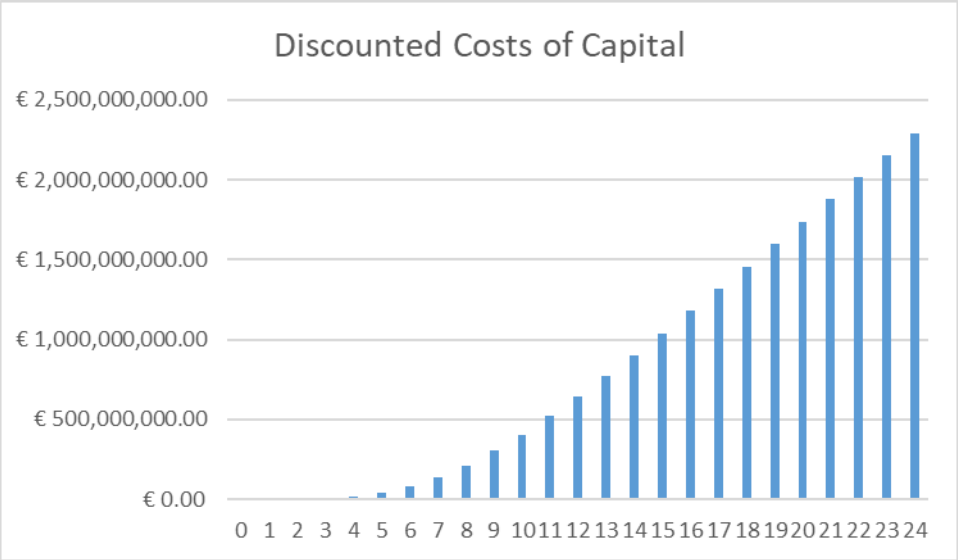
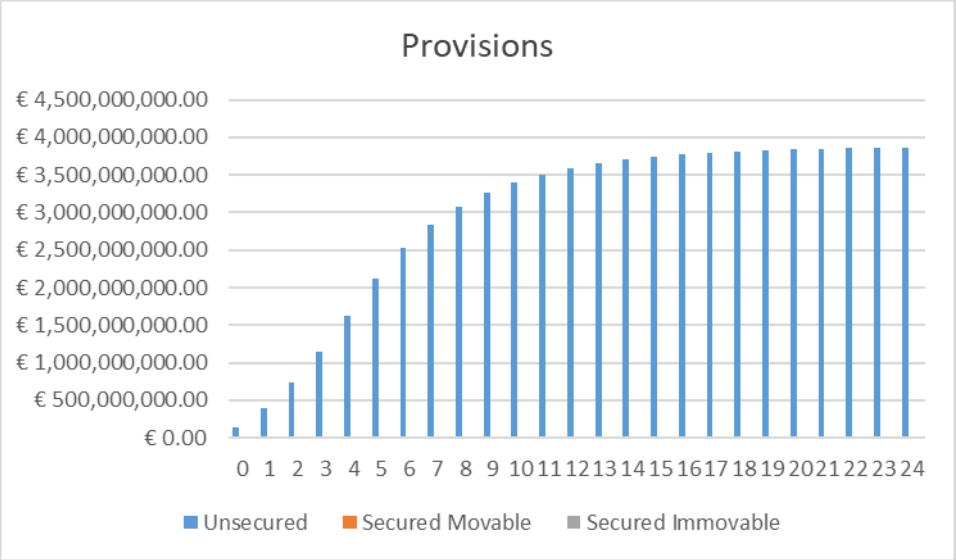
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

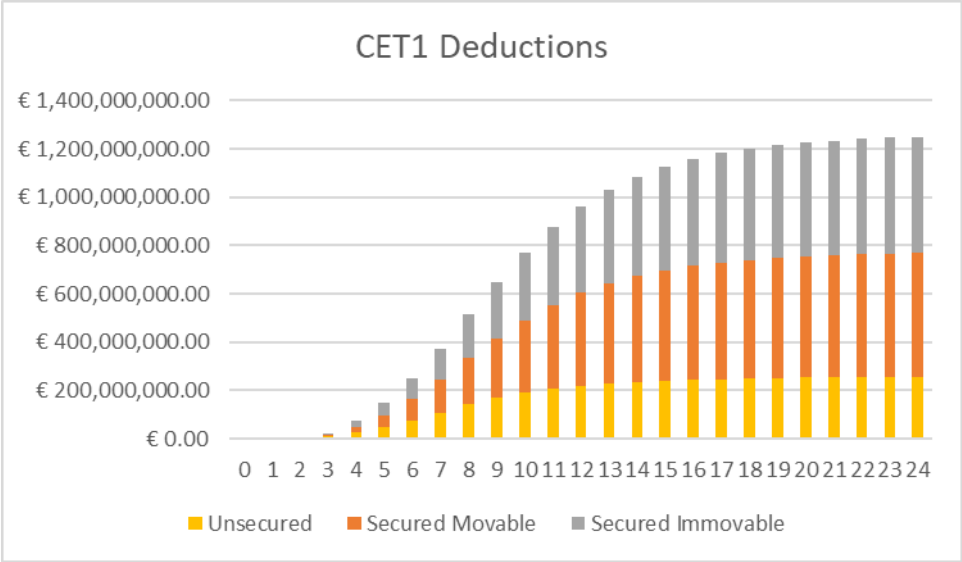

CET1 Deductions
€ 2,500,000,000.00
€ 2,000,000,000.00
€ 1,500,000,000.00
€ 1,000,000,000.00
€ 500,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

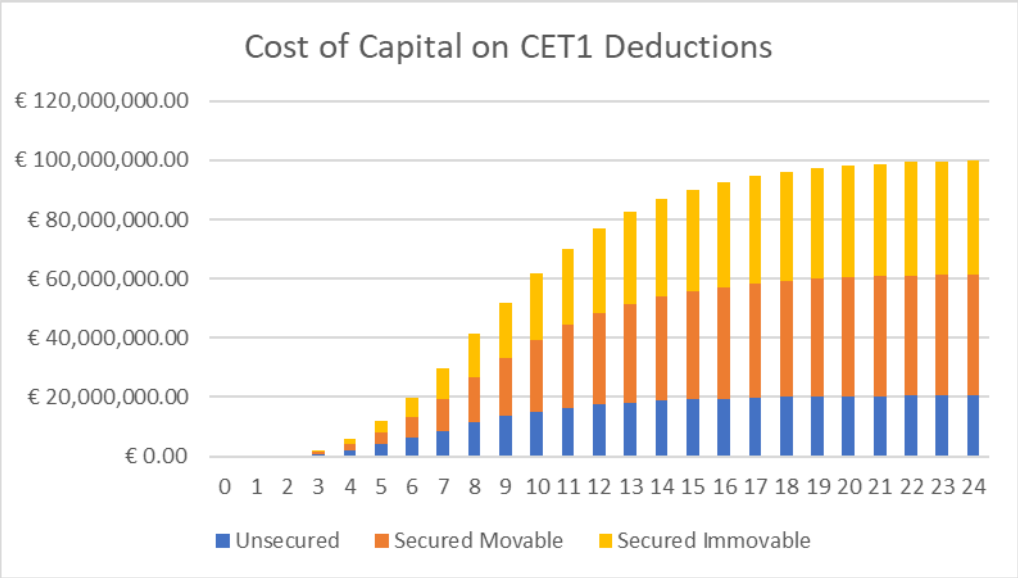


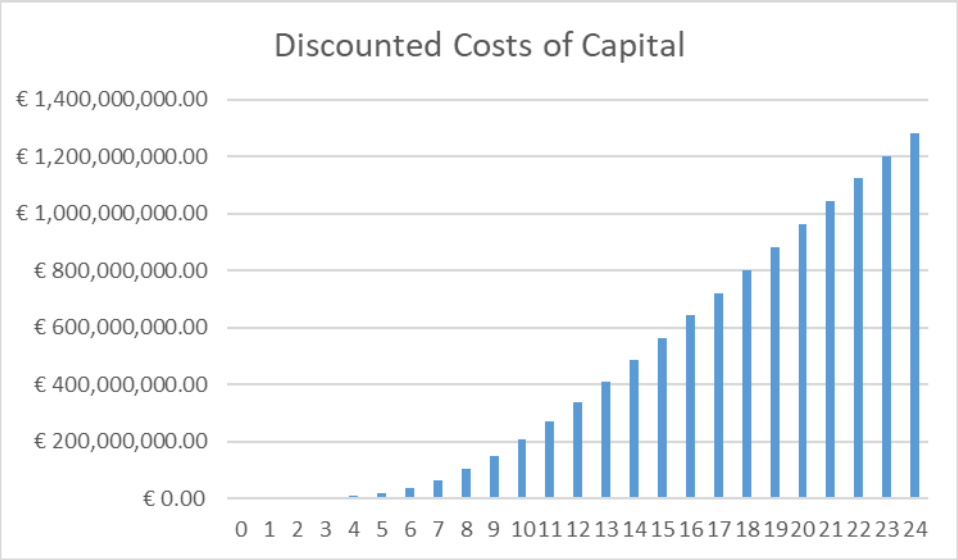


Profile 1	
Method	Optimal Provisioning
Coverage Ratio Unsecured Exposures	87.00%
Collateralization	44.77%

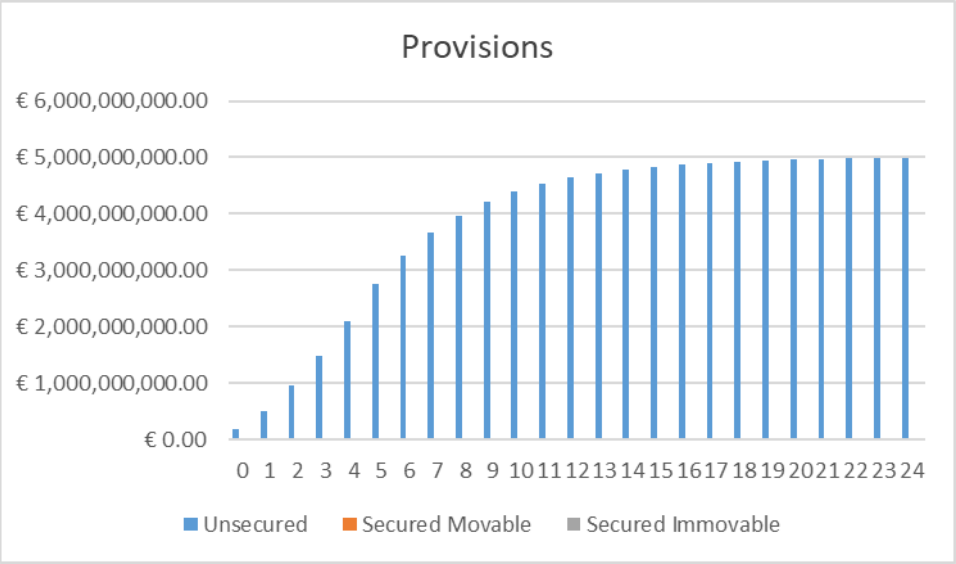

Provisions
€ 4,500,000,000.00
€ 4,000,000,000.00
€ 3,500,000,000.00
€ 3,000,000,000.00
€ 2,500,000,000.00
€ 2,000,000,000.00
€ 1,500,000,000.00
€ 1,000,000,000.00
€ 500,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

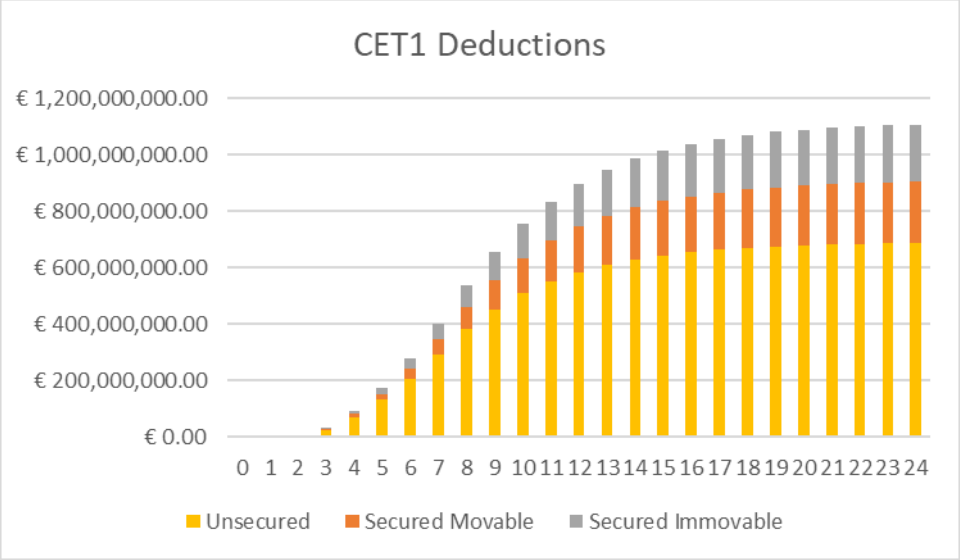

CET1 Deductions
€ 1,400,000,000.00
€ 1,200,000,000.00
€ 1,000,000,000.00
€ 800,000,000.00
€ 600,000,000.00
€ 400,000,000.00
€ 200,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

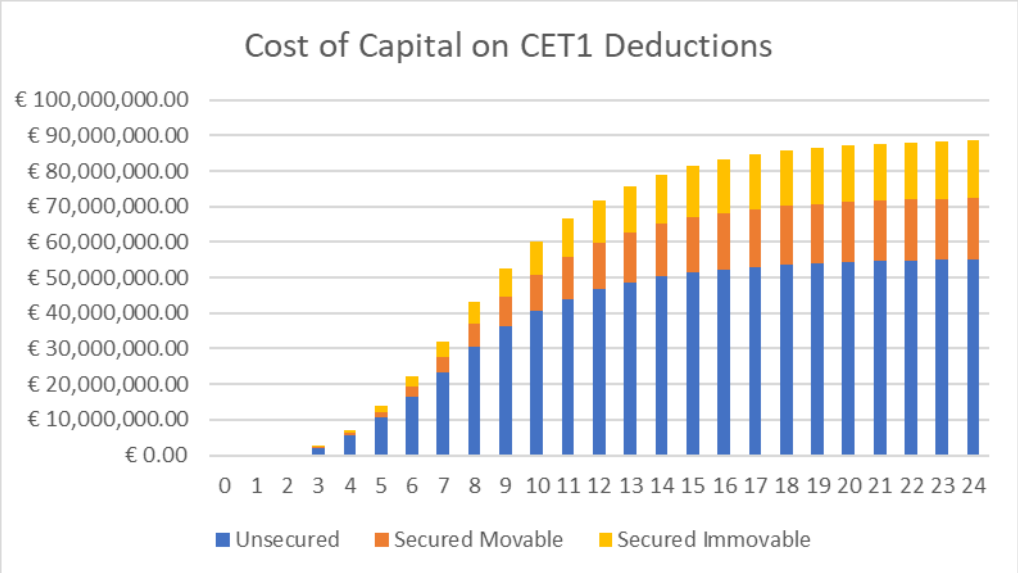


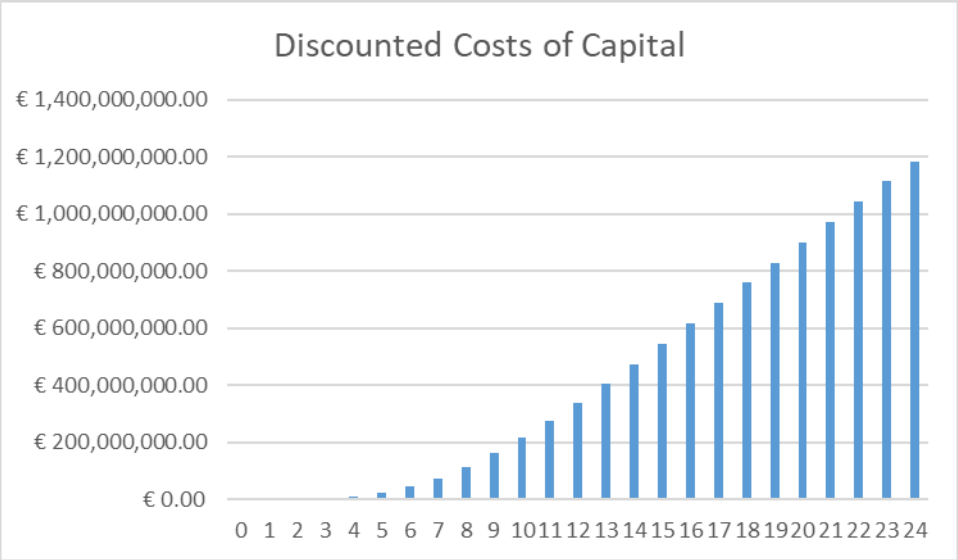


Profile 2	
Method	Optimal Provisioning
Coverage Ratio Unsecured Exposures	77.00%
Collateralization	19.00%

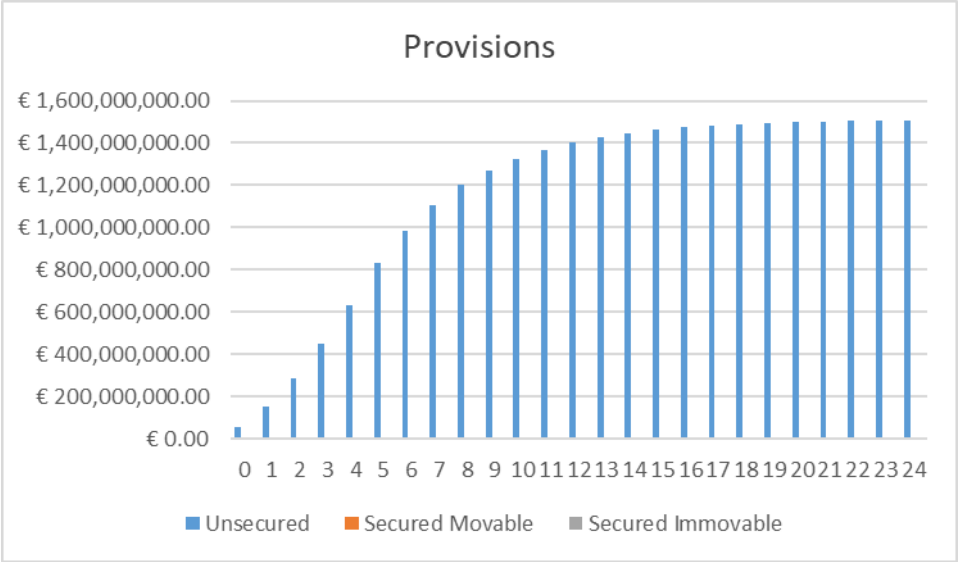

Provisions
€ 6,000,000,000.00
€ 5,000,000,000.00
€ 4,000,000,000.00
€ 3,000,000,000.00
€ 2,000,000,000.00
€ 1,000,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

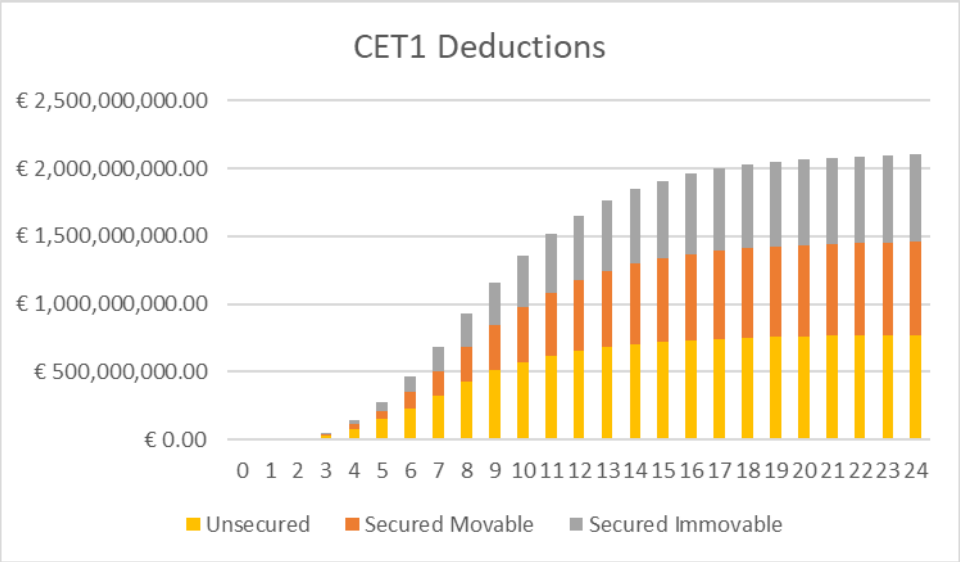

CET1 Deductions
€ 1,200,000,000.00
€ 1,000,000,000.00
€ 800,000,000.00
€ 600,000,000.00
€ 400,000,000.00
€ 200,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

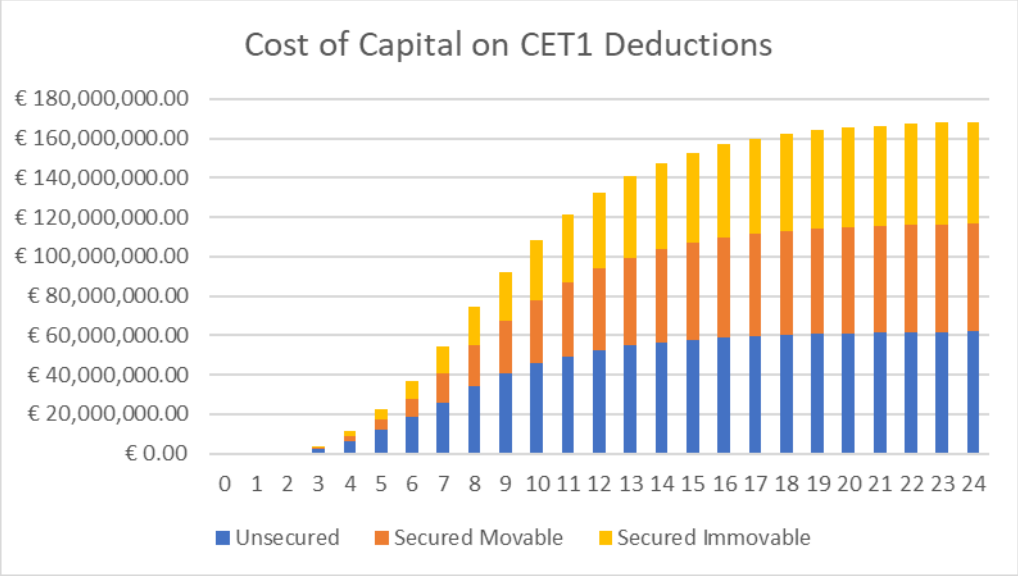

Cost of Capital on CET1 Deductions
€ 100,000,000.00
€ 90,000,000.00
€ 80,000,000.00
€ 70,000,000.00
€ 60,000,000.00
€ 50,000,000.00
€ 40,000,000.00
€ 30,000,000.00
€ 20,000,000.00
€ 10,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable

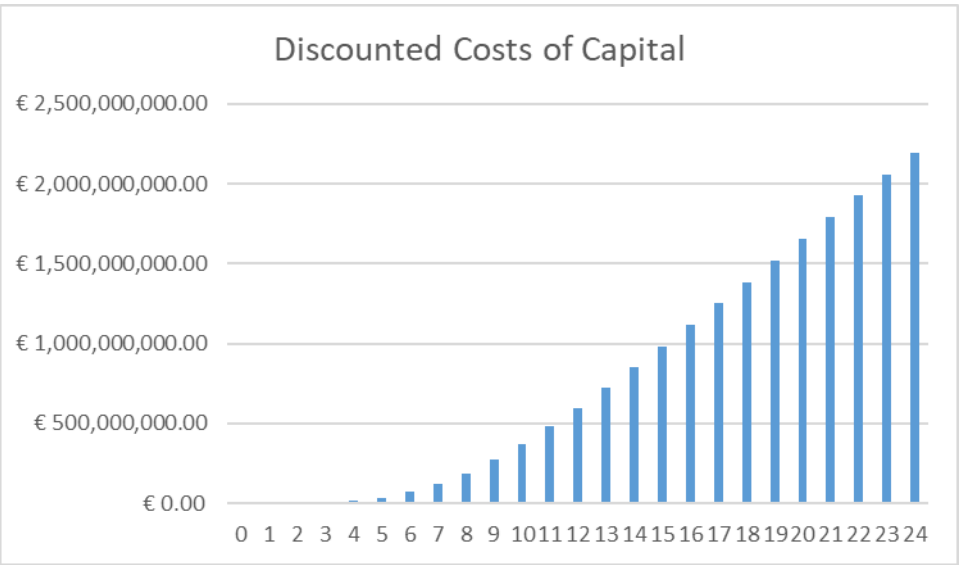


Profile3	
Method	Optimal Provisioning
Coverage Ratio Unsecured Exposures	47.00%
Collateralization	60.00%




CET1 Deductions
€ 2,500,000,000.00
€ 2,000,000,000.00
€ 1,500,000,000.00
€ 1,000,000,000.00
€ 500,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable


Cost of Capital on CET1 Deductions
€ 180,000,000.00
€ 160,000,000.00
€ 140,000,000.00
€ 120,000,000.00
€ 100,000,000.00
€ 80,000,000.00
€ 60,000,000.00
€ 40,000,000.00
€ 20,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Unsecured
Secured Movable
Secured Immovable


Discounted Costs of Capital
€ 2,500,000,000.00
€ 2,000,000,000.00
€ 1,500,000,000.00
€ 1,000,000,000.00
€ 500,000,000.00
€ 0.00
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

	ABN AMRO Bank NV	Banco Santander	Banque Fédérative du CM	BBVA	BPCE	Commerzbank	Crédit Agricole SA	Danske Bank	DZ BANK AG	Intesa Sanpaolo	KBC Group	Lloyds Bank Plc	Nordea Bank Abp	Rabobank
A Agriculture, forestry and fishing	5.10%	6.26%	4.11%	4.09%	6.87%	5.37%	3.73%	5.95%	3.72%	13.12%	2.20%	2.71%	8.61%	8.20%
B Mining and quarrying	9.59%	2.30%	5.21%	2.15%	5.64%	1.05%	2.20%	8.39%	24.52%	3.38%	4.82%	18.00%	18.64%	0.71%
C Manufacturing	8.50%	5.44%	4.03%	4.33%	6.61%	2.31%	3.54%	4.22%	6.83%	12.59%	3.65%	3.57%	4.34%	5.58%
D Electricity, gas, steam and air conditioning supply	0.92%	1.84%	3.08%	5.56%	1.84%	0.71%	1.25%	0.18%	1.06%	3.42%	4.73%	4.58%	0.09%	1.77%
E Water supply	13.77 %	2.39%	2.74%	1.57%	4.45%	0.54%	2.02%	2.44%	5.43%	10.29%	1.66%	0.03%	4.59%	4.39%
F Construction	6.43%	9.78%	5.61%	12.58%	7.64%	9.57%	11.73%	6.18%	5.13%	34.27%	5.81%	5.16%	1.80%	9.15%
G Wholesale and retail trade	4.63%	4.64%	6.20%	6.55%	8.02%	2.51%	4.98%	4.59%	4.37%	11.21%	8.45%	2.40%	2.20%	3.63%
H Transport and storage	7.93%	3.93%	2.31%	5.26%	4.87%	2.10%	4.55%	17.51%	12.67%	10.15%	1.32%	1.47%	5.30%	14.24%
I Accommodation and food service activities	3.68%	7.31%	8.33%	3.20%	9.92%	5.50%	6.96%	5.07%	13.25%	14.97%	5.95%	34.83%	0.98%	4.00%
J Information and communication	1.49%	1.82%	4.62%	1.41%	8.21%	0.85%	2.13%	1.33%	2.60%	5.14%	2.53%	0.36%	1.01%	2.69%
K Financial and insurance activities	6.68%	0.00%	4.06%	2.78%	3.71%	0.00%	3.04%	2.71%	0.00%	4.25%	4.84%	0.00%	0.71%	0.02%
L Real estate activities	1.87%	2.85%	2.24%	4.02%	2.86%	2.82%	3.36%	1.66%	0.50%	22.08%	4.48%	1.27%	0.36%	5.70%
M Professional, scientific and technical activities	8.10%	3.23%	2.72%	3.81%	5.16%	3.54%	3.79%	7.20%	0.82%	7.05%	3.02%	4.74%	3.15%	7.30%
N Administrative and support service activities	4.19%	4.46%	3.57%	3.43%	3.09%	0.74%	1.81%	0.94%	5.80%	11.67%	1.05%	0.47%	2.53%	4.11%
O Public administration and defence, compulsory social security	0.00%	0.08%	0.16%	1.72%	0.68%	0.01%	1.11%	0.01%	6.65%	0.01%	0.21%	0.00%	0.00%	0.00%
P Education	5.66%	4.64%	1.84%	4.51%	2.51%	7.27%	2.85%	1.36%	0.62%	14.24%	0.81%	9.51%	0.77%	3.64%
Q Human health services and social work activities	14.46 %	4.24%	1.53%	1.40%	2.35%	0.31%	2.16%	3.06%	0.67%	6.38%	1.27%	3.06%	0.35%	3.42%
R Arts, entertainment and recreation	4.99%	6.53%	4.65%	3.38%	6.84%	18.57%	6.51%	4.53%	2.21%	22.20%	4.17%	6.01%	2.10%	5.40%
S Other services	3.16%	3.68%	2.87%	4.29%	11.77%	2.87%	6.93%	1.46%	2.09%	1.39%	2.53%	18.78%	8.59%	5.43%
Loans and advances	6.31%	4.45%	3.44%	4.87%	4.85%	2.34%	4.00%	3.53%	3.56%	12.60%	4.30%	4.61%	2.80%	6.32%

Figure 40: NPL rates of sectors in Non-Financial Loans

Appendix E: Portfolio Characteristics of Non-Financial Loans

	ABN AMR	Banco San	Banque Fé	BBVA	BPCE	Commerzb	Crédit Agr	Danske Ba	DZ BANK	ING Bank	Intesa San	KBC Grou	Lloyds Bar	Nordea Ba	Rabobank
A Agriculture, forestry and fishing	6.77%	2.59%	4.71%	2.16%	1.62%	0.49%	8.94%	2.75%	0.86%	1.44%	1.94%	3.29%	9.67%	6.51%	33.08%
B Mining and quarrying	6.73%	2.17%	0.29%	2.69%	2.74%	2.18%	2.87%	0.98%	1.07%	5.27%	2.95%	0.23%	1.88%	1.87%	0.53%
C Manufacturing	8.25%	15.78%	7.27%	22.75%	7.65%	32.88%	17.43%	10.08%	9.74%	19.58%	25.25%	18.99%	7.76%	9.31%	13.55%
D Electricity, gas, steam and air conditioning supply	1.37%	4.25%	1.24%	7.08%	3.15%	8.93%	4.40%	2.77%	7.67%	5.00%	3.81%	3.67%	1.22%	2.94%	1.63%
E Water supply	0.57%	0.61%	0.47%	0.52%	0.43%	1.56%	0.64%	0.43%	0.50%	0.87%	0.90%	1.10%	1.51%	0.64%	0.15%
F Construction	2.47%	5.99%	5.12%	6.30%	4.95%	2.90%	3.57%	2.68%	3.74%	4.18%	8.61%	7.78%	9.90%	4.35%	2.58%
G Wholesale and retail trade	15.20%	21.90%	9.66%	15.81%	10.44%	14.87%	12.76%	7.71%	6.52%	17.30%	15.26%	17.64%	9.59%	6.81%	14.46%
H Transport and storage	12.43%	5.61%	3.80%	5.55%	2.37%	5.86%	7.45%	5.68%	10.79%	9.95%	5.67%	6.49%	4.76%	8.53%	2.93%
I Accommodation and food service activities	1.63%	3.59%	2.30%	5.01%	2.70%	0.65%	2.67%	1.09%	0.52%	1.09%	2.82%	1.32%	4.52%	0.96%	2.03%
J Information and communication	1.68%	4.39%	1.41%	3.89%	1.13%	7.13%	2.67%	1.50%	1.68%	4.84%	3.15%	2.05%	1.94%	2.35%	0.58%
K Financial and insurance activities	19.92%	0.00%	5.50%	3.95%	10.32%	0.00%	5.07%	2.17%	0.02%	0.08%	1.87%	2.61%	0.00%	6.32%	0.49%
L Real estate activities	8.58%	14.88%	30.85%	11.19%	35.70%	12.39%	18.86%	52.64%	44.74%	16.04%	8.85%	14.17%	28.84%	34.44%	10.03%
M Professional, scientific and technical activities	4.79%	4.72%	7.59%	2.52%	6.05%	2.61%	4.76%	3.11%	2.45%	4.30%	6.08%	6.74%	3.77%	6.86%	3.01%
N Administrative and support service activities	4.45%	3.27%	3.15%	1.97%	3.48%	3.95%	2.59%	2.81%	2.83%	5.04%	2.12%	4.60%	4.98%	3.01%	1.01%
O Public administration and defence, compulsory social security	0.01%	0.11%	0.09%	0.16%	0.04%	0.01%	0.50%	0.51%	0.00%	0.54%	0.00%	0.00%	1.11%	0.01%	0.00%
P Education	0.08%	0.70%	0.74%	0.52%	0.55%	0.12%	0.19%	0.07%	0.10%	0.19%	0.10%	0.08%	1.75%	0.31%	0.30%
Q Human health services and social work activities	3.12%	1.80%	4.00%	2.70%	2.92%	1.12%	1.41%	0.94%	0.87%	2.80%	0.92%	6.41%	4.12%	1.06%	2.53%
R Arts, entertainment and recreation	0.63%	0.47%	0.64%	0.80%	0.67%	0.27%	0.41%	0.28%	0.21%	0.31%	0.48%	0.75%	0.59%	0.65%	0.65%
S Other services	1.30%	7.16%	11.18%	4.42%	3.09%	2.08%	2.81%	1.81%	5.69%	1.17%	9.21%	2.06%	2.07%	3.06%	10.45%

Figure 8: Spread of portfolio of peer group for loans to non-financial corporations: source S&P SNL EBA transparency exercise template & own calculations

NPE Coverage Ratio per industry	ABN Amrc	Santander	Crédit Mu	BBVA	BPCE	Commerzl	Crédit Agr	Danske Ba	DZ	ING	Intesa San	KBC	Lloyds	Nordea	Rabobank
A Agriculture, forestry and fishing	19.96%	55.97%	66.03%	80.88%	75.30%		104.64%	46.27%		40.42%	63.07%	61.29%	24.56%	24.50%	12.43%
B Mining and quarrying	40.97%	68.56%	58.76%	85.43%	33.88%	109.27%	53.04%	33.86%	71.13%	29.02%	86.67%		25.45%	44.50%	
C Manufacturing	33.68%	50.18%	67.22%	72.57%	72.06%	62.88%	71.09%	39.74%	58.83%	63.61%	61.26%	63.22%	26.50%	48.31%	53.06%
D Electricity, gas, steam and air conditioning supply		73.26%	44.49%	84.06%	61.30%	44.79%	100.87%		99.17%	65.68%	84.06%	30.25%			
E Water supply		66.04%	76.37%		60.04%		74.15%				74.18%				
F Construction	38.33%	65.51%	59.16%	63.60%	70.94%	64.14%	69.18%	43.19%	63.11%	44.86%	59.14%	62.62%	61.21%	78.65%	56.21%
G Wholesale and retail trade	43.88%	65.97%	58.75%	80.45%	61.84%	76.44%	66.00%	51.33%	56.20%	48.06%	64.99%	81.28%	57.26%	64.65%	40.23%
H Transport and storage	35.95%	62.92%	57.11%	77.31%	45.61%	33.71%	63.57%	27.50%	48.25%	43.00%	66.22%	75.64%	66.17%	22.99%	17.57%
I Accommodation and food service activities	43.95%	51.58%	62.70%	72.85%	70.65%	86.14%	95.57%		61.96%	50.48%	57.11%	46.27%	28.90%		52.35%
J Information and communication		65.06%	54.92%	68.04%	36.85%	57.82%	50.50%	99.91%	70.72%	76.78%	56.54%			99.76%	68.73%
K Financial and insurance activities	37.94%		80.97%	73.03%	75.40%		89.85%	79.75%			47.66%	33.35%		45.87%	
L Real estate activities	29.68%	48.86%	56.77%	67.34%	64.98%	39.79%	78.64%	18.86%	25.65%	55.97%	48.72%	44.61%	49.12%	54.05%	16.98%
M Professional, scientific and technical activities	49.65%	47.85%	58.01%	83.80%	60.05%	65.00%	90.89%	21.42%		28.25%	63.10%	57.35%	16.56%	17.28%	46.84%
N Administrative and support service activities	21.54%	63.72%	65.50%	114.28%	56.08%	76.09%	87.03%		50.90%	74.13%	66.00%	73.82%	97.96%	168.99%	46.90%
O															
P Education		67.90%	69.28%	94.50%	78.53%										
Q Human health services and social work activities	12.46%	58.87%	64.90%	84.21%	72.96%		74.35%	107.59%		192.53%	67.43%	51.36%	59.78%		37.43%
R Arts, entertainment and recreation		52.16%	59.21%	82.71%	62.29%		63.92%				47.53%				37.34%
S Other services		42.09%	49.13%	108.15%	61.53%	55.79%	77.18%	158.84%	66.60%	83.55%	96.56%	121.36%	7.34%	63.53%	31.47%
Loans and advances	35.29%	57.71%	60.40%	76.32%	64.32%	59.33%	76.53%	33.63%	54.66%	51.05%	60.27%	64.55%	33.93%	43.69%	26.51%

Figure 9: Ratio of accumulated impairment, changes to fair value due to credit risk exposures over NPEs: source S&P SNL EBA transparency exercise template & own calculations

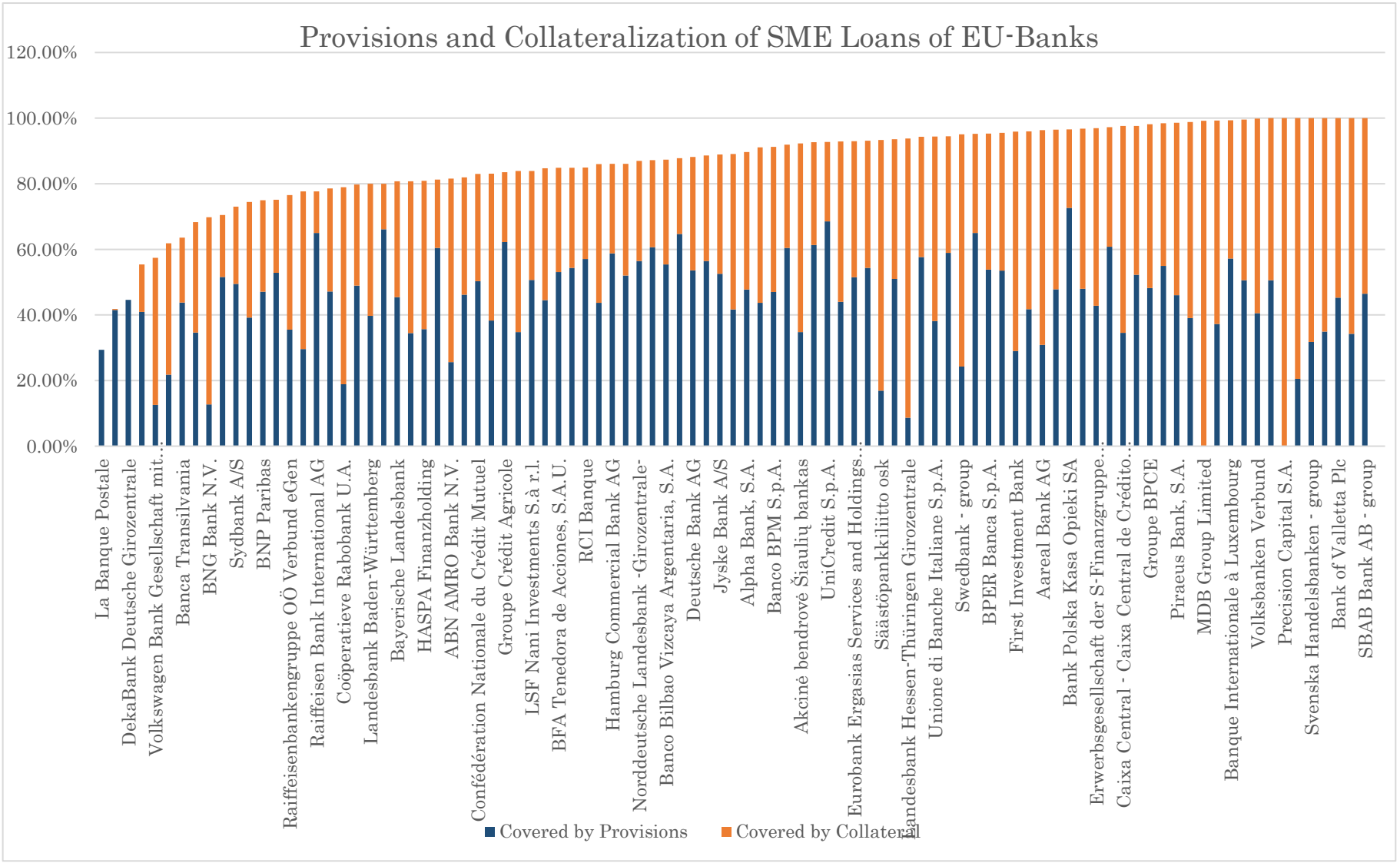


Figure 41: Provisions and Collateralization of SME NPLs of banks under EBA supervision (Source: EBA transparency exercise & author's own calculations