

# **Essays on Bank Funding Strategies**

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## List of papers

This dissertation is based on the following papers:

### Paper A

Do covered bonds issuers differ from non-issuers under the new Basel III liquidity regulation?

### Paper B

Covered bonds funding usage: Evidence from asset encumbrance of European banks

### Paper C

The role of distance and securitization decisions of the Swedish savings banks

### Paper D

Time for change: The role of professional self-esteem in relation to industry support of banking reforms in Sweden

# Abstract

According to the European financial crises database from July 31, 2017, there are 18 European countries that still have not got their systems back to normal. Despite crisis management being implemented in very few countries, formally the financial crises are still in existence.

A common accelerator of economic crises is excessive credit growth. This cause is not totally new, and it has been repeated with continuity over the last century. Under certain economic conditions, financial intermediaries start to lose ground together with their lending standards, resulting in them expanding their lending, which leads to one of two major economic outcomes: growth or meltdown. How does a bank decide whether to follow the herd or not? What are the institutional arrangements that might potentially improve the banks' choice in line with the socially desirable arrangements expected by regulators and supervisors?

This thesis examines excessive funding supply as a potential source of market imperfection, fueled by digitization and financial innovations in the banking industry, leading to excessive lending on residential property. The central research question of this thesis can be formulated as follows: **What are the implications of the banking regulatory amendments (i.e., Basel III) for the funding strategies of financial intermediaries in Europe?** The delay of regulators in designing a system for proper supervision and framing of that activity has led to imbalances in markets and regulatory arbitrage. Changes in the locations of banks headquarters

show that there is insufficient communication between the regulatory authority and the industry, which is potentially caused by the underlying conflict between different visions of the future of banking. The related research questions investigated in this thesis and addressed in the form of appended essays are the following:

**Q1:** Does Basel III favor financial intermediaries that issue covered bonds? (*Essay A*)

**Q2:** How does asset encumbrance affect banks' asset allocations in terms of balance sheet growth and future encumbrance levels? (*Essay B*)

**Q3:** What is the effect of distance for competitor banks in the securitization decisions of Swedish savings banks? (*Essay C*)

**Q4:** How do the characteristics of bank employees affect banking reform support in Sweden? (*Essay D*)

The thesis consists of two parts: Part I is the kappa of the thesis and Chapter 1 in the kappa provides an institutional background for the thesis and introduces the concepts used in the essays. Chapter 2 introduces the motivations for the research questions addressed by the essays. The main theoretical concepts are presented in Chapter 3. Chapter 4 describes the theoretical framework and research process of the thesis. Chapter 5 summarizes the essays and provides a discussion of results and future research. The essays, presented in Part II, aim to facilitate our understanding of the financial intermediation process under regulatory changes.

## Acknowledgements

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The usual disclaimer applies,

Natalia Kostitcyina,

May 2019, Gothenburg





*To Nika*



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**Part I**  
**Introduction**

Jane Fuller:

Banks face an onslaught of new regulation, but it is debatable whether much, or any, of it will tackle fundamental weaknesses in the industry's structure. Perhaps the greatest of these weaknesses is the too big to fail blanket that has wrapped itself around large and/or complex financial institutions. This is despite the taxpayers' anger at being bounced into underwriting the risk-taking activities of overmighty and overpaid bankers.

The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States (2010, p. xvii):

The crisis<sup>1</sup> was the result of human action and inaction, not of Mother Nature or computer models gone haywire. The captains of finance and the public stewards of our financial system ignored warnings and failed to question, understand, and manage evolving risks within a system essential to the well-being of the American public. There was a big miss, not a stumble. While the business cycle cannot be repealed, a crisis of this magnitude need not have occurred. To paraphrase Shakespeare, the fault lies not in the stars, but in us.

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<sup>1</sup> The Global Financial Crises of 2007



# Chapter 1

## Background

### 1.1 Introduction

The focus of this thesis is the persistent regulatory changes that have followed the global financial crisis. The crisis came at significant costs to society by hampering banks' funding sources, leading to public funds being used to supplement the suddenly depleted markets of unsecured and even secured funding. Vast governmental funds have been invested in order to renovate the financial system, which almost collapsed during the years from 2007 to 2009 (Bernanke, 2010).

After the global financial crisis, public demand has also increased for additional disclosure and supervisory comments on the policy interventions (see the discussion in Costello et al. (2016) and Schoenmaker et al. (2016)). In line with Bouvard et al. (2015), the wide media coverage put significant pressure on governments to make the rationale for their actions more transparent. The publicly available disclosures and thousands of interviews, published soon after the financial crisis, provide invaluable material for academic studies on financial regulations and, in particular, the stability of the banking system.

The global financial crisis is still relevant to study due both to the concern that, as Thakor (2018) argues, there has been an irrelevant regulatory response (i.e., the implementation of Basel III) and because there are ongoing academic debates about the reasons for the crisis. This thesis aims **to characterize** the shift of the

regulatory framework in European banking, with a particular focus on Sweden, and **to evaluate** the effect of the regulatory amendments of the last ten years on banks' funding strategies. The design of the study is presented to get a first insight (i.e., in relation to the research question) how the changes in regulations have affected banking behavior.

It is widely acknowledged that every banking crisis has come after a credit expansion, but, as stated by Mendoza and Terrones (2014), only one third of all credit booms end up with a banking crisis. Mendoza and Terrones (2014) analyze the major causes of credit booms, which are surges in capital inflows, gains in total factor productivity (TFP), and policy reforms in the financial system. No matter the cause of favorable economic conditions, it is more or less a fact that banks expand during "good times" by providing more credit than they would do in other conditions.

The "good times" may result from a TFP shock, during which a bank faces structural changes in the economy and increased demand for credit due to a larger amount of projects that formally comply with the bank's lending standard. The credit demand shock either goes along a credit rationing path (or credit crunch), in which the bank rations some good projects and loses investment opportunities due to its inability to get enough funding, or it simply meets the demand and funds all profitable projects in the economy. The latter action results in economic growth. A bank is expected not to increase the price of credit following increased demand due to an adverse selection problem and "lemon premiums" (Bernanke and Gertler, 1995).

Economic conditions, such as excessive money supply or favorable financial liberalization, may incentivize a bank to engage in excessive lending and loosen its lending policy by funding riskier borrowers than it usually does (for a discussion of lending standards relaxation, see Ciccarelli et al. (2015)). Excessive credit supply potentially leads to over-borrowing and spurs demand for residential properties, which then starts price bubbles (Acharya and Naqvi, 2012).

Each over-borrowing spiral, during which the banking industry starts to accumulate assets, is a concern because it builds the risk of a potential economic meltdown. One out of three cases of banks starting to extend lending supply lead to a crisis. The lending standards that constitute the basis for loan applications re-

main mostly hidden from scholars. This opaqueness contributes to the difficulty of distinguishing economic growth from risk accumulation based on a credit boom.

In its Basel III framework, the Basel Committee on Banking Supervision aims to address the excessive lending supply by building up buffers in good times (economic growth), while preventing extensive risk growth through capital charges in bad times (Acharya and Naqvi, 2012). According to the regulatory opinion, the last few years have been an opportunity to build up buffers, and up till now there is no convincing evidence of any banking crisis ahead. Most of the concerns regarding banks are still echoes of the last global financial crisis. Whether the existing buffers are enough to sustain the next downturn is an open question.

Essays A and B study the question of whether the exposures to risk are already increasing in the banking industry through the use of covered bonds (CBs) as a way to fund mortgages. The eased funding constraints lead to more mortgages issued by banks, which in turn leads to price growth of residential properties. Essay A studies whether the banks that exploit CBs as a source of funding grow faster than other banks. Essay B looks at the persistence of the reliance on CBs as a funding instrument.

The empirical focus of the thesis is situated in a European context, with a particular focus on Sweden. The main rationale behind the specific focus on Sweden is that the country is one of the earliest adopters of the Basel III standards. The study design, formalized in Essay C, examines the sharp decline in branch network size of the four major Swedish banks due to digitization of banking services (e.g., moving bank loan applications to online forms, bank account management via a telephone service). This is explored as an exogenous shock for the small Swedish savings banks, which operate traditional banking. The main focus is on the loan growth and securitization decisions of these banks when a competing commercial bank closes down a nearby branch.

Even if the regulations were to perfectly address the issues within the banking industry, there might still be a problem when it comes to regulatory enforcement; that is, it is important to ensure that regulations are correctly implemented. Banks' compliance with the current regulatory framework depends on managerial readiness to enforce the standards properly. The managerial readiness to exert efforts

to comply is a function of the agreement with regulatory enforcement. The banks' accumulation of risky assets on their balance sheets is ambiguous given the banks' characteristics, including unobservable managerial personal justifications of supervision discipline. One of the first attempts to approach that problem is made in Essay D.

The fiercest debate remains about the nature of the crisis: whether it was liquidity risk-based or credit risk-based, and more importantly, whether the new regulatory regime correctly addresses the fundamental causes of the banks' failure. Unfortunately, the European Union provides significantly fewer comments on their actions than does the US Federal Reserve system. The European Central Bank (ECB) does not disclose the auditory reports and investigation results on European financial institutions' failures. The materials explicitly disclosed by the ECB, the European Banking Authority (EBA), the Bank for International Settlements (BIS), or other European Central Banks are not sufficient for gaining a satisfactory picture of the recent crisis.

In contrast, US financial markets are widely covered by mass media, with interviews, reports, and statements available for any date. Specifically, the Fraud Enforcement and Recovery Act of 2009 (Public Law 111-21) created the Financial Crisis Inquiry Commission to examine those major financial institutions that failed or would have failed if not for exceptional assistance from the government (Financial Crisis Inquiry Commission, 2011). Once this investigation had been made in response to the US banks' failure operated globally, *in this thesis I elaborate on problems revealed for banks' US divisions that, I imply, persist for the global banking industry, including the EU financial system.*

The narrative of Section 1.1 familiarizes the reader with the thesis topic and discusses *why* the topic is relevant. In Section 1.2, I first discuss *how* academics are currently addressing the puzzle of the global financial crisis and I elaborate on some of the potential limitations of existing empirical work. Second, I outline the steps that this thesis takes to address (although by no means perfectly) such empirical discrepancies. Section 1.3 describes the specific institutional weaknesses in the US that led to the spread of sub-prime poor lending practices becoming a systemic global crisis, as well as the rationale for regulatory responses. Section

1.4 summarizes the mechanism of the crisis as it spread to the European Union. Section 1.5 examines the EU regulatory response to the problems. Finally, Section 1.6 presents the institutional background of the thesis.

## **1.2 The scholarly representation of 2007–2008**

The turmoil of 2007-2008, which is usually labeled as the global financial crisis, showed us that liquidity and system design matter. Brunnermeier (2009) was one of the very first scholars to express his opinion on the major events. He provides a version of what went wrong to cause a series of banking collapses. His version is formalized in the published model by Brunnermeier and Pedersen (2009). Conceptually, the funding liquidity constraint averts traders from taking capital-intensive illiquid positions, and consequently transfer the shock of funding liquidity (e.g., higher trade margins) to a shock for market liquidity (that is, the availability of instruments, such as repurchase agreement deals, to fund banking operations).

In order to grasp the whole situation without resorting to anecdotal evidence, let us consider the case of Bear Stearns. According to Brunnermeier (2009), the failure of Bear Stearns was nothing more than the unfortunate coincidence of two factors. The first factor was Carlyle Capital, an Amsterdam-listed hedge fund, clearing out its portfolio in order to compensate the rising credit spread between agency bonds (issued by Freddie Mac and Fannie Mae) and treasury bonds. The second factor was a late email on the evening of March 11, 2008 from an unnamed hedge fund to Goldman Sachs "asking it to step into a contractual relationship that would increase Goldman's direct exposure to Bear Stearns" (Brunnermeier, 2009). Brunnermeier (2009, p. 88) notes:

Given the late request, Goldman only 'novated' (accepted) the new contract on the morning of March 12. In the meantime, the late acceptance was (wrongly) interpreted as a refusal and was leaked to the media, causing unease among Bear Stearns's hedge fund clients.

Morris and Shin (2008) presented a paper (published nearly two months before Brunnermeier (2009)) that attempts to challenge the efficacy of the capital regulation paradigm. They argue in favor of liquidity regulation and the systemic context

of macroprudential regulation, and they quote from Christopher Cox's letter to the Basel Committee:<sup>1</sup>

As you will see, the conclusion to which these data point is that the fate of Bear Stearns was the result of a lack of confidence, not a lack of capital. When the tumult began last week, and at all times until its agreement to be acquired by JP Morgan Chase during the weekend, the firm had a capital cushion well above what is required to meet supervisory standards calculated using the Basel II standard.

Specifically, even at the time of its sale on Sunday, Bear Stearns' capital, and its broker-dealers' capital, exceeded supervisory standards. Counterparty withdrawals and credit denials, resulting in a loss of liquidity - not inadequate capital - caused Bear's demise.

Morris and Shin (2008) argue that the main cause of the failure of Bear Stearns was maturity mismatch, in which long-term assets were funded by short-term liabilities. Thus, the story falls in line with the "black swan" concept: the systematic inherent fragility (maturity mismatch) and interconnectedness turned into a huge meltdown due to an event with extremely low probability in theory, in other words, it constituted a "butterfly effect". It is clearly stated that this butterfly emerged from a rollover risk of a bank's funding instrument, stemming from, in opinion of Brunnermeier (2009), provoked by CNBC panic.

It is worth noting that Brunnermeier (2009) relies on the **unreferenced** Goldman Sachs' contract acceptance, while Morris and Shin (2008) cite a favorable communication paper for their arguments. At the same time, in both papers the authors neglect the unfavorable oversight reports available when they were working on their drafts. On September 25, 2008, Report No. 446-A<sup>2</sup> was released, but it was probably neglected by the authors as it was evidence that did not fall in line with the story of prudentially compliant banks failing under systemic risks.

Report No. 446-A underlines several facts about Bear Stearns's failure, which do not make a perfect fit with the *lost of confidence* story. The major statements from the audit results are as follows (my clarifications and comments are in square brackets):

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<sup>1</sup> Chairman Cox Letter to the Basel Committee in Support of New Guidance on Liquidity Management, 2008-48, see [www.sec.gov/news/press/2008/2008-48.htm](http://www.sec.gov/news/press/2008/2008-48.htm).

<sup>2</sup> Audit of SEC's Oversight of Bear Stearns and Related Entities: The Consolidated Supervised Entity Program, Report No. 446-A, <https://www.sec.gov/files/446-a.pdf>

- Bear Stearns was fully compliant with Consolidated Supervised Entity (CSE) Program’s Capital Ratio And Liquidity Requirements.  
*[A careful reading of the document’s methodology appendix on page 71 reveals the fact that the scope of the audit did not imply recalculation and validation of the data provided by the CSE firms, which simply means that the audit did not validate the actual compliance.]*
- Bear Stearns was not compliant with the spirit of certain Basel II standards and we did not find sufficient evidence that Commission’s Division of Trading and Markets (TM) required Bear Stearns to comply with these standards. [*i.e. Pillar II, statement 777: “Supervisors should take appropriate actions where the risks arising from a bank’s credit risk concentrations are not adequately addressed by the bank”.*]  
 TM became aware of that risk management of mortgages at Bear Stearns had numerous shortcomings:
  - lack of expertise by risk managers in mortgage-backed securities at various times;
  - lack of timely formal review of mortgage models: persistent understaffing;
  - a proximity of risk managers to traders suggesting a lack of independence;
  - turnover of key personnel during times of crisis;
  - the inability or unwillingness to update models to reflect changing circumstances.
 Notwithstanding this knowledge, TM missed opportunities to push Bear Stearns aggressively to address these identified concerns.
- TM authorized (without an appropriate delegation of authority) the CSE firms’ internal audit staff to perform critical audit work involving the risk management systems instead of the firms’ external auditors as required by the rule that created the CSE program.

Aside the falling apart claim about Bear Stearns as a compliant bank, Brunnermeier’s (2009) story about Goldman’s late acceptance being perceived as “hesitations” starts to look perverse upon re-watching the actual CNBC interview from 12 March 2008. On that day, there were two videos: one in the morning (9:48 a.m. ET) and one in the evening ( $\approx$ 3 p.m. ET). In the morning, CNBC’s David Faber asked Bear Stearns’s chief executive Alan Schwartz to clarify the information he got from a reliable source:

So when I am told by a hedge fund, that I know well, that last night they tried to close out a mortgage credit protection / a mortgage position with Goldman Sachs that they had bought a year ago. Bear was the low bid and I am told the Goldman would not accept the counterparty risk of Bear Stearns.

In the evening video, Faber commented on the morning interview:

I have heard that this trade did actually go through, Goldman did say: "All right now we will accept Bears as a counterparty"

These interviews suggest that the actual point of the story was that there was a quite reliable source reporting on Goldman's refusal to "novate" the contract with Bear Stearns. As time passed, that information appeared to be the truth. According to the Financial Crisis Inquiry Report (2010): Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States (pages 287-288):<sup>3</sup>

Hayman Capital Partners, a hedge fund in Texas wanting to decrease its exposure to sub-prime mortgages, had decided to close out a relatively small million subprime derivative position with Goldman Sachs. Bear Stearns offered the best bid, so Hayman expected to assign its position to Bear, which would then become Goldman's counterparty in the derivative. Hayman notified Goldman by a routine email on Tuesday, March 11, at 4:06 P.M. The reply 41 minutes later was unexpected: GS does not consent to this trade.

That startled Kyle Bass, Hayman's managing partner. He told the FCIC he could not recall any counterparty rejecting a routine novation. Pressed for an explanation, Goldman the next morning offered no details: Our trading desk would prefer to stay facing Hayman. We do not want to face Bear. Adding to the mystery, 16 minutes later Goldman agreed to accept Bear Stearns as the counterparty after all.

The story of regulative forbearance, failure to meet Basel II standards and poor risk management practice is transformed into a recognized series of publications related to bank runs and arguments for liquidity regulations. Brunnermeier (2009) sold the story with Goldman Sachs as a delayed response mistakenly perceived by the market as a rejection, while CNBC reported that Goldman Sachs actually rejected entering into the contractual relationship with Bear Stearns. Morris and Shin (2008) cite an early letter from Cox to the Basel Committee in April 2008, not noticing the later audit results which do not fit with their arguments.

Brunnermeier (2009) turned the pieces of evidence into the wrong market interpretation of Goldman's late acceptance that caused a bank run on the regulatory compliant bank, and which was explained by Brunnermeier and Pedersen's (2009)

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<sup>3</sup> Available at: <https://www.gpo.gov/fdsys/pkg/GPO-FCIC/content-detail.html>



model via liquidity spirals. It is worth noting that the model, which the authors had first tried to publish in 2005, was accepted for publication in the same year as Brunnermeier's article on the crisis, and that both papers have since then been cited more than 3,000 times each. Does it mean that academics provide unbiased studies and deliver effective risk mitigation practices? Do we actually learn what went wrong from recent financial studies? One might consider the possibility that not all efforts have been made to learn this.

In this section, I have described and illustrated some major problems of the institutional and academic structures around the banking industry and the consequent policy implications. In short, scholars may risk moral hazard by pushing their arguments such that they misreport the actual events or data. Furthermore, regulators might be prone to strengthen the credibility of their decisions by basing them on reports that might be subject to misrepresentation problems. As a result, regulatory and supervisory amendments supported by widely cited academic papers may have a chance to pass and be adopted. Nobody can give a full guarantee that the Basel III regulatory amendments are not subject to similar problems. The wrongly addressed problems within the banking industry lead to unintended consequences of unknown magnitude. This thesis addresses the reproducibility of datasets, which are used in the essays.

### **1.3 The global financial crisis of 2007: The bigger perspective**

In an economy, several things might go wrong and lead to the sort of financial downturns known as financial crises. Claessens and Kose (2013) identify four types of financial crises: debt crisis (the inability to borrow in debt markets, whether external or domestic); currency crisis (depreciation of the local currency exchange rate); sudden stop crisis (large reversal of capital flows); and banking crisis (failure, losses, or runs in the banking industry). Some of these crises often occur simultaneously or follow each other. Some crisis events occur due to similar fundamentals, or a crisis event may trigger the fundamental cause of another. For instance, sudden

stops may trigger a bank run, while a domestic debt crisis may lead to a protracted deterioration in the quality of banks' assets.

Given the series of financial crises over the last 100 years (for a summary of major financial crises, see Reinhart and Rogoff (2013)), the global financial crisis of 2007-2009 has created an invaluable empirical opportunity to acquire information previously not available to academics. As mentioned above, the high social damage caused by the global financial crisis has brought extensive social attention to it. Following the disclosed information and comments from various parties, such as bankers, supervisors, and auditors involved in the investigations, researchers have started to look more at the banking system design and institutional quality. In Section 1.2, I discussed an example of scholars fitting reality to their models. In this section, I focus on various facts which governmental and supervisory commission reports claim to be sources of institutional weaknesses that led to the financial crisis.

The probability of a country being involved in the global financial crisis is based on the trigger source of unsupervised foreign banking exposure to the US financial industry. Therefore, without a loss of generality, the summary of the causes of the crisis may be limited to US coverage, and exposure (or the second order condition: exposure to the exposed entity) of a certain country to US losses is determined by country-specific supervisory and regulatory factors (for further details, see Section 1.4).

The narratives of the extensive bank lending in the wake of the financial meltdown had been discussed widely long before the start of the global financial crisis. The improperly supervised lending institution might take speculative positions using funds, which are protected by the deposit insurance safety net - the classic "heads I win, tails you lose" situation (Bernanke, 2002). In a speech from 2002, Bernanke made a statement that very much describes what would happen five years later:

When this moral hazard is present, credit flows rapidly into inelastically supplied assets, such as real estate.

Given the academic background and the deep ex ante understanding of the underlying processes of bubbles, Bernanke (2002) expressed his concerns about not

having resolved the regulatory response to price bubbles. That Bernanke's pronounced concerns remained unaddressed has led to a classic case of regulatory forbearance and, as a consequence, the worst financial recession since the Great Depression.

The practitioners' perception of academic reasoning was classified by Bernanke (2002) into two camps: *lean-against-the-bubble strategy*; and *aggressive bubble popping*. These strategies to address a price bubble advocate a monetary policy response at different rates of intensity. However, Bernanke's (2002) argument is that neither of these views is consistent with practice, since monetary policy is not the proper instrument to deal with putative bubbles. Aspiring bubble poppers pay a high price by the risk of vanishing economic growth, while soft, safe popping would not have any effect on a heated market.

Bernanke's (2002) main argument is not to allow speculative misuse of the safety net in the first place; or, failing that, to intervene and fix the problem when it is recognized. Later, Bernanke (2015, p. 127) explained why supervision does not work either:

Stationing on-site teams of examiners at the same large banks for protracted periods could have made them too willing to accept the prevailing assumptions and biases at the institutions they supervised.

Any efforts to formalize and unify the supervisory process were pushed back. The 2005 regulatory initiative of Susan Bies to make supervision more centralized was resisted by the Reserve Bank presidents. Later, the drafted guidance on non-traditional mortgages (70 FR 77249 from December 29, 2005) met unprecedented pressure from Congress and the financial industry. According to the Financial Crisis Inquiry Commission (2011), the Fed initiative was torn to shreds by the American Bankers Association (which said the guidance "overstate[d] the risk of non-traditional mortgages") and by Congress ("[saying] that we were going to deny the dream of homeownership to Americans if we put this new stronger standard in place" - Susan Bies).

The results of governmental investigations provide a totally different picture of the crisis compared to the academic picture of liquidity problems. The problems seem not to be within the Basel II framework, but rather with the Fed's inability

to put Basel II standards in place or to provide any kind of response to the evident problems of the deteriorating lending practices. The misalignment of the institutional authorities and safety-net abuse led to a global dissemination of the crisis.

The conflict of interest between the Fed, on the one side, and Congress with the bankers, on the other, underlines the importance of clear and stable communication channels and the necessity to have a major consensus between all players in the market. The failure of the Fed's regulatory enforcement might be a result of an inability of the Fed to communicate clearly about the seriousness of the situation and the necessity to take active steps. The *personal or institutional disagreement (i.e., unaligned incentives) on supervisory discipline* caused unprecedented economic disruptions. This is the lesson that has not been properly studied: the disagreement displays the underlying conflict of interest that might result in serious turmoil.

## **1.4 The European perspective on the global financial crisis**

The global financial crisis came to the EU through the US sub-prime mortgage exposure. The bank holding companies held huge investment funds within their structure. These funds were directly exposed to sub-prime products. This section aims to align the spillovers from the US and the regulatory response at the European scale. The series of dates and events during the financial meltdown follow Guillén (2009), who provides the most extensive documented timeline of the global economic and financial crisis, while the ECB's and other authorities' reactions and auxiliary details are derived and systematized on a manual basis with all the references enclosed.

The first warning bell rang on February 7, 2007, when HSBC announced loan impairment charges and other credit risk provisions of US\$8.8bn. Michael Geoghehan, the HSBC Holdings plc Group Chief Executive from 2006 to 2010, during a conference call on February 8, the transcript of which is available under HSBC investor disclosures, commented on additional provisioning (p. 3):

There's enough industry information out there, not to dwell on that too much, but the reality is, what we've looked at – and this is in some depth; my hands are all over this

and we have been sort of focusing on this all the time since we gave you our last trading update, both with the HSBC Finance and with our investment bank, and myself involved, directly – where we see the situation is that we are looking at different areas and where we believe that the first lien mortgagee will foreclose – and we’re seeing a lot of that going on– we are then saying, well, it’s unlikely we’ll get anything for the second lien.

Shortly thereafter, on March 12, Gertrude Tumpel-Gugerell, member of the executive board of the ECB, discussed the competitiveness of European financial markets at the Washington Economic Policy Conference, Washington, D.C.:<sup>4</sup>

A comparison with the United States, for example, suggests that the dispersion of mortgage rates across US regions is lower than among euro area countries. Therefore, the ECB broadly supports the European Commission’s initiative to review existing impediments to the integration of European mortgage markets and the potential benefits of market-led and regulatory measures to address them. Particularly in the secondary market for mortgages, and in the funding practices, I see significant potential for integration.

By April 2007, the concerns about the imperfectly globalized financial market were becoming more and more pronounced, but mostly on a conceptual level. On April 18, Jean-Claude Trichet, president of the ECB, expressed his concerns regarding the development of credit derivatives at the 22nd Annual General Meeting of the International Swaps and Derivatives Association (ISDA), Boston. The opacity and unsupervised net credit risk exposures and concentration of positions in line with liquidity and systemic risk amplifications were the most pronounced worries during his speech. On July 28, Jos Manuel Gonzalez-Prado, member of the executive board of the ECB dealing with the financial stability assessment of central banks, was confronted by the increasing complexity and interdependencies of financial systems due to the rapid pace of innovation and the ongoing globalization and integration of financial markets.

August is a vacation month sometimes referred to as “August shutdown”. During that month in 2007, there were no documented speeches by representatives of the ECB. However, two European financial institutions got hit by spillovers from the US sub-prime market: BNP Paribas and Sachsen Landesbank. The official po-

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<sup>4</sup> Interested reader may access the full transcript of that and following speeches at <https://www.ecb.europa.eu/press/>

sition was presented by Jean-Claude Trichet during a hearing at the Economic and Monetary Affairs Committee of the European Parliament on September 11, 2007:

A number of European banks admitted direct or indirect exposures to the US mortgage market. Yet it is important to remark that the credit losses were not significant enough to materially impact the soundness of core financial institutions.

Trichet characterized the market situation as "a correction phase which can, as frequently observed in such situations, comprehend episodes of hectic behaviour, a high level of market volatility and elements of over-shooting". One month later, on October 10, Trichet reported witnesses of tentative signs of normalization in some parts of the credit and financial markets. On December 19, Trichet reported to the European Parliament:

With financial systems undergoing a process of de-leveraging and re-intermediation, uncertainty surrounding the financial stability outlook for the euro area has heightened and may persist until it becomes clearer how the potential balance sheet effects of the turbulence will be spread across individual financial institutions.

The previous statement about the bank's credit losses and estimated exposure to US sub-prime remained unaddressed in his speech.

The argument from this communication between the European Parliament and the ECB is rather clear. The inertness in understanding the situation, followed by the lack of authority to get the proper data and to form a comprehensive picture, led to the rare communication by the ECB in a time of distress, when, instead, a clear communication strategy was needed to impose discipline on the disturbed and volatile markets. Moreover, the informational asymmetry about real exposures to the toxic instruments and differences in estimation of realized losses created a potential for speculative misuse of the safety net, bringing us back to the argument of Bernanke (2002) about the effect of credit flows on real estate resulting from moral hazard.

## **1.5 Institutional amendments of the Basel III EU regulatory regime**

Clearly, the devastating financial meltdown during the global financial crisis had to be addressed by significant changes in regulation and supervision. The benchmark practices of banking supervision has historically been developed and formalized by BIS. Aside from minor changes in definitions and model parameters, each supervisory regime is usually referred to by one of the stylized frameworks developed by BIS. As of 2018, there have been three regimes that superseded one another: the Basel I, Basel II, and Basel III accords. The last of these resulted from rethinking after the experience of the global financial crisis.

In the most concise summary of the Basel III framework, it is important to underline the strengthening of capital requirements and enhancement and formalization of supervisory practices regarding liquidity regulation. However, the terms of the second decade of the 21st century is the total loss absorption capacity (TLAC) and the resolution procedure. The TLAC is an indicator by which the resolution plan has to come into force. The maintenance of consistent resolution procedures required a number of institutions to be established to support the efficient procedure to resolve any financial intermediary's insolvency without altering the functions of the financial system. The major institutions - the Financial Stability Board and the Single Resolution Board (SRB) - are the products of the new supervisory framework.

The SRB decides the resolution mechanism to be applied in the case of a bank's distress. As of 2018, the rhetoric behind the major resolution principle is for all unimportant financial institutions in distress to wind down. The authority of the SRB is applied to the banking union, but Sweden is not part of the single resolution regime. Financial intermediaries in Sweden are instead subject to the local resolution framework. Before the single supervisory mechanism was in place, all banks enjoyed the non-Brussels supervision and close contact with the regulatory authority. In recent years, one of the major financial institutions (i.e., Nordea) failed to reach consensus with the Swedish authority and changed residency to a member country of the Banking Union. The divorce was about the resolution fees.

While the real reasons of Nordea's departure from Sweden and move to Finland are subject to various speculations, the historical precedent of regulatory arbitrage was observed, which has underlined the major problem in banking supervision: regulatory avoidance. If a financial intermediary is out of tricks to maintain business as usual, it may move out. Obviously, there are two main scenarios: either the Swedish Financial Supervisory Authority lacks the resources to deliver adequate due diligence and we are going to see more of the similar departures, or Nordea is not in an adequate state to continue to operate under the close supervision of a small, focused "watchdog". Time will tell which of these is the case.

## **1.6 Industrial background of the thesis**

The previous sections have presented the core US and European events that constitute the institutional background of my thesis. While these events are not considered directly throughout the thesis, the understanding of the events are crucial for contextualizing the issues covered by the essays of the thesis. The Google Scholar engine yields more than a million documents related to "financial crisis" for the period from 2007 to 2018. While the subjects and reasoning in these documents vary extremely, almost all of them have in common an acknowledgment of the sources of the initial seeds of the global financial crisis: credit losses from the sub-prime mortgage exposures. This is the so-called patient zero. In my thesis, the focus is on the role of financial intermediaries in mortgage lending in the European context. It is important to outline that the thesis focuses only on regulated financial institutions as transmitters of public goods; that is, a bank mediates residential mortgages according to public supervision and regulation in the interest of its equity holders or other stakeholders.

A regulated financial intermediary in the post-crisis institutional environment is incentivized to retain mortgages on the balance sheet following the "skin in the game" principle or to securitize it via "simple, transparent and comparable" securitizations in line with the Basel III Revisions to the securitization framework. The retention of long-term mortgage lending on the balance sheet is challenging for a



bank under the Basel III liquidity regulations. The core principle of the Basel III liquidity framework requires that a bank match the maturity of its assets and liabilities, which implies a requirement to finance residential lending by funding sources with similar maturities.

Historically, banks have funded loans via demandable deposits. Extremely short-term funding used for long-term assets is the fundamental characteristic of a bank, ensuring the social benefit via liquidity insurance (Diamond and Dybvig, 1983) and delegated monitoring (Diamond, 1984). The short-term demandable debt ensures the bank's due diligence and imposes discipline over asset allocation (Calomiris and Kahn, 1991). Financial development over the last twenty years has led to retail deposits being supplemented with wholesale funding. Huang and Ratnovski (2011) underline the central role of wholesale as a propagation funding mechanism during the global financial crisis. The professional market players accumulate and supply enormous volumes of liquidity to the banking sector and provoke fast lending expansion that compromises credit quality. Short-term wholesale funding is also subject to a run in the case of noisy signals. Thus, it sounds reasonable to impose restrictions on banks' funding maturity. Problems arise in the current economic conditions in which residential mortgages are supplied at low interest rates. The necessity to fund low-profit long-term mortgages with long-term funding instruments poses a challenge for banks.

One way to issue a long-term funding instrument, at very low interest rates, is to ensure its exceptional creditworthiness. Here, I introduce the CBs instrument, which is a secured top-quality long-term funding instrument for residential lending. The use of CBs has grown to become one of the major sources of bank funding. As of 2017, the amount of CBs outstanding in Sweden, Norway, Portugal, Spain, and Finland constituted 32 %, 25 %, 17 %, 15 %, and 13 % of the countries' GDP respectively (according to my calculations based on the World Bank data for GDP, and the Covered Bonds Label for outstanding amounts of CBs). It is worth mentioning the Danish CBs, as outstanding CBs in Denmark are more than 1.2 times larger than the country's GDP. In fact, despite the recent establishment of legal frameworks, CBs in the Nordic countries represent sizable portions of the GDPs (see Figure 1.1).

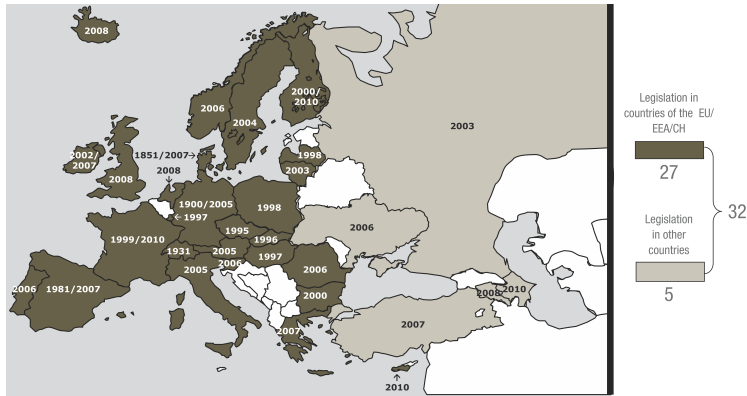


Fig. 1.1: Geographical overview Covered Bond Legislation in Europe (year of introduction / latest substantial amendment). Source: Stöcker (2011, p. 33).

The most distinct features of the use of CBs as a funding instrument is collateral. A CB is a type of secured funding backed up by separation into ring-fenced covered pool residential mortgages, which in turn are guaranteed by the market value of residential property. The ring-fenced characteristics ensure the principle of assets segregation, according to which the bank should assign the specific set of mortgage contracts that are separate and continue to exist until the CBs mature. In order to ensure the ability of the covered pool to exist until the maturity date of the CBs, and to prevent early liquidation due to a fall in the underlying assets' value (that is, residential property), the mortgages included in the covered pool are subject to loan-to-value caps (on average, 85 %). Additionally, the covered pool is larger than the outstanding amount of CBs to ensure the solidity of the CBs. While an issuer is solvent and continues to manage the covered pool, it commits to supplement the sour quality or prepayment of mortgages and to replenish them with new ones or a cash equivalent to support the quality of the covered pool. For a more formalized description of CBs, see Prokopczuk et al. (2013).

Currently, the most common framework of CBs funding is the issuance of CBs by a universal credit institution (see Figure 1.2), where the covered pool remains on the bank's balance sheet (Stöcker, 2011). The presence of assets attributed to

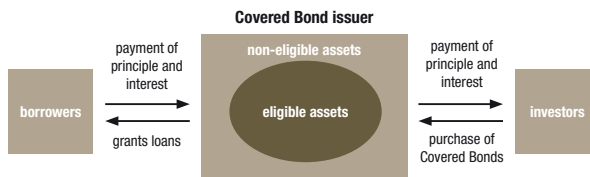


Fig. 1.2: The model of covered bonds issuance used in most European countries, where the issuer of covered bonds is a universal credit institution. Source: Stöcker (2011, p. 34).

the covered pool on the bank's balance sheet enables the amount and quality of the bank's assets attributed to unsecured debt-holders to be understood. CBs are not the only source of asset encumbrance. Among others, repurchase agreements encumber part of the bank's trading portfolio. The ECB has begun to disclose its concerns regarding the actual encumbrance levels of banks' assets and the eligibility of remaining assets in order for the bank to withstand liquidity shortages in a distressed period (Ahnert et al., 2018). The use of the collateral also introduces procyclicality by variation of margins, eligibility criteria and haircuts (Houben and Slingenberg, 2013).

In my thesis, I focus on the role of Basel III regulatory amendments, and on CBs in particular, to prevent the build-up of risks that may result in a new financial crisis. The implications of the banks' reliance on CBs funding have been examined during the Basel III adoption. The structural change of the regulatory regime allows the first effects of the banks' adaptation to Basel III to be studied.

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## Chapter 2

### Problem Statements and Research Questions

The previous chapter outlined the motivation for studying the funding structure of banks and introduced the industrial context of the banking literature. In light of the facts presented in the introductory chapter, it is possible to say that not all problems revealed by the recent crisis have been addressed yet. There is no consensus in the community on how to respond to the growing credit flow and the associated housing market distress discussed by Bernanke (2002). As long as an adequate policy response is not defined, banking crises will recur.

Given the embedded vulnerabilities of banking, it is reasonable to summarize the main arguments for why banks cannot be supplemented with an open market. First, Jacklin (1987) shows that demand deposits facilitate risk sharing in incomplete markets. This means that financial markets and banks are **not** perfect substitutes. The existence of bank debt is justified by heterogeneous agents and the presence of informational asymmetry (Diamond, 1984). The bank exists because these imperfections exist. Agents who apply for loans differ according to their history of repayment (Diamond, 1991), their pledged collateral (Holmstrom and Tirole, 1997), their probability of engaging in moral hazard (Boot and Thakor, 2000), or their quality (Holmstrom and Tirole (1997) and Gorton and Pennacchi (1990)),

whereas agents who deposit their savings differ according to their preferences to consume - that is, whether they are "early" or "late" consumers.<sup>1</sup>

In their seminal paper, Bolton and Freixas (2000) analyze the coexistence of equity issues, bank debt, and bond financing. They utilize arguments put forward by Myers and Majluf (1984) and Hart and Moore (1995) that equity issuers face a lemon market and have to bear information delusion costs, while bank debt can more easily be renegotiated than debt to disperse bond issues. Bolton and Freixas (2000) explain that the riskiest firms issue equity, the safest firms tap securities markets to avoid the intermediation costs, and those in between turn to bank financing. Additionally, a large strand of literature shows that bank lending produces economic growth. Initially, this effect was mentioned by James (1987), who shows that the announcement of a bank loan has an abnormally positive effect on share returns in comparison to bond financing. Furthermore, Levine and Zervos (1998) and Beck and Levine (2004), among others, empirically demonstrate a significant effect of bank lending on economic growth.

These arguments indicate that banks are an invaluable component of a well-functioning economy. Once there is consensus that the banking industry should continue exist, the problems revealed during the global financial crisis can adequately be addressed. Following Bernanke (2002), a proportionally increased lending supply fuels a price bubble in the elastically supplied housing market, which is extremely hard (or more or less impossible) to cope with. The expanding mortgage portfolios of banks should be focused on as a potential source of systemic vulnerability.

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<sup>1</sup> Originally, the types of depositors were introduced by Diamond and Dybvig (1983) and known as "*Diamond-Dybvig preference*". Gorton and Pennacchi (1990) classify depositors as consumers with known and unknown preferences to consume.



## 2.1 Problem statement

As was discussed in the introduction chapter, wholesale funding was a leading mechanism of the global financial crisis. The loss of confidence dried up the interbank market and reduced foreign operations. The "great retrenchment" of international capital flows during the crisis (Milesi-Ferretti and Tille, 2011) led to more intense use by banks of secured debt to fund their lending. The covered bonds (CBs) funding strategy is supposed to supplement securitization activity and provide stable long-term instruments owned by the same professional investors who had previously provided wholesale funding.

A bank's investment decisions are justified by the funding disposed by the bank (Kashyap and Stein, 1994). Under various economic conditions, a bank may experience either an excessive or a limited supply of funding according to the amount of depositors' money and the supply of debt markets. Limited funding (i.e., a credit or capital crunch) causes the bank to be cautious and to ration investment decisions by picking the most attractive investment opportunities, thereby adopting credit rationing (Bernanke et al., 1991). An excessive funding supply (e.g., a savings glut) forces banks either to relax or dilute lending standards and to fund riskier projects (Martinez-Miera and Repullo, 2017) or to lend money at interbank market interest rates to another bank that is experiencing a lack of funding (Bhattacharya and Gale, 1985). Most probably, a bank with a lack of funding is either a specialist in a different economic sector in which the bank with excess funding has no expertise, or is operating in an area beyond the geographical reach of the bank with excess funds. Given the time variations of economic conditions and savings rates in different regions, the interbank market plays a significant balancing role (Freixas and Holthausen, 2004). This forces economic growth in the areas with insufficient funding supply.

While the design of CBs is extremely protective for investors (for an extended discussion, see Prokopczuk et al. (2013)), this thesis raises a concern regarding financial stability implications of CBs usage. The treatment of CBs, within the Basel III framework, also introduces uncertainty regarding the resolution mechanisms. The immunity status of CBs in the resolution procedure introduces complexity due

to the necessity to segregate the covered pool from the issuing bank's assets. Additionally, it provides uncertainty about unsecured debt holders' attributed assets, which undermines the ability of a bank to raise unsecured funding (Juks, 2012).

On the one hand, collateralized by mortgages, the funding by CBs accentuates the bank's sensitivity to residential property prices on the asset side (Maggio and Tahbaz-Salehi, 2015). It also reduces the ability to raise funds against the same covered pool during price declines (Krishnamurthy et al., 2014). On the other hand, the classification of CBs as high-quality liquid assets (HQLA) and the introduction of Basel III create demand for CBs' funding. Due to the simultaneous introduction of the Basel III liquidity coverage ratio in European countries, more banks have demonstrated an appetite to hold CBs. The potential growth in funding supply may contribute to additional lending and, in line with Dell'Ariccia and Marquez (2006), to a loosening of lending standards. This mechanism is one of the contributors to an increasing concern about the scarcity of collateral (Levels and Capel, 2012) and increased liquidity risk due to limited asset eligibility for repurchase agreements (REPOs) as collateral for loans from the central bank (Cecchetti and Disyatat, 2010).

## **2.2 Research questions**

The availability of bank consumer credit financing is necessary for lifetime consumption smoothing (Hurst and Stafford, 2004). The choice of households to borrow against residential property is subject to the expectation of future house prices and mortgage interest expenses. In line with Kregel (2008), the timing of household decisions to invest in housing is a moment of uncertainty resolution about household lifetime earnings and beliefs about future property prices. The link between house frenzies and money illusion has been studied by Brunnermeier and Julliard (2008). Low short-term interest rates can create an illusion of lower mortgage service expenses and encourage a household to buy a house based on higher earning uncertainty or lower lifetime income expectations.

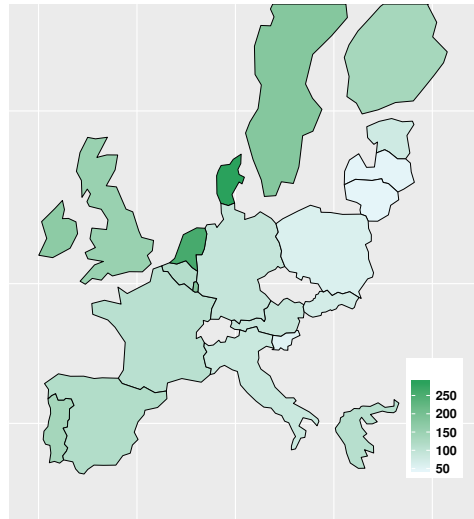


Fig. 2.1: Household debt as a percentage of Net Disposable Income as of 2016. Source: OECD

The distribution of household debt as a portion of net disposal income across European countries is shown in Figure 2.1. According to the Swedish mortgage market annual review made by the Swedish Financial Supervisory Authority (Finansinspektionen [FI]), as of 2018 the largest part of household debt (82 %) is attributed to mortgages. As the dark green fills Sweden, it is evident that Swedish household debt is among the highest in Europe, with a significant portion of debt attributed to mortgage financing.

As of 2018, Swedish real estate prices have not experienced any decline since the mid 1990s. Various actions have been taken by Swedish authorities in order to get the situation under control, such as mortgage amortizations and a cap for debt-to-income ratio. The Swedish situation is in line with the argument by Bernanke (2002) that credit flows into an inelastic supply of real estate may cause a price bubble, which is extremely hard to cope with. Bernanke (2015, p. 121) continues to argue about the inefficiency of the "lean-against-bubble" strategy:

Swedish central bankers raised interest rates in 2010 and 2011 in response to concerns about rising mortgage debt and house prices, even though inflation was forecast to remain below their target and unemployment was high. As a result, the Swedish economy fell into deflation, forcing the central bank to cut rates from 2 percent to zero over the next three years – an embarrassing reversal.

The Basel III proposal to increase the risk weight of residential mortgages does not seem to be able to reverse the rising trend of residential prices. This poses additional concerns about the efficiency of risk-adjusted capital requirements to enforce banks' discipline. The Basel III liquidity standards do not have any effect due to long maturities of CBs. Since none of the regulatory amendments are able to reverse the trend, one might consider studying in depth the sources of growth in mortgage supply. This thesis assumes that the driver of increased volumes of outstanding mortgages lies within the banks' funding conditions that are supported by the regulatory framework. The central research question is: **What are the implications of the banking regulatory amendments (i.e., Basel III) for the funding strategies of financial intermediaries in Europe?** The thesis analyzes the major forces that engage banks in one activity (in this case, mortgage lending) given the easier funding conditions, enforced concentration risks, and excessive exposure to real estate prices (see Table 2.1).

According to the classic story, once a bank is in the mortgage business, it develops expertise in the market that enables it to fund more mortgages and better assess risks related to that activity via information reusability (Millon and Thakor, 1985). First, at its own risk, the bank makes investments and covers all losses with equity. No sophisticated investor would fund the operations of a bank that does not have expertise and a good track record of performance in its operations. Certain factors limit investors' screening capacity and incentivize a reliance more on quantity (diversification) than on quality, such as widespread real estate lending and the large pool of investors willing to buy instruments backed by mortgages, the increasing demand for instruments, and the large pool of banks issuing these instruments. In line with Molyneux and Shamroukh (1996), the increasing number of banks using a CBs funding strategy and weakening screening of investors and market discipline lead to a situation in which more banks start to adopt innovations.

In line with Manove et al. (2001), the widespread use of CBs may cause that the less investors (i.e., banks that hold CBs issued by other banks) rely on screening, the more they demand a "hard" collateral. The over-collateralization of the covered pool becomes a hedge against losses, and the further this goes the more collateral is required to keep the wheels rolling. Additionally, banks are prone to **herding behavior** (Acharya and Yorulmazer, 2008), which facilitates the trend. The widespread use of CBs eases the funding constraints of CBs issuers. The recently implemented Basel III also treats CBs as a reliable source of funding by assigning the preferential risk weights (relative to mortgage-backed security (MBS)) and by granting the eligibility status as an HQLA. Essay A explores the difference in sub-populations between CBs issuers and non-issuers in order to address the question: *Does Basel III favor financial intermediaries that issue covered bonds?*

As more banks start to issue CBs to seize the wagon (Molyneux and Shamroukh, 1996), a more diversified pool of CBs issuers results. The more efforts that are required to screen the growing number of CBs issuers, the fewer are the investor incentives to make an effort to screen, which makes it easier to pick up the most over-collateralized CBs issues, and so on. A more detailed analysis of the CBs funding strategy follows in Essay B, which addresses the following research question: *How does asset encumbrance affect banks' asset allocations in terms of balance sheet growth and future encumbrance levels?* It explores the covered pool composition and further lending behavior of particular banks in light of data disclosed on a voluntary basis.

The asset allocation decision may also be driven by competition structure. The increased competitiveness of the banking industry may change the banks' lending supply. It is impossible to isolate the change in competition for a relatively large CBs issuer given that most banks are international and operate within several jurisdictions. Local savings banks are easier to study, but they usually have no option other than to keep the newly issued mortgage on the balance sheet. Essay C considers the quite unique association of local Swedish savings banks (SSBs) and a large commercial bank in Sweden. The commercial bank plays a role of a quasi-central bank for the SSBs by reallocating excess funding supply among the SSBs. The excess lending demand in the local market can be fulfilled by the SSBs by selling

the excess mortgages to the commercial bank with similar securitization features, such as junior risk retention and underwriting rights.

Essay C studies the small, financially constrained SSBs, which can either securitize their real estate mortgages or retain the mortgages on the balance sheet. The decision depends on the market structure, such as the geographical distance from competitors or the presence of a competing bank branch within the same geographical area. Essay C poses the question: *What is the effect of distance to competitor banks in the securitization decisions of Swedish savings banks?* The SSBs have almost no access to debt markets and have very limited growth opportunities. The cooperation with the larger bank is a type of symbiotic relationship from which both sides benefit: the large bank plays the role of a central bank and a clearing system, and it provides access to various capital-intensive IT systems, which would be too costly for the small SSBs to develop itself. The large bank benefits from a wide branch network of many SSBs across the country and enjoys equity and stable funding supply provided by the SSBs.

Aside from the changes in the regulatory frameworks and the industry environment, the most straightforward guess as to why the regulatory changes are unable to control the lending supply to residential properties is the failure to impose the regulatory amendments. In other words, the pills do not work because the patient does not take them. It is hard to control the implementation of the Basel III rules. Usually, the supervisory agent controls only the compliance of regulatory standards, but not the adherence to the principles. Essay D formulates the banks' compliance and discipline by comparing the perception of the recent regulatory amendments from both an industry and a supervisory point of view. The study aims to get insight on the following question: *How do the characteristics of bank employees affect banking reform support in Sweden?* The essay allows an insight into one of the least discussed topics in banking by exploring the determinants of bankers' ability to comprehend regulatory changes and anticipate the implications of such reforms.

Table 2.1: Research Questions

<i>Research Question</i>	<i>Essay</i>
What are the implications of the banking regulatory amendments (i.e., the Basel III) for the funding strategies of financial intermediaries in Europe?	Common
Does Basel III favor financial intermediaries that issue covered bonds?	Essay A
How does asset encumbrance affect banks' asset allocations in terms of balance sheet growth and future encumbrance levels?	Essay B
What is the effect of distance for competitor banks in the securitization decisions of Swedish savings banks?	Essay C
How do the characteristics of bank employees affect banking reform support in Sweden?	Essay D

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## Chapter 3

# Literature Review and Industrial Context

### 3.1 Regulation

There is no consensus among scholars regarding the question why banks should be regulated. Dewatripont and Tirole (1994) provide an explanation by identifying the characteristics of financial institutions that need to be regulated. They find that the most pronounced characteristics are the following: transformation function execution; payment system engagement; leverage characteristic; and deposit insurance. In their view, none of these explanations can be named as the reason for banks to be regulated. Evidently, the asset transformation function is also provided by unregulated financial intermediaries. This means that the fact of executing the asset transformation function is not sufficient for justification of the existence of regulation. The central role of banks in the operation of the payment system is not a prerequisite for regulation either, since it arises as a by-product of government deposit insurance.

Bank leverage is endogenously driven by the bank's asset risk, which in turn is controlled by the regulator. The rationale for government deposit insurance puts the cart before the horse, because it does not explain why government and private insurance do not provide this coverage. This fact makes deposit insurance only part of an optimal regulatory package. Dewatripont and Tirole (1994) explain the necessity of regulation by the need to protect small depositors from moral haz-

ard and adverse selection problems, which is also in line with Coval and Thakor (2005). Small uninformed investors are unable to perform the duplicating monitoring functions. Because the banks' debt is primarily held by small depositors, the free-riding problem among depositors to eliminate the screening costs gives rise to a need for private or public representatives of depositors, which has been proposed by Dewatripont and Tirole (1994) as the representation hypothesis.

The empowerment of a supervisory agent to watch over financial institutions does not necessarily lead to a better outcome. Most of the literature considers the bank supervisory policies and lending integrity - that is, the ability of the bank to efficiently allocate lending. The example of corruption in lending is a form of "zombie lending", that is, when credit flows are directed to insolvent borrowers in order to hide losses (Bruche and Llobet, 2013). While zombie lending is an extreme form of lending corruption, simpler examples might be considered. The different models of banking supervision have an ambiguous effect on lending corruption. Policies that force accurate information disclosure and provide incentives for private investors to monitor banks lead to a lowering of the importance of bank corruption when raising external finance. This is the empowerment view. Even in countries with highly developed institutions (e.g., effective governments and adherence to the rule of law), Beck et al. (2006) do not find that supervisory power improves the integrity of bank lending. They advocate that the primary goal of banking supervision should consist of fostering efficient capital allocation by facilitating private monitoring.

The regulatory framework substantially determines the bank market structure, conduct, strategy, stability, and development (Degryse et al., 2011). A number of competing arguments have been put forward in academic studies on the regulatory environment. One strand of literature considers regulatory enforcement as a treatment, while another strand considers it a friction. This discussion goes far beyond banking stability issues and reflects more than a century of the struggle between the "invisible hand" of the market and the "visible hand" of authority.

On one side of the barricades, deregulation treatment is often associated with a higher degree of competition (Angelini and Cetorelli, 2016) and lower bank interest margins (Demirgüç-Kunt and Levine, 2004), while the other side argues for stricter

capital and equity requirements Admati et al. (2013). The capital urge argument has been criticized: a low capitalized banking system has to be extremely socially costly to force banks to have higher leverage (Van den Heuvel, 2008).<sup>1</sup> Moreover, banks tend to innovate in order to escape regulatory compliance costs and adopt regulatory avoidance strategies (Kane, 1981).

The frictions between regulations, implementation of a specific regulation, design of the supervision process, whether a bank complies with regulation, and aversion of banks to comply with imposed regulations are all factors that cause uncertainty in the expectation of regulatory net effects. The implication from a bank funding perspective is that we should expect banks to adapt their funding structure to specific regulations. However, it is not clear whether the adaptation will be socially desirable nor whether supervision will effectively mitigate incentive conflicts between regulators and banks. As will be discussed further in the following sections, these incentive conflicts are particularly relevant in the light of covered bonds (CBs) funding strategies, because CBs are seemingly a funding instrument currently accepted by all of the involved parties.

### **3.2 Monetary policy and transmission mechanisms**

This section emphasizes that banking regulation is conducted by an authority, which is sometimes also responsible for conducting monetary policy and supervisory functions. The potential conflict of interest between banking supervision and monetary policy implementation is underlined by Goodhart and Schoenmaker (1995). To the best of my knowledge, there is no sufficient analysis of conflict between monetary policy and banking regulation functions. This and the next section aim to demonstrate the potential source of conflict between monetary and regulatory functions by considering the Swedish Central Bank (Riksbank) and Financial Supervisory Authority (FSA). Since the focus of this thesis is banks' funding

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<sup>1</sup> To prevent confusion: a bank's leverage represents equity scaled by total assets.

strategies with specific attention to CBs, the next section considers mortgages and related issues.

Quantitative easing encapsulates twenty-first-century monetary policy. Bernanke and Reinhart (2004) argue for three methods of monetary policy at low-bound interest rates: shaping interest-rate expectations; altering the composition of the central bank's balance sheet; and expanding the size of this balance sheet. The shaping of the interest-rate policy implies the conditional or unconditional commitment of the central bank to keep the interest rate at a certain level. In essence, if it is no longer possible to lower the policy interest rate, the central bank may promise to keep it low for a period exceeding the one the market believes in. In an extreme case, the changes to the balance-sheet composition of the central bank stand for an unlimited commitment to purchase an instrument at a given price (while selling the other), while an expansion is referred to as quantitative easing.

Let us consider each of these policies in detail. The lowering of the interest rate as a policy tool theoretically produces an effect up to the so-called zero lower bound (ZLB) point.<sup>2</sup> While the first working papers have begun to elaborate on an extreme interest rate, moving beyond which there is a reversal of the intended effect of conventional monetary policy - the "reverse interest rate" (Brunnermeier and Koby, 2016). Another paper has considered the implementation of negative interest rate policies as disintermediation costs. This is because stockpiling cash in a vault is then a viable alternative (Gabaix, 2016). Thus, shaping interest-rate expectations is an alternative to easing the interest rate near to the ZLB point.

The direct communication of the central bank in shaping the expectation of a likely path of future policy rates involves providing forward guidance (Cœuré, 2017). This guidance may be implemented conditionally (which is known as "Odyssean") or unconditionally ("Delphic"). In Sweden, the Swedish Central Bank (the Riksbank) is one of the most extensive users of forward guidance, although with variable success.

Figure 3.1 shows the market reaction to the Riksbank's commitment not to change its refinancing rate for two years. In Woodford's (2012) interpretation, the market took on board the Riksbank's forward guidance and corrected its expecta-

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<sup>2</sup> To prevent confusion, ZLB refers not to zero interest rate per se, but to the lowest rate applicable.

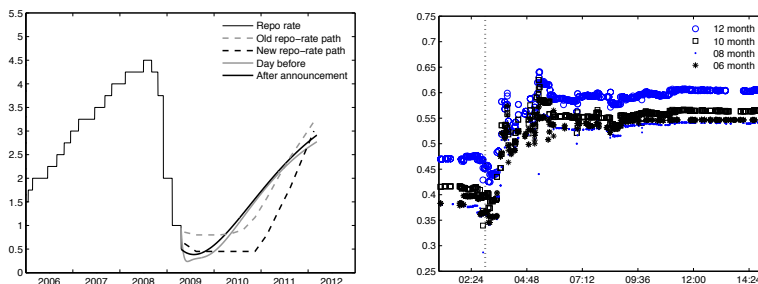


Fig. 3.1: Market expectations of the forward path of the repo rate in Sweden, before and after the Riksbank's press release on April 21, 2009 that indicated that the repo rate was "expected to remain at a low level until the beginning of 2011" vs Intraday Swedish OIS rates on April 21, 2009. The dotted vertical line indicates the time of the Riksbank's press release (9 a.m. in Sweden, or 3 a.m. EST). Source: Woodford (2012) based on Svensson (2010) and Bloomberg.

tions, which was contrary to what had been expected. The intended reaction from the Riksbank to dump interest rates had the opposite reaction of a jumped inter-bank offered rate due to market expectations of the interest rate going down. This reaction is in line with Bernanke and Reinhart (2004): the forward guidance should be made based on market beliefs. The same logic holds regarding the forward guidance of assets purchased by central banks.

The Asset Repurchase Program is a monetary stimulus delivered as a response to the Great Recession. The massive expansions of central banks' balance sheets, together with unconventional accumulation of public debt, are the "helicopter drops of money", to use Gabaix's (2016) term. Debt redistribution by supplementing a bank's debt with public debt, thereby recapitalizing the bank at the expense of public funds, is a reality that has been criticized by many. The core concern is the following: how does an additional debt solve the indebtedness problem? Eggertsson and Krugman (2012) argue that the assumption of the statement "debt is debt - it does not matter who owes the money" is fundamentally wrong. At the aggregate level, the net amount of debt is always zero: the debt in one part is a saving in another one. This implies that the level of debt is a concern only if the mechanics of

debt accumulation and constraints under various indebtedness levels are different across agents. It follows that additional debt accumulation by some actors can ease the problems caused by over-borrowing by other actors in the past. Eggertsson and Krugman (2012) imply that deficit-financed government spending may, in principle, avoid the situation of highly indebted or leveraged households pulling down the aggregate demand, causing in its turn an increase in unemployment, and so on.

### **3.3 Institutional arrangement of the banking industry**

Before the global financial crisis, the financial intermediation process was not embedded in most DSGE models (Beyer et al., 2017). This means that, in the models, financial frictions had no influence on the real economy. While the post-crisis literature aims to fill this gap, this section sums up the effect of bank's heterogeneous behavior on the real economy. Despite enormous efforts taken in recent years to harmonize supervisory and regulatory institutional set-ups, European banking regulation and supervision have not yet converged. An extreme aversion to centralization of banking supervision is demonstrated by the Swedish government. This section analyses the banking-related literature in connection to Swedish institutional arrangements, which are in contradiction with the European regulatory amendments.

The basic framework of banking regulation as a taxation is provided by Kane (1981). The analysis starts with a hypothesis formalized by Niskanen (1971): government maximizes its budget constraint on the minimum service quality demanded by encumbered politicians. Given the short-term period of encumbrance, every politician seeks to unveil the weaknesses of the banking system, increasing the chance of re-election. On the other side, the system is much more forgiving of delay than of ill-considered actions. As Jean-Claude Juncker has stated: "We all know what to do, we just don't know how to get re-elected after we have done it."

In contrast, central bank positioning is longer term, and the position of regulator will most likely next be held by the industry. Unless the regulator ensures that the functions will be held by its agency and not be overtaken by a competing insti-



tution, the budget of the regulatory agency depends on the size of the supervised industry. Following the arguments of Kane (1981), the change of Nordea's headquarter should be succeeded by a budget reduction for the Riksbank and the FSA due to fewer institutions and a lower total value of assets having to be supervised after Nordea's departure.

Costly reforms are postponed due to uncertainty and a long-term period of return (Bonfiglioli and Gancia, 2013). One country may also benefit from the costly reforms or monetary policy taken by another country, which creates a sort of free-rider problem and further prolongation of policy introductions (Dedola et al., 2013). For instance, the four Swedish commercial banks that operated outside Sweden benefited from the European Central Bank's asset repurchase programs. As of 2018, according to the FSA, the total household debt was SEK3.14 bn or 68 % of GDP. Two thirds of Swedish residential mortgages were funded via the CBs ( $\approx$ SEK2.3 bn), which is a secured funding source introduced in 2004.

A so-called war of attrition arises due to the ability of one group to postpone the costly reforms and shift the burden to forthcoming groups. Thus, delayed stabilization arises due to political stalemate over burden distribution (Alesina and Drazen, 1991). In order to illustrate the regulative forbearance and the war of attrition as a first approximation, it is plausible to consider the amortization requirements in the Swedish residence market. Since 2014, the FSA has repeatedly underlined the need for stricter requirements for mortgages.<sup>3</sup> At the same time, the Swedish Ministry of Finance has proposed to exempt newly built homes from the amortization requirement. The Riksbank opposed both proposals.<sup>4</sup>

Based on the presented theoretical literature, it is interesting to elaborate on why the Swedish Ministry of Finance would argue for the exclusion of newly built dwellings from the amortization plan. Given the rapid urbanization and infrastructure problems of suburban areas, someone probably finds it more reasonable to support the mature established neighborhood and not to give a further boost to the already overheated construction industry. As discussed previously, the policy of

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<sup>3</sup> The amortization plans were enacted only in 2016. Further, the FSA has made an effort to link the indebtedness cap linked gross income. Press releases are available at <https://www.fi.se/en/published/press-releases/>

<sup>4</sup> See the Riksbank's Notices from October 29, 2015.

forward guidance, implemented by the Riksbank, influences the long-term interest rate expectations. In recent years, the Swedish economy has twice bounced to the ZLB point. The consequences of this policy is that lower interest rates support the residential property prices. Price stability is necessary to prevent the spiral of self-fulfilling mortgage foreclosures driven by decreasing residential property prices given the required regulatory enforced de-leveraging.

The aversion of Swedish policymakers to allow market corrections is based on the rationale of supporting the stability of residential property prices. The proposed exclusion of new-build dwellings from the amortization plan makes the purchase of newly constructed property cheaper. Once (if) approved, this subsidy might spur demand and support the construction industry. The newly built apartments become more expensive, since customers are able to tolerate higher interest payments given the absence of amortization. This inevitably leads to higher indebtedness levels among buyers of newly constructed properties. Consequently, the other residential properties are priced in relation to the new-build alternatives. Conditionally on the readiness of banks to issue mortgages on the growing market and to fund them with CBs, the imposed amortization requirements do not affect the indebtedness of consumers, but they change the preference of the most indebted consumers to buy newly constructed properties. At first glance, the considered policy action to limit the striking indebtedness was undermined by the subsidy to the construction industry and, presumably, led to a shift of the riskiest borrowers to newly built apartments. The intentions of regulatory amendments and their implementation might be pulled apart.

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## **Chapter 4**

# **Theoretical Framework and Methodology**

### **4.1 Background**

The scarcity of empirical studies in the financial intermediation literature is a result of several factors. The first factor is that financial intermediation is a complex cross-border process with significantly different standards and frequencies of disclosure. The data comparability and applicability are very limited due to the voluntary nature of disclosure. Given this, two potential concerns arise: selection bias in analysis based on voluntary disclosure (the object discloses only favorable information), and data comparability. Both concerns have to be considered in the empirical strategy.

The second factor is the highly dynamic environment of financial intermediation. This implies significant constraints on the statistical power of estimations. It is almost impossible to isolate the effect of one regulatory measure due to a simultaneous introduction of a multiple regulatory framework. The gradual introduction and ongoing revisions of regulatory frameworks weaken their potential stratification.

The third factor relies on the connectivity or interconnectedness of the financial intermediation process. This interdependence justifies the presence of systemic risk embedded in the process. The connectivity implies a self-fulfilling process, which introduces a substantial bias in the studies on the effect of regulations. It gives

rise to numerous problems often addressed as omitted variable biases or as concerns about the presence of parallel trends. For these reasons, many studies in the financial intermediation literature are subject to model misspecification concerns. This leads to various model specifications and methodological modifications used to address the concerns, and a consequent lack of comparability of results.

Recent publications within the financial intermediation literature have increasingly coped with the issues discussed above by exploiting proprietary data for their estimations. This trend has given rise to a number of publications co-authored by the owners of this proprietary data (e.g., analysts at central banks and supervisory watchdogs). It is worth considering that co-authorship with supervisory representatives may cause a bias towards banking reforms and endanger the impartiality of academic judgment. This issue has begun to attract attention. For example, Colander et al. (2009) considered the lack of information about the actual empirical performance of the models used for building financial intermediation contracts as one source of the global financial crisis.

Overcoming the proprietary data usage problem could lead to more reproducible empirical research in the financial intermediation literature. Thanks to the recent data collection and processing improvements often referred to as big data processing, the utilization of unstructured data allows researchers to diminish their dependency on proprietary data when studying financial intermediation and to facilitate the reproducibility of the results.

For the purpose and scope of the analyses conducted in this thesis, the commercial databases were considered as a benchmark for previous studies, but this is no longer enough. The compilation of various data sources and self-disclosure reports were analyzed according to appropriate matching algorithms. The matching strategy has to be underlined separately due to the scope and inconsistency of financial disclosures (e.g., the covered pool report is disclosed at a national level, while the balance sheet report is given on an aggregated basis). The scope of the analysis implies using unstructured data methods on newly introduced voluntary reporting (e.g., harmonized transparency templates) disclosed at the national level in the EU. The overrepresentation problem is inherent in the self-disclosure reporting process, so different matching strategies were considered.

## 4.2 Data Sources

This thesis utilizes various data sources to address the research questions introduced in Section 3.3. The data sources were defined based on availability, processing time and relevance of the source. It is important to emphasize that the European institutional framework does not provide centralized data disclosures related to financial intermediaries at an entity level. A researcher in banking may only rely on commercial databases, which have a limited coverage of European financial institutions. In this thesis, I have utilized the SNL database as the primary source for balance sheet data.

This thesis attempts to cover the topic by considering particular banking establishments (either restricted by institutional or geographic characteristics), most of which, unfortunately, were not covered by any of the databases available at the time of this study. Such a narrow sampling procedure must either be based on specific data availability or on specific activities in which a bank is involved.

The encumbrance of banks' assets is not reported on a systematic basis. The disclosure of covered pools attributed to covered bonds (CBs) holders has been subject to evolving transparency standards in its early stage. The datasets of Essays A and B are available due to Article 129(7) of the Capital Requirements Regulation (CRR):

Exposures in the form of covered bonds are eligible for preferential treatment, provided that the institution investing in the covered bonds can demonstrate to the competent authorities that:

- it receives portfolio information at least on:
  - the value of the cover pool and outstanding covered bonds;
  - the geographical distribution and type of cover assets, loan size, interest rate and currency risks;
  - the maturity structure of cover assets and covered bonds; and
  - the percentage of loans more than 90 days past due;
- the issuer makes the information referred to in point (a) available to the institution at least semi-annually.

Based on Article 129(7) of the CRR, the Covered Bond Label Foundation was created in line with the primary purpose "to highlight to investors the security and quality of covered bonds, and to further enhance recognition of and trust in the covered bond asset class".<sup>1</sup> Under the Covered Bonds Label, the disclosed information is presented in a format according to the Covered Bond Label IT infrastructure.

The Covered Bonds Label is a voluntary disclosure, which implies registration costs, annual fees, and costs for additional issues. As specified under Article 129(7) of the CRR, the labeled CBs issuers are committed to providing, on a quarterly basis and based on the National Transparency Template, regular, accurate and up-to-date information on the covered pool.

The European Covered Bond Council (ECBC) represents another source of data. This institution was created by the European Mortgage Federation, which serves as the key talking partner of the European Commission, the European Parliament, the Council of the EU, the European Banking Authority, the European Central Bank and the Basel Committee on Banking Supervision on all mortgage industry-related questions. The ECBC's main objective is to be the point of reference for matters regarding the CB industry and to operate as a think tank, as well as a lobbying and networking platform, for CB market participants.<sup>2</sup> The Covered Bond Label, together with the ECBC, serves as the primary data source in order to identify the CBs issuers for further analysis.

The backbone of the dataset for Essay C was designed via usage of Google API services and industry information. The information about Swedish savings banks (SSBs) was generously provided by the Swedish Savings Banks Association (Sparbankernas Riksförbund). The organization represents SSBs' interests to authorities and serves as a consultative body and the negotiating party on issues of importance to SSBs. The reports are available on an annual basis and contain a wide range of financial information, mainly based on balance sheet and income statements. This thesis has also benefited from information provided by another industry representative: the Swedish Bankers' Association (Svenska Bankföreningen). The Swedish Bankers' Association keeps track of most dates of the closure of banks' branches.

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<sup>1</sup> For further information see <https://www.coveredbondlabel.com/About-mission-objectives/>

<sup>2</sup> For further information, see <https://hypo.org/>



This information contributed significantly to the distance estimations between local SSBs and the local branches of commercial banks.

Finally, the data enabling the research question of Essay D to be addressed came from Torbjörn Jacobsson, the Chief Risk Officer for Avida Finance. The survey rounds of 2016 and 2017 were run by him, and the survey of 2018 is a product of myself and my co-authors. The contact list was partially provided by the Swedish Bankers' Association.

### **4.3 Data Processing**

Big data is a relatively new term in scholarly research, but it is a system component for the industry. Laney (2009) defines the term "big data" by three components: volume, variety, and velocity (or the "three V's"). The first two components speak for themselves: the magnitude and diversity of data require a specific IT infrastructure to process. The proliferation of digital devices has led to an unprecedented speed of data generation (Gandomi and Haider, 2015). Velocity is the fundamental component of utilizing the data. As of 2018, the data generated by the banking industry in Europe is not available to be processed automatically in its current form.

Currently, researchers are overwhelmed by the amount of reports disclosed by banks, such as annual reports, press announcements, and communication letters, which are almost impossible to process. The public supervision of the banking industry is in its "Dark Ages" whenever the generated data is not suitable for making an informed decision. Consumers, who face limited choices, are totally blinded and misled by the inability to process information, which is necessary for the informed choice of a financial intermediary.

This situation is of great importance, not due to the risk of small consumers bearing higher expenditure, but because it has a fundamental weakness that undermines financial system stability. Beck et al. (2006) show that regardless of the degree of public institution development and law integrity, regulatory and supervisory efforts that do not facilitate the public oversight will lead to inefficient credit

allocation by financial intermediaries. Beck et al. (2006) refer to this effect as corruption in lending.

Obviously, the European academic community has no influence or institutional rights to demand access to structured information on financial intermediaries, which regulators and supervisors have at their disposal. Additionally, no academic institution has enough influence in Europe to be accepted as a representative on behalf of all European researchers and to aggregate the information from the banking industry in order to facilitate transparency and due diligence.

The investor information disclosures, which are available via the World Wide Web, are a fertile area for web-mining research. Information retrieval (IR) via web-mining is part of artificial intelligence, especially the sub-areas of machine learning and natural language processing (Kosala and Blockeel, 2000). The IR process focuses on automatic rather than manual retrieval and on structured information rather than unstructured data (Van Rijsbergen, 1979).

The velocity of data processing is subject to the structure of information. It can be structured as a database, semi-structured with a hidden or a varying data structure, or unstructured. This thesis mostly addresses information available on the Web, but with no clear data structure. For example, harmonized transparency templates are available on the Web, but the process of report retrieval is subject to web-mining.

The process of IR of harmonized transparency templates can be divided into several stages: definition of the population of CBs issuers; the information transparency check (i.e., the verification of the availability of disclosures for machine processing); reports retrieval; machine reading of reports; and data cleaning. The pull of CBs issuers is not available in a consistent manner. Instead, the combination of several sources was employed to get the most complete list of financial intermediaries who issue CBs: the Covered Bonds Label issuers directory, and the ECBC issuers directory.

All information is available in XML, which is a semi-structured information format subject to missing attributes, multiple values, variant attribute permutations, exceptions and typos (Hsu and Dung, 1998). Additional complications were caused by using different encoding standards and disclosures of entities' legal

names, which prevent automatic matching between the same financial institutions extracted from different web pages. The most evident example of such a mismatch is that the same CBs issuer is disclosed on web pages under different names. For instance, SEB (a Swedish bank) is named as "SEB" on the ECBC website and as "Skandinaviska Enskilda Banken AB (publ)" on the Covered Bonds Label website.

Another journey one has to go through is to retrieve the files from the individual bank's web pages, most of which are specifically designed to prevent unauthorized machine file retrieval. There is a separate strand of literature that studies the ethics of web crawlers Giles et al. (2010). In essence, every crawler should respect the Robots Exclusion Protocol, which is a set of domain-specific rules specified for "robot.txt" files. The unethically designed web crawler may cause serious disruption to the domain, such as a Denial of Service Attack, which in turn leads to server shut down. The principles of safe IR are discussed by Eichmann (1995). For the purpose of Essay B, the web crawler was designed to yield the harmonized transparency templates in the most ethical way to the best of my knowledge. The crawler gathered more than 3,000 files in 24 hours, out of which around 2,000 files were relevant.

Another source of information available on the Web is the commercially focused data provider. This is due to early stage development providing a certain day limit of free queries and endowment for developers. One of the most powerful and largely unexplored data sources for researchers is Google's API services. In this thesis, two major data sources were used to compile the spatial branch distribution of SSBs: Google Places API and Geocoding API. The former was used to locate the current branches of the SSBs; the latter was used to get the longitude and latitude of the closed branches provided by the Swedish Bankers' Associations. The data was retrieved as output in the JavaScript Object Notation (JSON) format.

Section 4.3 underlines the non-trivial methods and data sources used in this thesis. The rest of Chapter 4 is devoted to methods of data analysis and study design.

## 4.4 Study Set-up

As underlined in Section 2, society is interested in the role of banks in contributing to economic growth. So, it is implied that a bank funds opportunities that cannot be funded by bonds or equity financing, in line with Bolton and Freixas (2000).

The central problem is that banks are prone to herding behavior by undertaking correlated investment decisions in order to minimize the costs of borrowing in future (Acharya and Yorulmazer, 2008). In this case, observing the other bank's performance does not reveal any additional information about the given bank. All banks are similar, and good news about one bank mean good news about every bank. However, bad news about one means bad news about everyone else. Acharya and Yorulmazer (2008) claim that the former effect dominates the latter. Banks' herding behavior is studied in Essay A.

Additionally, debt is the least information-sensitive security (Dang et al., 2015). A trade with low information sensitivity does not require the investor to perform due diligence. In Dang et al.'s (2015) set-up, trading "debt-on-debt" preserves symmetric ignorance because it minimizes the incentive to produce private information about the payoffs. Hence, debt is the least information-sensitive security (i.e., it is liquid). CBs are the bank's debt-on-debt, which is mortgages. The shock about the fundamental value of mortgages creates incentives to perform due diligence and exaggerates shock propagation to "debt-on-debt" instruments. Properly functioning funding markets allow banks and other firms to manage their cash balances and short-term liquidity needs. Given the vital role of funding markets, Dang et al. (2015) have reached a *preliminary* assessment that collective ignorance supports informational insensitivity of "debt-on-debt" instruments.

At first glance, it may seem to be counterintuitive to aim to collect data about the "debt-on-debt" instrument, which, according to (Dang et al., 2015), is meant to stay information insensitive. However, this thesis attempts to study the effect that leads to an initial negative shock. Excessive lending and erosion of lending standards are two of the fundamentals that may become public news and lead to incentives to perform due diligence.

The status quo of the usage of the CBs funding strategy is maintained if the issuing of information-insensitive CBs increases the information sensitivity of holders of junior debt and equity. It implies that secured funding introduces higher monitoring incentives for debt and equity holders. The anticipated effect of increasing due diligence should make banks more cautious about their investment decisions. The first assumption of Essay B is that the earnings of banks with a higher portion of secured funding should be less volatile in comparison to the earnings of other banks.

In Dang et al.'s (2015) set-up, the secured depositors are ultimately information insensitive compared to secured funding, which is conditionally information insensitive. This means that secured deposits do not perform due diligence even in the presence of a negative shock. From this is derived the prediction of Essay B: deposit funding erodes the screening incentives of unsecured debt and equity holders. Hence, a bank with a larger deposit base experiences less pressure by issuing CBs, and we may not find any differences in the performance of banks issuing CBs compared to other banks.

The imperfect information sensitivity elasticity between secured debt and junior stakeholders introduces market discipline imperfections, which might be abused by banks so that they can continue business as usual. On the one hand, cheap secured funding sources, together with lack of due diligence, lead to higher interest rate margins and, thus, higher earnings. On the other hand, they cause asset segregation by attributing high-quality loans to the covered pool and leaving junior stakeholders with whatever is left.

In the case of CBs, the logic is straightforward: the best mortgages end up in the covered pool, while the rest stay on the balance sheet. The securitization decisions work differently. The bank decides which of the mortgages to sell out and which to keep on the balance sheet. Even if the framework is different, the contingency mechanism in the case of mortgage quality deterioration is similar. Essay C explores the set-up in which the SSBs may transfer part of the mortgages to a large commercial bank (Swedbank) on the condition that it bears the first tranche losses. While the quality of the bank's assets is opaque, the transferred volume of loans and the bank's total assets is provided by the Swedish Savings Banks Association.

Small SSBs have to segregate their assets and transfer part of them to Swedbank due to capital constraints, liquidity or funding needs, and so on. The due diligence process between Swedbank and SSBs is not known. The information asymmetry persists and is proxied by the distance between Swedbank's closest branch to the local branch of the SSB. As with covered pool asset segregation, the various implications for mortgage retention decisions and transfer strategies are explored in Essay C.

The financial literacy literature is enormous, but it mostly concerns consumer behavior (e.g., see Lusardi and Mitchell (2007)). A summary of the situation can be borrowed from Lusardi and Tufano (2015): the more literate people are, the better they are at wealth accumulation and smooth consumption. In light of this, it might be of interest for society to ensure that bankers are able to provide financially literate support for consumers' lifetime wealth accumulation. It may, for example, be expedient to ensure that banks' top management teams understand the necessity of regulations. Of course, no one would be allowed to question the financial literacy of banks' top management teams. Instead, Essay D operates in terms of professional self-perception or self-esteem. The bankers with high self-confidence and competence related to the regulatory changes and overall banking operations are expected to have a different attitude towards upcoming changes.

## **Chapter 5**

### **Summary of Research Contributions**

Chapter 5 presents the results of the essays on which this thesis is based. The essays aim to contribute to the understanding of the implications of banking regulatory amendments (i.e., the Basel III accord in this thesis) for the funding strategies adopted by financial intermediaries in Europe. Essay A is the result of joint work with one of my supervisors, Assistant Professor Viktor Elliot. The idea and motivation for the paper was developed as a joint effort. I am the first authors of the Essay because I came up with study design, performed data collection and estimations. The analysis and conclusions are the result of joint work. In this essay, we aim to answer whether the Basel III accord favors CBs issuers over other financial intermediaries. Section 5.1 presents the main conclusions of Essay A.

Section 5.2 summarizes the findings of Essay B. This essay presents one of the first descriptions of data related to banks' asset encumbrance attributed to CBs. This data was utilized to study the existence of banks' propensity to increasingly resort to secured funding. Essay B assesses how the asset encumbrance affects the banks' asset allocations in terms of balance sheet growth and future encumbrance levels.

Section 5.3 focuses on the findings of Essay C. In this essay, I analyze the driving factors behind small SSBs segregating newly issued loans based on the degree of competition the bank faces. Essay C focuses on the effect of distance to competitor in securitization decisions of SSBs.

Section 5.4 describes the contributions made by Essay D. This study is a result of collaboration between academia (i.e., Viktor Elliot and me) and industry (i.e., Torbjörn Jacobsson<sup>1</sup>). We study how the characteristics of bank management affect banking reform support in Sweden. I am the first author, since I came up with the study idea and performed all estimations. My co-authors (and particularly Mr. Jacobsson) did most of the data collection, while the analyses was a joint effort. Essay D explores one of the least discussed question in the literature relating to the bankers' support of the regulatory amendments.

### **5.1 Essay A: Do covered bonds issuers differ from non-issuers under the new Basel III liquidity regulation?**

The Basel III accord provides significant amendments to the securitization activity on which banks heavily relied before the global financial crisis. The intrinsic role of mortgage-backed securities (MBS) before the crisis poses a question about the regulatory amendments stemming from the crisis's aftermath. With the loss of confidence and disintermediation processes, secured funding has started to play a feasible role in the European banking industry. An alternative to MBS is CBs.

The Basel III accord is designed to ensure that the use of CBs by banks does not allow them to build up similar risks and exposure that resulted in the global financial crisis. These risks imply excessive exposure to residential properties together with poor underwriting standards. The correctly designed regulatory framework excludes the possibility to abuse the use of CBs in order to gain faster growth relative to conventional banking. In Essay A, we assume a potential deviation in the response to the new Basel III regulatory amendments between European banks that issued CBs and those that did not. Consequently, we address the concern of asymmetrical regulatory treatment of banks issuing CBs.

The study characterizes the evolution of banks' characteristics around the Basel III accord adoption. The results show that under the Basel III framework, CBs

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<sup>1</sup> CRO Avida of Finans



issuers demonstrate higher asset growth rates. Our conclusion implies that the new Basel III and Liquidity Regulation framework particularly favor banks that rely on a CBs-driven funding strategy.

## **5.2 Essay B: Covered bonds funding usage: Evidence from asset encumbrance of European banks**

As high-quality secured funding instruments, CBs maintain the credit availability for mortgages. CBs also introduce encumbrance on the banks' balance sheets. The segregation of mortgages with low loan-to-value ratios and commitment to re-pledge the sour-quality loans with those that fulfill the requirements or cash equivalents result in potential weaknesses in the European banking industry.

In Essay B, the new disclosure filings are utilized to address the research question: How does asset encumbrance affect banks' asset allocations in terms of balance sheet growth and future encumbrance levels? The study is based on a data collection procedure designed to obtain the asset encumbrance attributed to the CBs funding strategies adopted by European banks. The variable of interest is the effect named "asset depletion", which stands for the difference in the growth rates of the bank's total assets and the segregation of its assets by pledging mostly mortgages to a covered pool attributed to holders of CBs. The analysis is made due to growing European Central Bank concerns about the level of asset encumbrance of European banks.

The data analysis shows the early findings based on available data. A major contribution is the finding that the significant growth of asset deterioration is followed by high asset encumbrance. Another finding is that once a bank starts to rely on CBs funding, it is expected, according to the current time frame, that its growing reliance on CBs will be maintained during the next period. This result demonstrates the potential locked-in effect of CBs funding: once a bank starts to fund its needs via secured funding, it tends to increase its reliance on this funding strategy. This in turn starts a spiral of assets encumbrance.

### **5.3 Essay C: The role of distance and securitization decisions of the Swedish savings banks**

Banks' decisions to segregate assets, and the rationale for which loans to sell or encumber and which to retain on the balance sheet, are subject to extensive academic debate. One of the key determinants of the segregation principle is the degree of competition the bank faces.

Essay C studies of small savings banks' behavior given the presence of a competing commercial bank branch. The essay studies the relation between the structure of banks' branch networks and the assets transfer between SSBs and Swedbank, a large commercial bank in Sweden. The cooperation with Swedbank allows the SSBs to balance their lending demand and savings supply within a narrow geographical area by transferring part of newly issued loans to Swedbank. This in turn allows the SSBs to fund the increasing lending demand and to compete with other large commercial banks.

The geographical proximity of a branch of a commercial bank is a proxy for the degree of competition that the local SSB faces. The closer the branches of the commercial and the SSB, the more intense the competition. Moreover, SSBs face informational asymmetry by transferring loans to Swedbank. The greater the remoteness of Swedbank's branches, the more informational asymmetry exists between Swedbank and the local SSB. Geographical remoteness limits the ability of the SSB to transfer a loan.

The results yield the following conclusions. Decisions of SSBs to retain loans are subject to the nature of competition they face. Once a local SSB operates close to a branch of a commercial bank that specializes in relationship lending, the SSB competes by issuing more loans. These loans are consequently retained on its balance sheet. This effect persists once the SSB competes with Svenska Handelsbanken. The opposite effect is observed when the close commercial bank uses transactional lending. Given the proximity of Nordea, SEB, and Länsförsäkringar, the portion of loans retained by SSBs is smaller.

## **5.4 Essay D: Time for change: The role of professional self-esteem in relation to industry support of banking reforms in Sweden**

In Essay D, we utilize unique survey data to address the research question: How do the characteristics of bank employees affect banking reform support in Sweden? We study the effect of professional self-esteem on the acceptance of regulatory changes by the top management of Swedish banks. In particular, we analyze the effect of self-reported proficiency. We call professional self-esteem, or simply self-esteem - on the opinion of how regulatory changes will affect the Swedish banking industry.<sup>2</sup> Our analysis is based on comprehensive survey data collected by top managers and industry experts in the Swedish banking industry each year from 2015 to 2018.

Two complementary approaches are used to address the individual attitude towards the anticipated effect of the Basel III accord requirements on the Swedish banking industry. The first approach relies on a small subsample of industry outsiders (advisory and regulatory representatives) as a potentially unbiased reference point. The second approach is based on Rossi et al.'s (2001) model, which was specifically developed to cope with individual-scale usage heterogeneity in similar surveys with Likert-scale discrete ratings.

The results show that the respondents who self-report as more literate in banking operations and regulations tend to demonstrate a higher approval of regulatory efforts. These respondents are also more positive towards the anticipated effects of the new regulatory framework on the banking industry. The study results underline the urgent need for clearer regulatory communication strategies. The financial regulation authority might achieve better regulatory discipline if it makes an effort to contribute to overall banking literacy.

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<sup>2</sup> In line with the Rosenberg Self-Esteem Scale, we measure self-worthiness based on proficiency.

## 5.5 Discussions, implications, and future research

The conclusions of the essays presented in the thesis have straightforward policy implications. The year 2018 marks a decade since the most serious economic meltdown in modern history. One might consider ten years as a reasonable distance of time from which to address the consequences of the distress of the largest financial intermediaries.

The adjustments to the current regulatory regime are a way to address the weaknesses exposed by the global financial crisis. Meanwhile, these amendments may become a source of new unintended risks. CBs are protective of investors, but they impose risks on the issuing bank. Given the presence of safety nets, these risks may not be fully priced. In the short term, they lead to a competitive advantage for the issuing bank. In the long term, the excessive reliance on CBs generates asset encumbrance and may create the risk that the bank cannot survive a liquidity shock.

The globalization of financial markets is a source of weakness in the financial system. However, once the toughened competition looks to develop a closer relationship with clients and better due diligence, the relationship lending starts to flourish.

Any change in regulatory standards imposes a burden on the regulatee to adapt, but those ready to change turn out to be those knowledgeable about the changes. If the relationship is truthful, then an improved communication strategy and regulatee support (which are analogous to customer support) would be likely to make the process of changes occur more easily.

As mentioned in the introductory chapter, banks' disclosure and transparency have undergone significant improvements. However, although considerable effort has been made in that direction, there is still a long and, more importantly, expensive way to go. Banks are still prone to avoid making an effort to facilitate the disclosure standards. On the one hand, the associated investments in the IT infrastructure favor only large banks with enough scope to compensate themselves for expenses (again, consider the first TBTF argument). On the other hand, IT infrastructure investments produce considerable public expenditure to maintain the

facilities of central banks. The Covered Bonds Label market initiative is considered in Essay B, but it also suffers from a number of issues.

While this thesis is a small step towards the unification and facilitation of public monitoring, more studies are needed to put forward the institutional role of the academic community in banking supervision. The European data liberalization process is inexcusably slow given the scope of the issues revealed by the global financial crisis. Shortcut options based on market initiatives have started to emerge, such as the harmonized transparency templates disclosures. However, the usability of this framework is at an early stage. Further steps should definitely be taken in that direction.

The results and conclusions of this thesis are made in collaboration with a number of industry associations that aim to promote the transparency and efficiency of the banking industry. While the findings of this thesis underline the important role of regulatory and supervisory authorities, the communication between academia and "watch dogs" is limited. There is a manifest need for further promotion of transparency of regulatory and supervisory procedures for the sake of academic integrity and reproducibility of results.

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**Part II**  
**Essays**





## **Chapter 6**

### **Essay A: Do covered bonds issuers differ from non-issuers under the new Basel III liquidity regulation?**

NATALIA KOSTITCYNA, VIKTOR ELLIOT

## 6.1 Introduction

The roots of the global financial crisis of 2007 - 2009 are typically attributed to mortgage-backed securities (MBS)<sup>1</sup> and the residential property price bubble (Gorton and Ordoñez, 2014). The underlying mechanics of how price bubbles turn into a crisis are still the subject of extensive debate. The traditional view implies co-integration of property prices and such fundamentals as real income, population, construction costs, and land supply (see Wheaton (1990), Capozza et al. (2004), and Ortalo-Magné and Sven (2006) among others). Perhaps the most prominent among the non-conventional arguments is the hypothesis that property prices are subject to behavioural bias. Case and Shiller (1988) observe backward-looking expectations, which are inherent in property prices. In the absence of declining property prices, the market players extrapolate the recent increase in the prices and overestimate the future capital gain from owning a residential property.

The non-conventional set of studies argue that there is no cointegrating relationship between property prices and real estate market fundamentals (Gallin, 2006). Coleman IV et al. (2008) explain the growth of house prices from 2003 up to 2006 by the displacement of private asset-backed securities issuers for the government-sponsored enterprises, which led to a disconnection of market prices from their fundamentals. They claimed that the subprime lending and subsequent events were a result of fundamental changes in the legal, political and regulatory environment, which resulted in strong incentives for a surge in lending and securitization by private issuers under loosened underwriting standards. Those practices turned out to be unsustainable and resulted in the most severe meltdown since the Great Depression.

In this essay, we consider the regulatory treatment of the covered bonds (hereafter, CBs) under Basel III as a potential cause of the eased lending constraints and loosened standards, which, in line with the argument of Coleman IV et al. (2008), may result in growth in property prices and trigger a similar chain of events as described earlier. The current regulatory framework treats CBs as a "problem-free" alternative to MBS with considerable investor protection via minimum overcollat-

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<sup>1</sup> The underlying collateral constitutes the debt contracts on US residential property.

eralization (OC) requirements and dual resource (i.e., investors have an additional claim on residual bank assets). A CB issuance is not followed by asset segregation, and pledged to covered pool (CP) collateral is kept on the balance-sheet and monitored by the mortgage originator. Since 2007, CBs outstanding in Europe have increased from EUR 2 trillion to EUR 2.5 trillion by December 2016.

The increase in CBs usage by European banks has also led to steadily increasing levels of asset encumbrance, something that is closely monitored by the European Banking Authority (EBA). A EBA report on asset encumbrance (EBA, 2017), singles out CBs as the major source of asset collateralization. According to the report, the weighted average ratio of asset encumbrance in European banks was 26.6% as of December 2016. While a high encumbrance level is problematic in itself, the EBA (2017) is specifically concerned with the rising encumbrance of central bank eligible assets resulting from replenishment of assets downgrades in the current CB pools.

In relation to the Basel III framework, few financial instruments have been discussed on social media so fiercely as CBs (both within and outside Europe). The earlier versions of the liquidity coverage ratio (LCR) proposal issued in December 2009 called for 20 – 40 % discount on CBs at the high-quality liquid assets (HQLA) level 2 composition. Mauricio Noe, managing director of debt capital markets at Deutsche Bank as of 2010, extended his critique against the initially proposed haircuts in an interview with the Financial Times on 23 of April 2010, saying that CBs would be "*whacked*" by the banks if the proposed haircuts went ahead. The later versions of the Basel III proposal assign a *preferential* 15 % haircut on CBs (subject to certain criteria). The same *preferential* treatment does not apply to traditional MBS. Residential mortgage backed securities (RMBS), with similar features of risk retention and full recourse, are subject to a 25% haircut. This drives a regulatory wedge between these two rather similar instruments. The new bank resolution framework (bail-in procedure) also favors CB holders by providing safeguards in the case of resolution. This favorable regulatory treatment is addressed in this essay under the introduced notion of a "*covered bonds easy-living*" hypothesis.

Jon Nicolaisen, the deputy governor of Norges Bank, discussed the implications of CB funding strategies at the European Covered Bond Council (ECBC) plenary meeting, Oslo on 6 April 2017. He stated that the preferential regulatory treatment of CBs, together with low risk weights for residential mortgages, incentivize banks to expand further into mortgage lending. Two potential downside effects follow from this. First, the potential crowding out effect of corporate lending due to extensive mortgage lending increases the banks' exposure to price changes of the underlying collateral (i.e. house prices) and heightens bank leverage. Second, the reduction of eligible assets on the banks' balance sheets hampers the credit and liquidity risk profile of the sector.

In this study, we stress "*CBs easy-living*" arguments. In particular, we estimate the effect of Basel III adoption on the European CB issuers. High demand for HQLA, preferential treatment of long-term funding, and lower risk weights for residential mortgage lending may favor CB issuers. We test whether the new regulatory framework allows CB issuers to perform better than those who do not issue CBs. The estimations are based on a genetic matched sample of CB issuers versus non-CB issuers for the period before (2012 – 2013) and after (2015 – 2016) the introduction of the Basel III LCR. We employ the difference-in-difference (also referred as diff-in-diff) approach in a study designed to test the presence of a potential treatment effect from the introduction of Basel III.

We find that there is an effect of the Basel III introduction on CB issuers compared to non-issuers. CB issuers demonstrate higher asset growth rates after the Basel III adoption, given the estimations are performed on the balanced sample of banks with not statistically different characteristics as of 2012. The existence of a regulatory policy that is aimed to substitute one practice with a better one from a regulatory point of view is not a surprise. In essence, we show that there is in fact support for the CBs easy-living hypothesis, but it is still unclear whether CBs are actually a more stable instrument than RMBSs. Further research should strive to make this distinction clear in order to confirm that the current preferential treatment of CBs is indeed well motivated.

The essay is organized as follows. Section 6.2 discusses the literature on the Basel III framework and the regulatory treatment of CBs. Section 6.3 discusses the

empirical strategy of this research. Section 6.4 presents the data description. Section 6.5 describes the matching strategy. Section 6.6 reports the estimation results. Section 6.7 addresses the robustness and validity concerns. Section 6.8 summarizes our findings, draws the conclusions, and elaborates on future investigations.

## 6.2 Literature

While the securitization of mortgage lending is the scourge of the century, we should strive to understand what would have been the consequences of the global financial crisis if MBS would have been supplemented with CB financing earlier. Would it have been less severe? In order to address this question, we need to outline the fundamental difference between CBs and MBS.

The empirical evidence about credit risk allocation between securitized and retained-on-balance-sheet loans is ambiguous. In a sample of European banks, Faruggio and Uhde (2015) find that only less risky banks with a higher loan portfolio quality are more actively engaged in securitization, while Affinito and Tagliaferri (2010), based on sample of Italian banks, find that less profitable and riskier banks are more involved in the securitization process.

Greenbaum and Thakor (1987) discuss a bank's choice to fund a newly issued loan by emitting deposits or to securitize the loan by selling it to investors. Without information asymmetry about asset quality and government interventions, the banks are indifferent between these options. The regulation and footings-related subsidies<sup>2</sup> may affect the bank's funding model by prompting retention of newly issued loans on the balance sheet. At the same time, when adverse selection is in place, higher-quality loans are securitized whereas lower-quality loans are kept on the bank's balance sheet (Greenbaum and Thakor, 1987).

While the Basel Committee on Banking Supervision (BCBS) policy papers<sup>3</sup> blame the savings glut on the emerging markets, absence of due diligence, man-

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<sup>2</sup> That is, subsidized access to a lender-of-last-resort and underpriced deposit insurance (Greenbaum and Thakor, 1987)

<sup>3</sup> See BCBS Report on asset securitization incentives (BCBS, 2011)

agerial compensation schemes, and so on, most scholars agree on that the price bubble of the US housing market is one of the primary sources of the crisis (for a review, see Thakor (2015)). Nevertheless, the quality of the lending standards is still beyond the scope of policy consideration.

Given that the laxer lending standards built up the baskets of "lemons", which subsequently were pulled out for securitization, it is unclear how the supplementation of securitization with CBs is going to address this issue. The first argument in favour of that initiative is the "skin in the game" principle. This means that the loans retained on the bank's balance sheet are better monitored. This logic goes against the argument of Greenbaum and Thakor (1987), where the poorer-quality loans are funded through insured deposits. The depositors' monitoring incentives are diluted by deposit insurance schemes or explicit/implicit government guarantees, causing the implosion of stricter capital regulations (e.g., Admati et al. (2013)). The ignorance of MBS investors about the quality of underlying assets can be similar to that of the insured depositors under the presence of the same safety nets. Discussion about implicit government guarantees can be found in Acharya et al. (2011). The authors argue that, in the absence of implicit guarantees and safety nets, professional investors are better at risk assessment compared to the insured small depositors. Moreover, such practices as junior risk retention (when the originator retains the riskiest tranche of the issue) also implies "skin in the game".

Regulators are concerned about the adverse selection problems, when the poorer-quality mortgages are securitized. The same principle holds in the case of segregation of assets on the bank's balance sheet. The CB issuer chooses which mortgages to include into the cover pool (CP) and which to retain on the balance sheet. In line with Greenbaum and Thakor (1987), given the absence of depositors' due diligence, the lower-quality loans are funded by deposits and higher-quality loans are segregated to CP.

CBs are also starting to attract attention in the academic literature due to their rising importance for the financial institutions as a refinancing tool (e.g., Prokopczuk et al. (2013) and Larsson (2013)). Carbó-Valverde et al. (2017) compare CBs and MBSs, concluding that CBs and MBS share some familiarity with each other, but that, at least before the crisis, these instruments were primarily used

for different purposes: CBs were used to improve the issuer's liquidity position and MBS were used to reduce risks.

The study by Filippo et al. (2016) of a bank's choice between secured and unsecured money market funding shows that riskier banks substitute unsecured funding with secured funding. Ahnert et al. (2018) present a theoretical framework in which CBs issuance allows the increase of expected value of bank equity by financing more profitable investments, while shifting balance sheet shock to unsecured debt holders and thereby increase banking fragility. Meanwhile, the preliminary results of Garcia-Appendini (2017) Covered Industry show that asset encumbrance levels have no real effect on bank risk.

Juks (2012) shows that the recovery values of unsecured claimants diminish when the share of secured funding increases. When banks replenish an unsecured with a secured source of funding, the loss recovery ratios of unsecured debt might be affected. The presence of uncertainty about the future pay-off structure due to the inability of banks to pre-commit seniority of claims fulfillment hampers the bank's access to the unsecured market.

The study in this essay is also related to literature on the effects of liquidity regulation on bank funding models in general, and specifically to those works that study the Basel III adoption in 2015 and how banks have adjusted their balance sheet structure to meet the LCR minimum requirements. For example, Duijma and Wiertsa (2016) find that banks respond to the Dutch LCR (DLCR) shortfall by increasing the stable funding, not by increasing HQLA holdings. In contrast, Banerjee and Mio (2017) report that UK banks respond to liquidity regulation tightening not only by liability changes, but also by increasing HQLA holdings. Similarly, Bonner (2016) reports that preferential treatment increases banks' demand for governmental bonds beyond their own risk appetite. Moreover, they find that higher HQLA holdings have a negative effect on bank lending.

Although growing, literature on CBs is still scarce and to the best of our knowledge no previous papers have tested how the LCR requirements affect CB issuers versus non-issuers. Specifically, our study assesses whether the potentially favorable regulatory framework for CB issuers, without endogenizing the risk of washing-out the high-quality unencumbered assets from the balance sheet, may

hamper the bank's access to unsecured markets and worsen the bank's liquidity position.

## **6.3 Empirical strategy**

### ***6.3.1 Industrial Setup***

In our study, we rely on a sample of EU CB issuers. The advantage of relying on a cross-country sample of EU banks in order to estimate how the potentially preferential treatment influences CB issuers is that it allows us to move beyond the large unbalance imbalance between issuers and non-issuers groups of in a particular country. We test if banks, which are relying on CBs funding, enjoy benefits from the new Basel III framework compared to banks that do not exploit the CB funding strategy. As noted above, the initial Basel III proposal was much less preferential than the final version towards banks exploiting a CB funding strategy than the final version, which that is currently being implemented.

The first question to address is whether Basel III favours CB issuers over banks that do not issue CBs. The effect is driven by the preferential eligibility status of CBs for inclusion in HQLA with a haircut of 15% versus a haircut of 25% haircut for RMBS. The lower haircut to for holding CBs by a bank for the purpose of LCR calculation supports the demand for this instruments and eases the funding constraints of banks, which that rely on CBs as a funding instrument.

The second question to consider is what bank characteristics will be affected the most, if Basel III favours CB issuers over non-issuers. The most straight forward expectation is that those banks that, which issued CBs before the Basel III introduction, have a possibility to can increase mortgage lending via additional issuance of CBs. Of course, it is a case this would only be the case if the bank is not capital -constrained. In that case, we might expect excessive assets growth of banks that, relying on CBs funding. The asset growth of CB issuers can be via (a) supplementing "old" mortgages, which were previously held on the balance sheet



and not pledged to the CP, and, for example, e.g. increasing corporate lending, or (b) issuing new mortgage lending and pledging it to the CP.

The third question to address is which CB issuers are expected to be most affected most by the Basel III introduction. We expect the most pronounced effect to be on the issuers which who were issuing CBs before the Basel III adoption. This is because the CBs of established issuers have a historical performance, and the increased demand for CBs affects more the large and established issuers. On the other hand, the small CB issuers were previously funding funding-constrained, and so, under eased market conditions, the small and risky CB issuers experienced the biggest (positive) shock, if the. We assess whether this effect is still in place.

While we cannot certainly predict whether small or large CB issuers are affected the most, it is reasonable to assume that the most preferential position would be for the banks that hold a sufficient mortgage lending portfolio with that simultaneously have low loan- to -value ratios and are at the same time as it is not fully pledged to CB holders. Unfortunately, there is no data available on the unencumbered mortgages held at on the bank balance sheets.

Another potential determinant of the shock significance is the date when the bank started to issue CBs. The Basel III enforcement designed a favorable regulatory framework for CB issuers and investors by imposing the LCR framework since 2015. While there is extensive cross-country variance in the legal enforcement schedule for the LCR, we are primarily interested in the aggregate demand at the EU- level.

We follow the unified harmonized implementation schedule to be in place for year-end observations of 2014 (formally, January 1, 2015) at a minimum of 60% that gradually increased up to 80% as of by the 2016 year-end. So, we expect the anticipation and adoption period to be 2014. Given that, we drop 2014 year-end observations as our anticipation period. The pre-treatment period is determined before 2013, while the post-treatment period is after 2015.

The innovation diffusion is a function of the innovation desirability (Molyneux and Shamroukh, 1996). The adoption of the softened CB treatment within the Basel III framework increases the desirability of CBs, but it is reasonable to assume that late adopters do not fully experience the positive shock from the regulatory treat-

ment of CBs. In the wake of regulatory amendments, banks tend to develop these compliance strategies and make adjustments before the regulation is in place. If the precautionary compliance argument holds, we may find the most significant effect for the CB issuers who issued CBs before the "precautionary" compliance was made (i.e., before 2014). Thus, we expect that Bonner (2016)'s findings of an increased aggregate demand for government bonds under the new liquidity requirements also imply the increased demand for CBs and lead to improved economic conditions for CB issuers.

The probability of being a CB issuer before the Basel III proposal is not random. The determinants of a CB funding strategy lie in the dimensions of capital structure, business models, funding strategies, and profitability. In order to address imbalances in the sample between CB issuers and non-issuers, we follow the growing strand of literature exploiting various matching algorithms in line with Groppe et al. (2018) and Almeida (2012). We exploit the generic optimization algorithm following Sekhon and Mebane (1998) and Diamond and Sekhon (2013); in addition, we use a similar set of covariates to those in Groppe et al. (2018) to capture the potential differences between the CB issuers and non-issuers for the general population: total assets, capital ratio, customer loans as a share of total assets, non-interest income as a share of total operating revenue, deposit funding as a share of total assets, and net income over total assets.

### ***6.3.2 Methodology***

Once we have a balanced sample of the financial intermediaries that issue and do not issue CBs, we may test for the existence of the effect of the Basel III regulation on CB issuers vs non-issuers. The most established way to test for this effect is to employ the difference-in-difference estimations to test for the presence of a potential treatment effect from the favorable regulatory framework for CBs.

In this study, we assume that each bank exploits improved economic conditions by expanding its balance sheet. Several arguments support this assumption. The too-big-to-fail argument implies the preferential treatment of banks in the

case of distress. Recently, this argument has been supported by a separate regulatory framework for systemically important financial institutions. Also, a number of studies document the existence of economy of scale in banking. For a more specific discussion, see Davies and Tracey (2014).

We estimate the regression specification 6.1 in order to determine the treatment effect of LCR implementation on *CB issuers* compared to the control group of non-CB issuers. The  $CB\_issuer \cdot After$  stands for difference in differences (DID), where  $CB\_issuer$  is equal to 1 for CB issuers and 0 for non-CB issuers, and  $After$  is determined as the post-treatment LCR adoption period after 2014. We test how the reliance on a CB funding strategy affects the bank's ability to grow - that is, to increase the bank's total assets.

$$Y_{i,t} = \alpha + \beta CB\_issuer_i \times After_t + \gamma Bank\_Controls_{i,t} + v_i + v_t + \varepsilon_{i,t}. \quad (6.1)$$

The DID estimation is based on the parallel trend assumption (PTA), which means that, in the absence of treatment, the control and treatment groups would have behaved similarly. Unlike in the controlled laboratory experiments, it is impossible to isolate the treatment effect with constantly changing economic conditions. The banking industry is characterized by dense changes in the economic and regulatory environment in the post-crisis period. The state policy of precautionary capitalization, bail-outs, restructuring, and other government interventions, together with a number of country-specific regulatory and political changes introduced in parallel, have resulted in the inability to test for the PTA.

The failure of PTA does not exclude the applicability of DID estimations. Chabé-Ferret (2017) outlines that the proper matching strategy on pre-treatment outcomes enables to get consistent DID estimations to be attained. The various matching strategies result in the set of control groups, matched with the treatment group via different sets of pre-treatment covariates. It allows us to perform the DID estimations and make an inference about a presence of the effect.

The strictest matching strategy is designed according to the following logic. Under the assumption that the major effect took place during the period of pre-

cautionary compliance in 2014, the presence of the shock from the Basel III introduction can be tested by DID estimations based on matched groups of CB issuers who started to issue CBs before 2014, versus the control group of CB issuers who started to issue CBs after 2014. This matching strategy eliminates the claim about the uniqueness of banks issuing CBs. The problem with this study design is that the estimation is biased towards the group of issuers who started to use the CB funding strategy after 2014. It may turn out that the late (i.e., post-2014) adopters of a CB funding strategy were, for example, capital constrained during the pre-treatment period. The matching strategy based on the capital covariate leads to selection bias of the early adopters, who were consequently also capital constrained and could not realize the growth potential due to regulatory restrictions on asset growth. That leads to the false rejection of the studied effect presence. Moreover, the following matching strategy is not applicable due to the small sample of the late issuers with non missing data on the variables of interest. The matching strategies are discussed in details in Section 6.5.

## 6.4 Data

Our dataset is mainly constructed from annual entity-level balance sheet data, collected through the SNL database. The coverage of the European banks is limited in the SNL, which means that we are restricted to those banks that have filed the consolidated data on variables of interest for the period from 2012 to 2016. The variables of interest are summarized in 6.1.

The list of CB issuers was accessed through the European Covered Bonds Council's (ECBC) official webpage as of 2018. The ECBC sample of the treated group consists of 318 non-consolidated CB issuers across Europe as of 2018. In order to eliminate potential bias from complex corporate structures of bank holding companies (BHC) and to match with SNL dataset, we aggregate the level of analyses in the case of a special purpose vehicle (SPV) usage up to the bank and further BHC levels. The issuers are identified and matched with SNL dataset via domain

Table 6.1: Summary statistics

Variable (SNL Key)	2012						2016					
	Mean	SD	Min	25%	75%	Max	Mean	SD	Min	25%	75%	Max
Total Assets (132264)	16.5	1.9	11.8	15.5	17.5	21.4	16.6	1.8	11.8	15.5	17.5	21.5
Capital Ratio (133176)	17.6	13.2	0.9	13.0	18.4	167.6	20.7	27.5	8.1	15.4	20.5	416.6
Leverage Ratio (133084)	7.2	3.9	0.9	5.0	8.3	30.1	8.8	3.7	1.6	6.0	11.0	22.6
Risk-weighted assets / Assets (227010)	50.5	20.0	1.4	36.4	64.5	100.9	48.5	19.0	3.2	33.9	60.7	96.3
Net Loans / Assets (133095)	61.4	19.2	4.6	51.7	76.0	91.6	62.4	18.2	7.9	52.3	76.4	89.2
Noninterest Income / Operating Revenue (13345)	31.1	28.5	-171.1	22.2	43.9	95.5	33.5	28.6	-257.7	22.8	45.0	95.0
Depository funding / Assets (132288/132264)	55.7	21.8	1.3	41.8	71.1	91.7	60.6	19.7	2.3	51.0	75.5	89.4
Net interest income / Assets (133377)	1.7	1.3	0.1	1.0	2.1	9.3	1.7	1.2	0.1	1.0	2.0	10.1
Asset Growth (133962)	4.2	14.8	-43.2	-1.1	6.6	73.6	3.5	12.4	-43.3	-1.8	6.9	85.1

Total Assets are log scaled; number of banks is 221

of the banks' webpages, which is analogue to unique key given the consolidated SNL dataset. This procedure yields a sample of 142 banks.

In order to define the set of CB issuers, which exhibited the CB funding strategies during the finalisation of the Basel III proposal, we rely on additional data from the Covered Bonds Label and Moody's. The Covered Bond Label was created by the ECBC and maintained by the European CBs issuer community. It discloses the CB issues of registered CB issuers. Given that information, we collect the most recent year of issues for each CB Label registered CB issuer. Additionally, Moody's discloses the rating actions related to the CBs issuance. We collect the date of the first Moody's rating actions of CBs issuance available via Moody's webpage. The specified strategy allows us to identify, at the best proximity, the earliest dates, when a bank can be classified as a CB issuer. The following procedure allows us to approximate the date for 99 out of 143 CB issuers. As noted before, we are interested only in banks, issuing CBs before 2012. Further merge with SNL data gives a sample of 47 CB issuers (as of 2012) with observed variables of interest.

## 6.5 Matching

The effect of regulatory amendments on the CB treatment is of interest for the following study design. At best, the experiment design implies the randomly assigned treatment for a drawn sample of CB issuers versus non-treated CB issuers - that is,

a control group. This means that the observed covariates of treatment and control groups have the same joint distributions. Obviously, this is not the case for this essay, or for many other observational studies.

The generic optimization algorithm (for specific discussion, see ? and Diamond and Sekhon (2013)) is commonly used for multivariate matching based on the Mahalanobis distance. It minimizes the largest observed covariate discrepancy at every step. For details on the implementation of the generic optimization algorithm, see Sekhon (2011).

This study expects to find the following. Given an assumption that a bank exploits every opportunity to acquire profitable assets if there is no capital or other regulatory constraint, we should observe the most successful banks expanding their balance sheets in the absence of severe crises. If the new regulatory framework changes the banking competition in favor of certain types of banks, we can observe the discrepancies in performance of the banks that should otherwise demonstrate similar performance.

We derive the variables used for the matching procedure given the assumption that the observed covariates of the treatment and control groups should have the same joint distribution. The CB issuance alters bank balance sheet due to the presence of CP on the asset side, and symmetrically on the liability side the CBs supersede the deposit funding. We estimate probit regression with a dummy dependent variable, which is equal to 1 if a bank issued CBs in 2012 and 0 if not. The results are presented in Table 6.2.

Following Gropp et al. (2018), we use the share of non-interest income in revenue to control for the banks' business models. If we were to drop this variable, it could produce an imbalanced sample because the non-issuers of CBs might receive more of their income from trading activities and commissions compared to the CB issuers. Banks that are more like hedge funds are able to grow in assets significantly faster due to increased market operations. Table 6.3 presents the pre-treatment summary statistics before and after the matching procedure for the group of CB issuers against the non-issuers of CBs as of 2012. During 2012 there was still a significant presence of regulatory interventions. In order to eliminate bias

Table 6.2: Probit regression for status of CB issuer

The table reports the estimation results of predictors to use a CB funding strategy as of 2012. The significance levels are \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

	CB issuer
Total Assets	0.124*** (0.035)
Total Capital Ratio	-0.108*** (0.029)
Noninterest Income / Operating Revenue	-0.006 (0.004)
Net interest income / Assets	-0.575*** (0.215)
Net Loans / Assets	0.016** (0.007)
Depository funding / Assets	-0.024*** (0.007)
Asset Growth	0.001 (0.008)
Observations	221
Akaike Inf. Crit.	183.632

driven by atypical market events, we adjust the sample by removing the outliers of asset growth.

Table 6.3: Pre-Treatment Bank Characteristics

The table reports the means for the samples of CB issuers, non-issuers, and matched non-issuers of CBs for 2012. Asterisks indicate the p-values of the bootstrapped Kolmogorov-Smirnov test ( $n=1000$ ) at the significance levels: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Notations: CR - Capital Ratio; TA - Total Assets; IntInc/TA - Net Interest Income / Assets; Dep/TA - Depository funding / Assets; Loans/TA - Net Loans / Assets; NonIntInc/Rev - Non-interest Income / Operating Revenue

Statistic	N	CR	TA	IntInc/TA	Dep/TA	Loans/TA	NonIntInc/Rev
<b>Unmatched Sample</b>							
<i>CB issuers</i>	21	14.5	18.4***	1.4*	45.9***	63.8	30.6
<i>Non-CB issuers</i>	123	17.1	15.9	2	61.3	64	31.3
<b>Matched Sample</b>							
<i>CB issuers</i>	21	14.5	18.4	1.4	45.9	63.8	30.6
<i>Non-CB issuers</i>	21	15.5	18.3	1.3	45.8	63.7	34.8

It is evident that given the sample of control and treatment groups, there are significant imbalance in regulatory capital, banks' size, profitability, and funding strategies. The rest of the covariates are presented in order to show that the matching procedure does not introduce imbalances in the covariates of interest. The quality of the matching outcome is defined by the lowest K-S p-value: the presented matching outcome yields the lowest p-value ( $\approx 0.15$ ) for Net Loans over Assets. As the difference between samples is not significant for any of the covariates, the matching can be considered to be successful.

## 6.6 Discussion of results

This section presents the results of the model specification introduced in Section 6.3. The variable of interest is the growth of banks' assets during the period of the Basel III draft discussion and, following its adoption, from 2012 up to 2016. The central interest of the essay is to examine the effects of the Basel III introduction on the group of banks, that received a preferential treatment from the adopted Basel III version versus the original one.

Under the same regulatory regime (as is the case in the EU), the banks are more alike than any other entities within the same industry. This statement is supported by the presence of systemic risk and the high importance of counterparty risks. The banks are prone to take a correlated investment decisions for various reasons (see Acharya and Yorulmazer (2008)). Accordingly, similar banks tend to invest in similar assets, which, given equal access to the market and efficient regulations, should produce similar profits. Having similar performance and size coefficients, the market should treat similar banks identically. These facts lead to the conclusion that similar banks should demonstrate similar growth rates. However, once a shift in the regulatory framework produce a structural imbalance towards a certain group of banks, we might observe deviations.

Assuming that each bank exploits the opportunity to grow, the eased funding constraints should result in assets growth. By definition, this growth does not affect the profitability due to the presence of costs per unit of funding. Table 6.4 presents



the sample means for the EU CB issuers versus non-issuers in order to show the shift in the data features, which drives the benchmark results.

Table 6.4: Bank Characteristics

The table reports the means the samples of CB issuers, and non-issuers as of 2012 and 2016. Stars indicate p-values for the Welch Two Sample t-test. The significance levels: \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ . Notations: CR - Capital Ratio; TA - Total Assets; IntInc/TA - Net Interest Income / Assets; Dep/TA - Depository funding / Assets; Loans/TA - Net Loans / Assets; NonIntInc/Rev - Non-interest Income / Operating Revenue

Statistic	N	Growth	CR	TA	IntInc/TA	Dep/TA	Loans/TA	NonIntInc/Rev
<b>Unmatched Sample - 2012</b>								
<i>CB issuers</i>	21	2.9	14.5	18.4***	1.4*	45.9 ***	63.8	30.6
<i>Non-CB issuers</i>	123	3.4	17.1	15.9	2	61.3	64	31.3
<b>Unmatched Sample - 2016</b>								
<i>CB issuers</i>	21	1.1*	19.3	18.4***	1.3\$***	52***	65.9	33.8
<i>Non-CB issuers</i>	123	4.1	18.1	16.1	1.9	65.4	63.6	30.9
<b>Matched Sample - 2012</b>								
<i>CB issuers</i>	21	2.9**	14.5	18.4	1.4	45.9	63.8	30.6
<i>Non-CB issuers</i>	21	5.1	15.5	18.3	1.3	45.8	63.7	34.8
<b>Matched Sample - 2016</b>								
<i>CB issuers</i>	21	1.1	19.3	18.4	1.3	52	65.9	33.8
<i>Non-CB issuers</i>	21	2.1	19.7	17.7	1.2	51.8	66.3	32.2

As of 2012, the raw means comparison of unmatched samples indicates significant imbalances in the banks' size, funding structure and profitability. The CBs issuers are on average larger in assets, rely less on deposit funding, and earn less on interest-bearing assets. Given the similar share of interest income in revenue, it is possible to conclude that CB issuers are less profitable relative to the control group. As of 2016, the imbalance persists in the same set of covariates. Additionally, the comparison between the samples show significant imbalance in asset growth in favour of banks that do not issue CBs.

The matching procedure introduces balance in the set of covariates used for matching. Surprisingly, the improved sample likeness introduce a significant discrepancy in the assets growth of the treatment and control groups. In the wake of the Basel III adoption, the control group exhibits significantly higher growth rates relative to CBs issuers. Unlike for the unmatched samples, where the difference persists in 2016, the asset growth of the matched treatment and control groups

are not statistically different as of 2016. It is also important to note the increased reliance on depository funding after the Basel III adoption.

Table 6.5 reports the baseline results of the model specification presented earlier, estimated on the raw and matched datasets. The results indicate an opposite finding for the treatment effect. Estimated over the unmatched sample, the results indicate a negative effect of the Basel III CB treatment on the CB issuers relative to the banks not issuing CBs. However, the model run on a balanced dataset produces the significant positive effect of treatment.

Table 6.5: Baseline results - The effect of the Basel III on CB issuers balance sheet growth vs non-issuers of CBs

The table reports the estimations results of the effect of the Basel III introduction on asset growth of banks. Standard errors are clustered at the bank level. The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

	Asset Growth	
	<i>Raw sample</i>	<i>Matched sample</i>
$CB\_issuer_i \times After_t$	-2.35* (1.31)	4.61** (2.31)
Depository funding / Assets	0.07*** (0.01)	-0.51*** (0.17)
Bank fixed effects	YES	YES
Time fixed effects	YES	YES
Observations	1,105	170
R <sup>2</sup>	0.02	0.07
Adjusted R <sup>2</sup>	0.02	0
F Statistic	11.26*** (df = 2; 1103)	5.23*** (df = 2; 130)

The share of depository funding is a significant determinant of assets growth for estimations on both datasets. On the unmatched sample, more reliance on depository funding results in higher asset growth. The matched dataset indicates the opposite relationship between banks' assets growth and usage of deposits as a funding source. Due to sample difference and limited industry coverage, it is hard to say which results are closer to the true relationship. The theoretical argument suggests

that wholesale funding (which is typically market-based) is easier (i.e., faster) to establish relative to expanding the depositors' base. So, lower reliance on depositary funding usually leads to higher reliance on wholesale funding, which is easier to expand. If this argument is correct, the estimation results on the matched dataset are in line with the banking literature.

It is worth noting that the matched control group demonstrates a drop in assets growth during 2016 relative to 2012, while the unmatched control group experiences increased growth rates during the same period. The period studied is subject to serious regulatory adjustments and increased regulatory burden for larger financial institutions. It is logical to expect slowed growth rates, which is in line with the matched dataset.

## **6.7 Limitations of analyses and validity of results**

A weakness of our analysis is that, due to the severe consequences of the global financial crises and the subsequent government interventions, it is impossible to check whether the PTA holds. The correctly performed matching procedure can produce an unbiased estimation in the case of a correctly specified model. While the performed analysis addresses these problems as far as possible, given the data availability and sample size, the validity of the conclusions is subject to further investigation.

One of the major concerns with DID estimations is that the post-treatment differences may be partially driven by various asymmetric effects of the control and treatment groups arising from common trends rather than from the treatment itself. In line with Banerjee and Mio (2017), we are aware that our results may be partially driven by the common trends affecting financial institutions in different ways. One potential concern is the European Central Bank (ECB) macroprudential policy in general and its quantitative easing in particular.

The quantitative easing implementation mechanism is the ECB asset purchase program (APP), which was gradually implemented from 2012 and was in place as of 2018. The ECB inflation target is managed via the purchasing of assets (ECB

APP) that may have different effects on different types of banks. One of the aspects of APP is the CB purchasing program (CBPP), which started in June 2009 and was gradually extended until 2017 (CBPP1, CBPP2, CBPP3). In contrast to Banerjee and Mio (2017), the fact that APP affected the CB issuers more than other banks strengthens our conclusion of the presence of preferential treatment of CB issuers by European regulatory and supervisory agents. The *CBs easy-living* argument still holds in that case.

It is an empirical quest to determine whether Basel III imposes structural imbalances in the competition by introducing discretion in the treatment of similar financial institutions. The subsidies built into a regulatory regime is not necessarily an undesirable outcome. The regulator may subsidize more prudent practices, but the question remains whether the usage of CBs over traditional securitization is a more prudent practice.

## 6.8 Conclusion

In this essay, we have investigated the Basel III regulatory adjustments of CB issuers versus non-issuers. We performed difference-in-difference estimations of the balance sheet growth rates after the Basel III implementation. In order to address the inherited bias between CB issuers and the population of European banks, we used a genetic matching procedure to balance pre-treatment characteristics of CB issuers and a non-CB control group.

Our results support the *CBs easy-living* hypothesis: CB issuers demonstrate a higher asset growth compared to the control group of non-issuers. This exercise shows that, on average, the CB issuers seem to outperform similar non-issuing banks. These results support the recent policy concerns regarding the preferential treatment of CB issuers due to the established favorable regulatory framework. Our findings contribute to the discussion regarding the potentially asymmetric regulatory treatment of CB issuers by Basel III. This imbalance may result in potential spillovers from providing favorable conditions towards secure funding.

In conclusion, the current preferential treatment of CB funding strategy has started to raise political and academic concerns regarding the unintended consequences of excessive reliance on secured funding. The heightened exposure to house prices on an upward trend may introduce the backward-looking bias, when the players do not consider the trend change and overestimate the future growth of residential property prices. Once the trend reverts, the falling value of underlying assets forces banks to supplement the deteriorated assets with high-quality mortgages or cash. The non-encumbered assets start to deteriorate faster given the supplementing of the residual high-quality assets with deteriorated in quality and non-eligible loans from CP. The growing interconnectedness due to cross-holdings of CBs is another potential concern that should be further investigated.

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## **Chapter 7**

# **Essay B: Covered bonds funding usage: Evidence from asset encumbrance of European banks**

NATALIA KOSTITCYNA

## 7.1 Introduction

Since the end of the 1980s, secured debt has been perceived in light of the following statement by Tirole (2006, p. 169): "Only weak borrowers pledge collateral." While this may be the case for consumer lending, banks use short-term secured debt, such as a repurchase agreement (REPO), for asset and liability management purposes. REPOs are typically backed up by high-quality debt instruments. The conduits and structured investment vehicles, such as residential mortgage-backed securities (RMBS), are also a type of instrument that is defined as "debt-on-debt" in line with the REPO. The "debt-on-debt" instruments are information insensitive. This means that they are backed up by debt (i.e., government, corporate, or consumer debt) and an investor should not have to perform due diligence in order to use it for funds management (Dang et al., 2015). The applicability of RMBS for funds management justifies the widespread use of these instruments in the wake of the global financial crisis.

Exposure to toxic assets backed up by subprime mortgages is widely recognized as a major build-up mechanism of the global financial crisis of 2007-09 (see Hellwig (2009) and Thakor (2015) among others). From a regulatory point of view, covered bonds (CBs) are a favorable alternative form of secured bank funding to an RMBS. CBs are qualified by the Basel III accord as a high-quality liquid asset and enjoy a preferential 15 % haircut relative to the 25 % haircut for similar RMBS. When issuing CBs, there is a segregation of mortgages in a ring-fenced bankruptcy remote covered pool (CP) with recourse to the issuer's balance sheet. When buying CBs, investors are immune to bail-in write downs and enjoy the regulatory and voluntarily imposed over-collateralization of the CPs.

By issuing CBs, a bank makes an obligation to maintain the quality of the CP and to replenish assets of deteriorated quality. Hence, the attributes of CBs make them a highly rated secured funding instrument, but at the same time banks' growing reliance on CBs as an important funding vehicle is starting to raise concerns. It has implications for financial system stability. In a European Banking Authority (EBA) report on asset encumbrance in 2017, CBs were highlighted as the major source of asset collateralization. The report raised a concern about the scarcity of

collaterals during a potential decline in property prices. It noted that, as of December 2016, the weighted average ratio of asset encumbrance in European banks was 26.6 %. Because banks have committed themselves to maintaining the quality of their CPs, there could be a deficiency of assets eligible for REPO deal instruments.

Secured funding offers a wider range of funding opportunities than unsecured funding. However, excessive reliance on secured funding could make the bank vulnerable. The reason is that there could be restricted access to unsecured funding stemming from high levels of asset encumbrance and depleted quality of the assets attributed to the unsecured debt holders (Haldane, 2011). In line with REPO securities, CBs are a source of a bank's asset encumbrance, which results in a pledge of the bank's assets to the contract possessor.

This essay addresses Haldane's (2011) hypothesis about banks' propensity to increasingly resort to secured funding strategies. In order to document the effect of transition, the *asset depletion effect* is defined in line with Greenbaum and Thakor's (1987) assumption that the highest quality assets are pledged to the CP. The asset depletion effect is the difference in growth rates between assets pledged to CB holders and a bank's total assets (for a formal definition, see Section 7.4). By limiting the reliance on secured funding, the bank can diversify its funding sources and ensure access to the secured funding markets in case of distress. However, once the risk of residual assets is concentrated to depositors and junior debt holders, it introduces fragility incurred by high asset encumbrance (Haldane, 2011).

The main results support the policy concerns raised by Haldane (2011). The results indicate that banks tend to fall into excessive reliance on CBs funding. This tendency is partially mitigated by higher capital buffers. Ahnert et al. (2018) implied that a high encumbrance ratio should prevent further abuse of secured funding. The results fail to demonstrate this effect. This is potentially explained by the encumbrance levels not yet being bounded.

The rest of this essay is organized as follows. Section 7.2 presents the related literature. Sections 7.3 and 7.4 describe the data collection process and methodology respectively. Section 7.5 summarizes the data. Section 7.6 presents the results, and Section 7.7 concludes the essay.

## 7.2 Related literature

The seminal paper of Myers (1977) on corporate borrowing introduced the "underinvestment problem". The core mechanism behind underinvestment is the conflict between debt and equity holders, which results in the foregoing of positive net present value projects. The underinvestment problem is related to the classic principle that every profitable opportunity should be realized. As highlighted by Jensen and Meckling (1976), shareholders are prone, in the presence of risky debt, to engage in asset substitution whereby a riskier project is substituted with a less risky one. According to Stulz and Johnson (1985), both underinvestment and asset substitution problems can be alleviated by the issuance of secured debt, which, compared to risky debt, does not require costly debt covenants and monitoring.

Dang et al. (2015) built on the Stulz and Johnson's (1985) rationale for the existence of secured debt. The informational insensitivity of secured debt is the fundamental characteristic of collateral in the inter-bank markets. In Dang et al.'s (2015) terms, "debt-on-debt" is the least informational-sensitive funding instrument. It allows banks to perform asset and liability management without incurring costs of due diligence. Additionally, the access to different funding markets provides a hedge against disturbances in one of the funding markets by substitution of funding sources (Chan-Lau and Oura, 2016). CBs have been widely discussed as a viable instrument that allows banks to diversify their investor bases and attain easy access to market funding (cf., Buchholz et al. (2010)).

The current literature on CBs is mainly focused on evaluating them (Packer et al. (2007); Prokopczuk et al. (2013)). The implication of CBs funding on systemic financial system is covered by Ahnert et al. (2018), whose basic idea is in line with the argument of Stulz and Johnson (1985). Issuance of CBs mitigates the underinvestment problem (bank funding effect) but deludes the risky debt and depositor claims (risk concentration effect). Prudential monitoring and regulatory surcharges are desirable for balancing the contradictory effects and limiting banks' asset encumbrance and segregation. Greenbaum and Thakor (1987) have shown that higher-quality loans are segregated and securitized, while lower quality loans are funded through deposits and retained on the balance sheet.

Haldane (2011) introduced the self-fulfilling tendency of banks to utilize secured funding instruments. The issuance of CBs introduces a risk of subordination by assigning preferential claims on the pool of assets to a new secured debt holder. In a state of liquidation, the bail-in regime allows banks to write down the unsecured debt holders' claims. The immunity of CBs holders from these write downs makes CBs an attractive funding tool due to attributed assets for claim fulfillment.

Following asset segregation, banks' intensive usage of secured funding during normal times introduces a scarcity of eligible assets (available for collateral). The collateral scarcity reflects a reduced amount of eligible assets available on the banks' balance sheet for liquidity management purposes. Banks with deteriorating asset quality are more prone to liquidity shocks due to encumbered eligible assets, which otherwise would have been used to attract secured funding in the event of distress (Levels and Capel, 2012).

In line with Haldane (2011), Ahnert et al. (2018) developed a theoretical model where the bank does not internalize the social costs of servicing the guarantee. This incentivizes the bank to excessively encumber assets by choosing socially inefficient levels of a privately optimal encumbrance. In the set-up of Ahnert et al. (2018), asset encumbrance is limited by the diminishing value of CBs holders' recourse rights to the bank's residual assets. Moreover, the residual assets attributed to unsecured debt and equity holders should potentially prevent banks from embarking on excessive assets encumbrance.

Garcia-Appendini et al. (2017) confirmed that the issuance of CBs subordinates the unsecured claims and, consequently, makes them riskier. The results demonstrate the negative total effect of CB issuance on the risk profile of a bank. In line with Ahnert et al. (2018), Garcia-Appendini et al. (2017) concluded that the risk concentration effect dominates the bank funding effect.

Ahnert et al. (2018) addressed the negative externalities that are generated by CBs funding by setting up the cap on asset encumbrance, capital charges, and Pigouvian taxation. Limits on asset encumbrance are adopted by Australia and New Zealand, while Canada and the United States have ceilings on the amount of secured funding. The Pigouvian taxation in the form of inclusion of encumbrance

levels in deposit insurance premiums has existed in Europe since 2015 according to the revised Directive on Deposit Guarantee Schemes (DGSD).

This essay formulates the hypothesis that banks increasingly resort to secured funding, as advanced by Ahnert et al. (2018) and Haldane (2011). The risk assets concentration effect due to asset encumbrance heightens the incentives to finance on secured terms. It leads to the banks' self-fulfilling tendency to move further and further into secured funding. The following sections address the mechanism of increasing encumbrance by examining the relationship between the growth rate of total assets and assets pledged to the CP, namely *asset depletion effect*.

### 7.3 Data collection process

Several different data sources were used in order to analyze the effect of the CBs funding strategy. This essay relies on the harmonized transparency template, which is a form of voluntary disclosure developed by the Covered Bonds Label. The Covered Bonds Label aims to promote transparency and efficiency in the CBs market. Membership of the Covered Bonds Label is subject to an initial fee and annual subscription fees thereafter. The fees primarily contribute to the maintenance and development of reporting standards for disclosure requirements. The list of CBs issuers is collected via the Covered Bonds Label web page.<sup>1</sup>

The next stage of the data collection process was to retrieve the harmonized transparency templates for each issuer. The manual download of about 2,000 harmonized transparency templates (each on its own web page) would take an enormous amount of time and effort. Thus, I decided to develop a web crawler to automate the process. The principles of automatic information retrieval are subject to domain-specific rules, which are called the Robots Exclusion Protocol. Each web crawler should follow that protocol in order to minimize the number of queries to the bank's domain server. The web crawler should also maintain cookies in order to comply with the acceptable use privacy policy. For example, most reports

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<sup>1</sup> see <https://www.coveredbondlabel.com/>

are accessible only after the confirmation of the user's jurisdiction for regulatory reasons.

Since the scope of this essay is restricted to European issuers and the retrieval of information took place in Europe, no regulatory violations were committed. The web crawler was designed according to current best practices in the information retrieval literature and was realized via the R software environment for statistical computing and graphics (R Core Team, 2018).<sup>2</sup> It should be noted here that the data download process of approximately 2,000 files took more than 24 hours even when using the web crawler, so it would not have been feasible to perform the retrieval manually.

Most of the collected files are in the Microsoft Excel Open XML format spreadsheets. The velocity of semi-structured XML files can be improved by the information retrieval tools, which are also available via the R environment. For the purpose of this study, the following variables were targeted: issuer name, URL, reporting date, currency of the report, assets attributed to CP, outstanding CBs, and so on.

The collection process conducted in this research is one of the first attempts to utilize the disclosed information for an academic study. Thus, one objective was to collect and organize these data for further research purposes. However, currently available reports present a number of issues when it comes to automatic data analysis. For instance, with respect to currency, the standardization of report filings should be unified and in line with the official ISO 4217:2015 guidelines.<sup>3</sup> Currently, the European issuers fill in the currency field as follows: "EUR" (preferred according to ISO 4217:2015), "EURO", "EUROS", "EURO CURRENCY", and use a wide range of letter cases. Even after correcting for letter cases, only two-thirds of the Eurozone issuers provide the currency nomenclature according to ISO 4217.

In terms of encoding, the harmonized transparency template is available only in English and should be filled out in English according to the Covered Bonds Label. However, some issuers fill in the name of the jurisdiction in their native language and with usage of non-Latin letters (some issuers do not fill in the field at all). There

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<sup>2</sup> See the latest version available at <https://www.r-project.org/>

<sup>3</sup> Further information is available at <https://www.iso.org/>

are cases when the local currency has been entered instead of the country. Such discrepancies in the way the templates are filled in are difficult to track down and correct, especially if the same issuer discloses several templates for different CPs. The adoption of ISO 3166-1 alpha-3 codes (or any other standardized nomenclature of countries) for country abbreviation would significantly increase the efficiency of data processing. Another serious issue is date format. The dates are reported in more than 20 different variations, including month names in various abbreviations. The conclusion here is that all the specified discrepancies limit the automated data processing, which leads to potential data exclusion. This results in a smaller data set overall.

In my view, unification according to current international standards should be introduced to facilitate more predictable, efficient and transparent data processing. This would facilitate reliable academic studies that lead to more robust conclusions. Such standards should also be promoted among the issuers who submit their reports.

In total, the processing of templates was made via more than 500 coding strings. The processing time for the fully automatic information retrieval from 1,500 files took more than 24 hours.<sup>4</sup> A further complication of the analysis arose from the removal of historical reports from the issuers' web pages. For scholars interested in studying CBs, it is important to maintain their own records of the reports. A cleaned version of the dataset presented in this study is available on request.

Although the harmonized transparency template disclosures are based on registered CPs, they must be aggregated at bank group level. This study utilized the SNL database as a primary source of balance sheet information and parent company retrieval. The CBs dataset was aggregated to the bank entity level with a preliminary local currency conversion to EUR by the European Central Bank (ECB) rates at the reporting date. The SNL key was attributed to each CB issuer based on the domain of the issuer's web page. If the issuer was a subsidiary of another bank, further aggregation of the data was performed accordingly.

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<sup>4</sup> The proposed data collection and processing algorithm is available from the corresponding author upon request.



## 7.4 Methodology

In order to study the asset depletion effect of a bank's CBs funding strategy, this essay utilizes the balance sheet disclosures to show the evolution of bank assets encumbrance and secured financing. Secured funding requires the covered assets to be pledged to secured debt holders. In case of insolvency, banks that rely extensively on secured funding clearly have fewer assets available for depositors and unsecured debt holders. The eligibility and quality of retained assets attributed to junior stakeholders (referred to as qualitative asset deterioration) cannot be studied due to limited information disclosure. However, the portion of assets attributed to the holders of CBs (referred to as quantitative asset depletion) is available via the data collection process outlined in the previous section.

Quantitative asset depletion is in place when the growth rate of the CP, attributed to the holders of CBs, is higher than the bank's asset growth. Therefore, asset depletion takes place when a bank funds its ongoing operations via CBs without a similar growth in total assets. This effect may be observed in various scenarios. For instance, a bank may pledge additional assets to the CP due to regulatory requirements to maintain the quality of the CP, and, hence, it substitutes the deteriorated assets with higher-quality assets (i.e., CP replenishment). An asset depletion may instead be a result of a substitution of unsecured with secured funding. A bank could turn to secured funding due to absence of liquidity in the unsecured market because of a liquidity crisis (systemic) or a rating downgrade (idiosyncratic). Finally, an increased demand for secured funding may be a result of supply side effects, such as reduced market rates in the secured funding market. In essence, up to certain limits, asset depletion as defined here is not necessarily evidence of bank fragility. It may just be a result of strategic diversification of bank funding sources.

Zooming in on the determinants of the evolving reliance of banks on CBs, there are essentially three states of asset depletion: stagnated (State 2), which is when the growth rate in CP is similar to the growth rate in total assets; asset depletion (State 3), which is when the growth rate of the CP is higher than the growth rate in total assets; and reverse asset depletion (State 1), which is when the growth rate of

the CP is lower than the growth rate in total assets. This is formalized in equation 7.1.

### 7.1: Definition of asset depletion states

The equation specifies the definition of asset depletion states in numerical order: 1 - reverse asset depletion, 2 - stagnated asset depletion, 3 - asset depletion. The parameter  $\alpha$  reflects the sensitivity cut of point of states definition. For the purpose of the study  $\alpha$  is the mean of the first (25%) and the third (75%) quantile of the bootstrapped empirical distribution for asset depletion.

$$State_{it} \theta = \begin{cases} 1, & \text{if } \left( \frac{CP_{it} - CP_{it-1}}{CP_{it-1}} - \frac{TA_{it} - TA_{it-1}}{TA_{it-1}} \right) < -\alpha, \\ 2, & \text{if } \left| \frac{CP_{it} - CP_{it-1}}{CP_{it-1}} - \frac{TA_{it} - TA_{it-1}}{TA_{it-1}} \right| \leq \alpha, \\ 3, & \text{if } \left( \frac{CP_{it} - CP_{it-1}}{CP_{it-1}} - \frac{TA_{it} - TA_{it-1}}{TA_{it-1}} \right) > \alpha. \end{cases} \quad (7.1)$$

This representation of asset depletion is made for tractability of the results and to discard any minor deviations from the main results. It was assumed that the future states depend only on the current states and the determinants of transition, which I will discuss next.

## 7.5 Data description and stylized facts

This essay utilizes the SNL database as a primary source of balance sheet information and parent company retrieval. The CBs data was aggregated to the bank entity level with preliminary local currency conversion to EUR by the ECB rates at the reporting date. If the issuer was a subsidiary of another bank, further aggregation of data was performed accordingly.

The availability of balance sheet disclosure for European banks is limited in SNL. Consequently, there were two restrictions on the analysis: a small observation number, and limited balance sheet information about issuers. The entities with fewer than three consecutive periods of data available were dropped. This further

limited the sample size. In total, the data collection process yielded 290 data points for 39 CB issuers during the period from March 2016 to September 2018.

Definitions of key variables and summary statistics are presented in Table 7.1. Asset depletion was defined according to formula 7.1. Asset encumbrance is the portion of total assets attributed to CBs holders:  $CP_{it}/TA_{it}$ . The CP and outstanding CBs were converted from the reported currency into EUR using the ECB conversion rate for the reporting date.

Table 7.1: Summary statistic

The table reports summary statistics for the variables of interest. Over-collateralization is constructed as the amount of assets pledged to the CP net of outstanding CBs and scaled by outstanding CBs. Asset encumbrance is the amount of assets pledged to the CP scaled by total assets. The quarterly observations are from March 2016 to September 2018 for 39 European banks.

	Abbr.	Mean	St. Dev.	Min	Pct(25)	Pct(75)	Max
<i>Panel A: SNL data</i>							
Total Assets, bn EUR	TA	331	474	6	51	378	2,234
Core capital, %	CET1	17.30	6.08	7	13.0	19.8	40
Total Capital, %	TC	19.89	7.75	8.07	14.41	22.44	51.63
Leverage ratio, %	LR	6.56	1.81	3.46	4.97	8.07	10.87
Deposits over TA, %	D.TA	50.31	17.00	4.62	37.02	64.14	84.79
<i>Panel B: Harmonized Transparency Templates Data</i>							
Covered bonds outstanding, bn EUR	CB	24.85	28.79	1.23	4.78	32.18	154.42
Covered pool, bn EUR	CP	36.97	35	1.73	8.3	54.04	164.26
Mortgages pledged to CP, bn EUR	CP_m	35.45	33.61	1.73	8.14	54.04	154.42
<i>Panel C: Author's calculations</i>							
Over-collateralisation of CP, %	OC	77.37	103.30	3.45	18.58	78.78	612.96
Asset encumbrance, %	AE	24.25	19.04	1.11	8.57	35.84	86.06
Asset deterioration, %	AD	.60	9.08	-91.16	-1.53	1.63	70.35
Number of observations	N			290			

The categorical variable of asset depletion reflects a significant deviation in the growth rate of assets attributed to CBs holders in the CP and the growth rate of total assets. This procedure yields the three states outlined above: *reverse asset depletion* (State 1), *stagnated asset depletion* (State 2), and *asset depletion* (State 3). The transition matrix for the states is presented in Table 7.2.

Table 7.2: Transition matrix of Asset depletion states

The table reports the transition matrix of our three states. The rows ( $i \in \{1, 3\}$ ) indicate the *States* of time  $t$ , and related the columns ( $j \in \{1, 3\}$ ) are the *States* of time  $t + 1$ , the number in the cell for  $State_{i,j}$  is the number of observed transitions from  $State_i$  to  $State_j$ . The table should be interpreted as follows: the number of observations when the reverse asset depletion quarter transits to the subsequent period of the stagnated asset depletion -  $State_{1,2}$ , is **21**. The numbers of observations when the states do not change and are maintained for at least two quarters -  $State_{i,j|i=j}$ , are **16 obs.** for  $State_{1,1}$ , **109 obs.** for  $State_{2,2}$ , and **16 obs.** for  $State_{3,3}$ .

State names		→ State 1	→ State 2	→ State 3
Reverse asset depletion	<i>State1</i> →	16	21	15
Stagnated asset depletion	<i>State2</i> →	17	109	20
Asset depletion	<i>State3</i> →	17	20	16

The sample for this essay consists of banks issuing CBs, while excluding mortgage brokers and other non-bank installments. The sample is an unbalanced panel dataset with at least three subsequent observations available. The estimated raw mean of asset encumbrance shows that on average a quarter of all CB issuers' assets are attributed to CB holders. On average, the CP exceeds the CBs outstanding amount by 77 %.

## 7.6 Empirical analysis and discussion

This essay studies the determinants of asset deterioration. The asset deterioration effect takes place when the growth rate of assets pledged to the CP and subsequently attributed to the CBs holders at the time of default exceeds the growth rate of a bank's total assets. The benchmark model specifies the fixed effects model of the asset deterioration effect. The specification shows how the previous state contributes to subsequent states. The results of the estimations are presented in Table 7.3.

The results in Table 7.3 suffer from several standard problems, including limited historical data, due to the recent introduction of the harmonized transparency tem-

Table 7.3: Main Results

The table reports the results of the fixed effect regression. The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

	<i>Dependent variable:</i>					
	Asset deterioration					
	(1)	(2)	(3)	(4)	(5)	(6)
$lag(State_{it}\theta)$	8.318*** (.783)	.122*** (.034)	.121*** (.035)	.128*** (.035)	.135*** (.035)	.156*** (.032)
$dAE_{it}/dt$		.984*** (.002)	.989*** (.002)	.989*** (.002)	.989*** (.002)	.989*** (.002)
$lag(dTA_{it}/dt)$			.005 (.006)	.039** (.016)	.043** (.017)	.040*** (.015)
$dCET1_{it}/dt$					.007 (.005)	
$dLR_{it}/dt$						.022*** (.005)
$lag(State_{it}\theta) : lag(dTA_{it}/dt)$				-.018** (.008)	-.020** (.008)	-.016** (.007)
$lag(State_{it}\theta) : dCET1_{it}/dt$					-.005 (.004)	
$lag(State_{it}\theta) : dLR_{it}/dt$						-.017*** (.003)
Observations	290	290	235	235	235	235
R <sup>2</sup>	.320	.999	.999	.999	.999	.999
Adjusted R <sup>2</sup>	.181	.999	.999	.999	.999	.999
F Statistic p value	***	***	***	***	***	***
F Statistic df	(df = 1; 240)	(df = 2; 239)	(df = 3; 184)	(df = 4; 183)	(df = 6; 181)	(df = 6; 181)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	Yes	Yes	Yes	Yes

plates. Accordingly, the results should be interpreted with care. Nevertheless, the results demonstrate the intuitive logic introduced by Haldane (2011). When asset deterioration increases significantly, there is an increased probability of a continuing trend of asset deterioration in future. Contrary to the predictions of Ahnert et al. (2018), the higher asset encumbrance of banks' assets does not restrain banks from further increasing their usage of secured funding. Thus, when banks start relying on CBs, they continue to expand their reliance on CBs funding. The effect becomes more pronounced when the asset encumbrance increases. The extent to which this effect remains as further data becomes available is open to debate, but regulators and investors ought to monitor the developments closely.

Table 7.4: Supplementary Results

The table reports the results of the fixed effect regression. The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

	<i>Dependent variable:</i>					
	Asset deterioration					
	(1)	(2)	(3)	(4)	(5)	(6)
$lag(State_{it}2)$	7.009*** (1.361)	.169*** (.051)	.161*** (.053)	.157*** (.052)	.159*** (.052)	.153*** (.046)
$lag(State_{it}3)$	16.645*** (1.565)	.239*** (.068)	.239*** (.070)	.223*** (.070)	.243*** (.071)	.296*** (.063)
$dAE_{it}/dt$		.984*** (.002)	.990*** (.002)	.990*** (.002)	.990*** (.002)	.989*** (.002)
$lag(dTA_{it}/dt)$			.005 (.006)	.033*** (.010)	.034*** (.010)	.037*** (.009)
$dCET1_{it}/dt$					.001 (.003)	
$dLR_{it}/dt$						.003 (.002)
$lag(State_{it}2) : lag(dTA_{it}/dt)$				-.043*** (.013)	-.044*** (.013)	-.045*** (.011)
$lag(State_{it}3) : lag(dTA_{it}/dt)$				-.031** (.016)	-.036** (.016)	-.029** (.014)
$lag(State_{it}2) : dCET1_{it}/dt$					.001 (.006)	
$lag(State_{it}3) : dCET1_{it}/dt$					-.013* (.008)	
$lag(State_{it}2) : dLR_{it}/dt$						-.006 (.006)
$lag(State_{it}3) : dLR_{it}/dt$						-.039*** (.006)
Observations	290	290	235	235	235	235
R <sup>2</sup>	.324	.999	.999	.999	.999	.999
Adjusted R <sup>2</sup>	.182	.999	.999	.999	.999	.999
F Statistic p value	***	***	***	***	***	***
F Statistic df	(df = 2; 239)	(df = 3; 238)	(df = 4; 183)	(df = 6; 181)	(df = 9; 178)	(df = 9; 178)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	No	Yes	Yes	Yes	Yes	Yes

Referring to Table ??, where instead of  $lag(State_{it}\theta)$  the dummy for each state is introduced, it would seem as if the potential reverse effect of asset growth appears only when the secured funding capacity is drained and banks have to turn to alternative funding sources. However, these alternatives might be even less sustain-

able and would most likely come at a sizeable cost, such as short-term wholesale funding.

The separation of states in Table 7.4 indicates that it is difficult for a bank to get out of the asset deterioration state once it has entered into this state. However, an alternative explanation might be that the bank does not hurry to normalize the activity and continues to segregate assets by pledging them to the CP in order to fund asset growth. Again, it does not necessarily imply that banks are fragile, but given the pronounced role of total asset encumbrance it may support the EBA concern about banks' asset encumbrance.

Another implication of the analysis is that the banks' leverage and capital are somewhat binding for their "over-usage" of CBs funding. Once a bank is in the third state, both capital and leverage have negative coefficients (see Table 7.4). This may be interpreted, in line with Ahnert et al. (2018), as capital regulation being a way to restrict asset encumbrance.

## 7.7 Conclusion

Banks that are currently exhibiting CBs-based growth are expected to continue on this path, especially at higher rates of asset encumbrance. This result supports the rhetoric on "worrying" asset encumbrance levels by the EBA and underlines the urgent need for further studies in this field. Ahnert et al. (2018) proposed the limits on asset encumbrance as an ex ante arrangement, while the Pigouvian tax is the socially optimal ex post policy remedy. Without prejudice to the results of Ahnert et al. (2018), if the effect of *increasingly resorting to secured funding* is in place, the ex ante policy of limiting the asset encumbrance levels leads to the bank being bounded by legal limits. The effective ex post Pigouvian tax might exaggerate the fragility of an over-encumbered bank. Given that the marginal incentives to encumber assets are increasing the usage of secured finding, ex ante progressive taxation potentially addresses the marginal increase in incentives to continue to use secured funding. The results of my study indicate that the strengthened capital requirements

introduced by the Basel III accord potentially addresses the encumbrance problem by lowering the speed of asset deterioration.

The analysis presented in this essay underlines several important topics. Despite the recent market initiatives from the Covered Bonds Label Foundation and the European Covered Bonds Council, the public monitoring of CBs is a challenging technical task. Manual data collection is not feasible and the availability of data collection processes is crucial for timely empirical financial studies.

Automatic collection and data processing can be significantly improved by the introduction of a standardization of the procedure for filling in the harmonized transparency templates. The consistency of the retrieved data could also be improved by making amendments to Article 129(7) of the Capital Requirements Regulation or the Covered Bonds Label eligibility criteria, which may clarify the requirements to disclose historical reports for at least  $N$  previous periods.

Moreover, automation in this regard should in future be favored and facilitated by Covered Bonds Label restrictions on automated data collection, such as by removing cookies requirement and requests limitations. This will help to advance the transparency of financial studies and better validate the results, with benefits for academic research and society as a whole.



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## **Chapter 8**

# **Essay C: The role of distance and securitization decisions of the Swedish savings banks**

NATALIA KOSTITCYNA

## 8.1 Introduction

The fundamental role of securitization in the recent financial crises underlines the importance of banks' lending behavior (see Gorton (2009) and Thakor (2015)). Once a cornerstone of risk management, securitization became a scapegoat (Caprio et al., 2010). Although ten years have now passed since the global financial crisis, the true roots of the crisis remain a mystery. The academic debate is ongoing about whether the nature of the crisis was insolvency (Thakor, 2018) or liquidity risk, as suggested in the seminal paper by Brunnermeier (2009). The former argument implies that the inefficient incentives scheme led to loosened underwriting standards and worsened due diligence. The latter assessment argues that system design which serves the securitization process is liable to exacerbate shocks. If the former argument is true, then we should primarily address the securitization process; if the latter argument is true, then the system design should be addressed.

This essay strives to contribute to the literature that aims to understand the driving factors behind banks' decisions to securitize. In particular, this study examines the effect of competition on the lending decisions of local savings banks. I analyze a unique dataset consisting of internal transfers between Swedish savings banks (SSBs) and their inter-organizational collaboration partner Swedbank to investigate whether the presence of large commercial bank branches changes the behavior of the SSBs. The SSBs and Swedbank function under a collaborative non-competing agreement whereby the SSBs hold equity in Swedbank and Swedbank provides various services for the SSBs, including IT business solutions and support, and legal and compliance services. Therefore, Swedbank can be said to play the role of a quasi-central bank for the SSBs.

The literature commonly views the relationship between competition and lending supply through the lens of banks' incentives to engage in relationship-based versus transaction-based lending (Rajan, 1992). However, the current literature is ambiguous as to what type of lending is actually preferred under competition. For example, Degryse and Ongena (2007) found that relationship-based lending tends to become more important when competition increases. This result stands in contrast to the common view advanced by Petersen and Rajan (1995) that the presence

of competing banks keeps local banks from investing in relationship-based lending due to sunk costs for opaque borrower quality audits and low switching costs.

The process of securitization in the SSBs functions as a means to move from on-balance sheet relationship-based lending to off-balance sheet transaction-based lending by transferring loans to Swedbank. This essay studies whether the decision of an SSB to securitize a loan (i.e., by transferring it to Swedbank) is subject to the level of competition on the local market and the informational asymmetry between Swedbank and SSBs. The Swedish banking industry is dominated by four large commercial banks and a cooperative bank: Swedbank, Handelbanken (SHB), Nordea, SEB, and Länsförsäkringar. Excluding Swedbank, the other four banks are the major local competitors of SSBs. The framework of this study is designed to estimate the decisions of SSBs, given the branch presence of a competing commercial bank (i.e., SHB, SEB, Nordea, or Länsförsäkringar), to securitize a loan contract by transferring it to Swedbank.

Based on data from the Swedish Banking Association, we can observe a persistent trend of branch closures among the Swedish banks. This trend is particularly pronounced in Nordea, which during the period from 2010 to 2016 closed 167 branches, and Swedbank, which during the same period closed 92 branches. The branch network of SSBs shrunk from 258 branches to 219 over the same period. This trend is expected to continue, partially because of digitization and ongoing consolidation in the banking industry.

This study's results show that the competition between large commercial banks and small rural savings banks in Sweden neither produce the common effect of less relationship lending in line with Petersen and Rajan (1995), nor greater relationship lending in the spirit of Degryse and Ongena (2007). The effect of a commercial bank's presence within the geographical reach of the local SSB depends on the competing strategy of the commercial bank and depending on that may have positive or negative sign.

The rest of the essay is organized as follows. Section 8.2 provides a brief literature review on the topic of interest. Section 8.3 presents the study's data source and methodology. Section 8.4 reports the baseline regression statistics, and Section 8.5 concludes the study and provides an interpretation of the results.

## 8.2 Literature review

The interaction between relationship-based lending's feasibility as a lending technology and the market power of banks has been studied in relation to small opaque businesses with restricted access to financial markets (Petersen and Rajan, 1995). Small regional banks survive competition with large commercial banks by building up relationships with customers. This is done by setting loan conditions based on a combination of hard information in terms of financial indicators and collateral values, and soft information about borrowers produced over time. The processing of soft information incurs costs for the bank. Thus, relationship-based lending is more costly for a bank than a transaction-based loan (Boot and Thakor, 2000).

The relationship and transaction loans are priced differently. One view is that relationship lending is valuable because, when length of relationships increases, a borrower pays less interest and is less likely to pledge collateral (Berger and Udell, 1995). The other view offers a different rationale for the existence of relationship lending. The transactional loans are cheaper during normal times, but, in the event of a crisis, the relationship loans are more likely to be renewed and they experience a lower rise in interest rates. Bolton et al. (2016) have presented a model in which only opaque borrowers choose to pay a higher intermediation spread in normal times in order to get continuation lending in a crisis. Sette and Gobbi (2015) found that credit growth by relationship lenders is 4.6 % higher, and that in a crisis the increase in the cost of credit by relationship lenders is 50 basis points lower than that by transactional lenders.

The rationale for why small banks enter into relationship-based lending was discussed by Nakamura (1994). He argued that a mouse bank (i.e., a small bank) is better than a large bank at maintaining close relationships and monitoring opaque borrowers. Moreover, Hakenes et al. (2015) noted that the presence of the mouse bank supports regional development and alleviates credit rationing of small opaque borrowers. The constraints of limited geographical reach and concentration risks may be eliminated by various multi-bank pooling arrangements (Gintschel and Hackethal, 2004). In this study, the pooling arrangement established by the SSBs

is presented in the form of collaboration with one of the largest commercial banks in Sweden. In this arrangement, Swedbank buys loans from the SSBs.

The borrower-lender proximity discussion was begun with the seminal paper by Petersen and Rajan (1994). Their paper addressed the issues of banks' market structure and credit contractions. The most recent study of borrow-lender proximity has been that of Beck et al. (2019). They found that, despite considerable technology development in lending, the distance between the borrower and the lender still functions as a significant determinant of the probability of the bank engaging in relationship lending. DeYoung et al. (2008) discussed the controversy behind credit scoring and other technology development, as well as the role of geographical proximity as a determinant of relationship lending.

Increased competition may either reduce or increase a banks' relationship lending. As Petersen and Rajan (1995) argued, increased competition may shrink profit margins and, thus, shift the banks' preferences towards transaction-based lending. Boot and Thakor (2000) proposed that higher levels of competition may instead encourage banks to become more client-oriented by introducing product differentiation and entering into closer customer relationships.

Studies on market structure and asset segregation are still limited. Salop (1979) developed a model in which the degree of competition is determined by geographical proximity when the borrower faces transportation costs. Degryse and Ongena (2007) utilized the model developed by Salop (1979) to study bank branch orientation in the choice between relationship-based and transaction-based lending. They found that high-level local competition leads to a higher probability of the bank engaging in relationship-based lending, in line with the argument of Boot and Thakor (2000). Recently, De Haas et al. (2018) found that local bank competition can impede the formation of long-term lending relationships with firms.

This essay addresses the decision of local SSBs to segregate and transfer part of their loans to Swedbank. Accordingly, this study combines insights from literature related to the local market structure as well as literature related to risk management in banks. In line with Freixas and Rochet (2008), a bank may use securitization to execute its asset and liability management. Additionally, by transferring parts of its loan portfolio, the small local bank can alleviate the credit contraction problems

that might result from regulatory capital or liquidity shortages (Bernanke et al. (1991); Stanton (1998)).

Depending on the level and type of local competition, the mouse bank can utilize various pooling arrangements in order to protect its local market. The determinants of the chosen strategy are based on the degree of information asymmetry that the competing commercial bank faces (Bofondi and Gobbi, 2003). Once the large commercial bank enters an area, the bank acquires local knowledge. Technological development has led many commercial banks to start downsizing in order to optimize the branch network by closing "brick-and-mortar" branches. The data on pooling arrangements between Swedbank and SSBs is an interesting setting to examine whether or not the geographical proximity affects the assets segregation given the exit of a competing commercial bank from the local market.

The effect of commercial bank proximity is subject to the business model employed by the commercial bank. Zineldin (1996) described the Swedish banks' business models as they were in 1993. Back then, Nordbanken (NB - now Nordea) was the main competitor to the SSBs when it came to savings, particularly in the form of salary deposits. More recently, Handelsbanken (SHB) has become a major competitor of the SSBs. Larsen et al. (2014) found that the business models and the strategic priorities of SHB and the local SSBs are almost identical.

### **8.3 Methodology and data**

This essay employs various data sources to reconstruct the geographical distribution of Swedish banks' branches over the studied period. The initial data came from the Google API Places service, which allows the *Place.ID* of every entity tagged with *bank* type to be retrieved. This information was further used to estimate distances between bank branches. The recent advancement of digital services also allows it to be determined whether the operations of the local branches have been *permanently closed*. Unfortunately, there is no information about the date a branch was opened or closed. The operational status of a bank branch is given as the moment of information retrieval. The operational status of each bank branch in



a given year is derived from banks' branch closure dates provided by the Swedish Bankers' Association. The dataset covers 53 SSBs from 2010 to 2015. Balance sheet data of these banks were provided by Sparbankernas Riksförbund.

The geographical proximity of a commercial bank affects the following lending choices of the relatively small local SSBs: (a) whether to set up loan terms based on soft information, which is more costly to collect and process, or only on hard information; (b) whether to compete with the commercial bank and try to maintain the SSB's niche by offering competing loan terms, or to specialize in lending to customers that are not of interest to the commercial bank; (c) whether to transfer part of the loans to Swedbank and use excess liquidity to meet lending demand, or to keep the loans on the balance sheet until maturity.

The main hypothesis of the study is the following. The presence of a competing commercial bank within the geographical reach of a local SSB affects the SSB's decision whether to transfer its loans to Swedbank (i.e., to securitize) or not. By definition, the loans sold to Swedbank are transactional. The lending policy of the SSB's competitors may ambiguously affect its lending portfolio composition. For instance, SHB is considered to be the SSBs' main competitor for commercial loans. This fact is indirectly shown by the lowest average distance (see Table 8.1) between SHB and SSBs. Nordea and SEB exhibit predatory behavior for mortgage (i.e., consumer) lending. As a community bank of a relatively smaller size than the commercial banks, Länsförsäkringar is considered to be the most friendly neighbor of the SSBs. Swedbank does not compete with SSBs under their agreement.

Following the methodology of Degryse and Ongena (2007), the *Closeness of Competitor* for the proximity measure was transformed as  $(1 + \text{distance\_to\_bank})^{-1}$ . This transformation implies the weakening effect of distance between the branches of the SSBs and the commercial banks. In the case of close distance (i.e., the distance is close to zero), the ratio is 1. In order to control for potential informational asymmetry between SSBs and Swedbank as a constraint on securitization of loans, I employed *Remoteness of Swedbank* as  $(1 - \text{Closeness\_of\_Swedbank})$ . This allowed explicit interpretation of the effect of a closely located competing commercial bank (closeness = 1) given the remoteness of Swedbank (i.e., remoteness is close to 1, too). This interaction shows the marginal effect of competition when

Table 8.1: Summary statistics

Summary Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Relational lending, %	396	59	13	33	50	67	100
Commercial lending, %	396	32	13	5	24	40	67
Consumer lending, %	396	41	13	8	32	47	75
SME lending, %	396	26	9	0	20	31	51
Distance to Nordea .km	396	19	19	.04	.3	28	151
Distance to SHB .km	396	7	9	0	.1	12	34
Distance to SEB .km	396	25	24	.07	8	38	118
Distance to Länsförsäkringar .km	396	18	26	.04	.4	27	189
Distance to Swedbank .km	396	26	21	.05	15	31	151
Closeness of Nordea, %	396	29	38	1	3	78	96
Closeness of SHB, %	396	56	41	3	8	93	100
Closeness of SEB, %	396	23	34	1	3	11	94
Closeness of Länsförsäkringar, %	396	28	37	1	4	72	96
Closeness of Swedbank, %	396	7	14	1	3	6	95

Swedbank is geographically close, namely the ability of SSBs to transfer more or fewer loans due to informational asymmetry derived via Remoteness of Swedbank.

Table 8.2: Pearson correlations

The table reports the Pearson correlation for measures of closeness between commercial banks and savings banks. The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

<i>Closeness of</i>	Nordea	SHB	SEB	Länsförsäkringar	Swedbank
Nordea	1				
SHB	.48***	1			
SEB	.4***	.33***	1		
Länsförsäkringar	.6***	.37***	.42***	1	
Swedbank	.29***	0	.27***	.12**	1

The methodology exploits fixed effects models specifications (which are also known as least squares dummy variables - LSDV) to determine the distance effect

on the lending behavior of SSBs. The main variable of interest is the local SSB's relationship lending defined as the ratio of lending remaining on its balance sheet to its total amount of loans issued. The supplementary ratios of commercial, consumer and SME lending are the ratio of relating lending types to the total loans issued by the bank.

$$\text{Relational Lending}_{i,t} = \beta \text{Bank Closeness}_{i,t} \times \text{Swedbank remoteness}_{i,t} + \delta_t + \alpha_i + \varepsilon_{i,t}$$

Even though the competing strategies of commercial banks and SSBs vary, the branch distribution of all commercial banks is highly correlated due to direct competition between commercial banks. For that reason, each regression considers only the proximity of one commercial bank branch at the time. First, the probability to have, for example, an SEB branch given the presence of a Nordea branch is not zero (see Table 8.2). Second, the subject of interest is the effect of each particular commercial bank branch on the lending strategy of the particular SSB.

## 8.4 Discussion of results

The baseline results (see Table 8.3) show an ambiguous effect of a commercial bank's presence within the geographical reach of the local SSB. The closeness of an SHB branch stimulates the local SSB's relationship-based lending, whereas the presence of Nordea, SEB, and Länsförsäkringar branches force the SSB to engage in transaction-based lending. The intense competition between SHB and SSBs is in line with the findings of Degryse and Ongena (2007):: the propensity of an SSB to issue relationship lending is higher if there is the presence of an SHB branch.

The SSBs' competition with Nordea and SEB, given the proximity of these commercial banks' branches, puts pressure on the SSBs' consumer lending and forces SSBs to engage in transactional consumer lending (mostly mortgages) by transferring their loans to Swedbank in line with the arguments put forward by Petersen and Rajan (1995). The transfer of transaction-based mortgage lending

Table 8.3: Main Results

The table reports the results of the least squares distance method regression specifications described in Section 8.3. The dependent variables are ratios of specified lending at each SSB for the period from 2010 to 2016. Interaction is the independent variable, and it is defined as interaction between bank closeness and Swedbank remoteness. SHB stands for Handelsbanken, LFS for Länförsäkringar, and SWED for Swedbank. The coefficient values are heteroskedasticity consistent coefficients. The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

<i>Closeness of</i>	<i>Nordea</i>		<i>SHB</i>		<i>SEB</i>		<i>LFS</i>		<i>SWED</i>	
	$\beta$	F	$\beta$	F	$\beta$	F	$\beta$	F	$\beta$	F
<b>Relational</b>	-2.9	11.3	.6	2.87	-.21	12.68	-.22	9.59	.2	14.27
<i>p-value</i>	***	***	*	*	***	***	*	***	***	***
<i>Interaction</i>	.03		-		.001		.003		-	
<i>p-value</i>	***		-		*		***		-	
Time FE		Yes		Yes		Yes		Yes		Yes
Bank FE		Yes		Yes		No		No		No
<b>Commercial</b>	.11	50.6	.12	73.92	.12	44.81	-	-	-	-
<i>p-value</i>	***	***	***	***	***	**	-	-	-	-
Time FE		Yes		Yes		No		-		-
Bank FE		No		No		Yes		-		-
<b>Consumer</b>	-.06	13.55	-.07	22.23	-.07	4.97	-	-	-	-
<i>p-value</i>	***	***	***	***	***	**	-	-	-	-
Time FE		Yes		Yes		No		-		-
Bank FE		No		No		Yes		-		-
<b>SME</b>	-.06	25.6	-.05	25.43	-.06	22.89	-	-	-	-
<i>p-value</i>	***	***	*	***	***	***	-	-	-	-
Time FE		Yes		Yes		Yes		-		-
Bank FE		No		No		No		-		-
N		396		396		396		396		396

to Swedbank results in a lending portfolio composition of the SSBs that is biased towards commercial lending. The remoteness of Swedbank makes the loan transfer harder for SSBs, thereby positively affecting the portion of lending retained on the balance sheet of SSBs.

The following interpretation of the competition effect measured as closeness to a competing commercial bank branch might have a different explanation. Meanwhile, given the scarcity of the information disclosed, the results show that the effect of competition on relationship lending is ambiguous. The proximity of a commercial bank branch may alleviate the relationship lending as well as provoke securitization based on the business model of the competing commercial bank.

## **8.5 Concluding remarks**

The analysis shows the opposite reaction of small SSBs given the presence of branches of competing commercial banks. Despite the fact that Nordea, SHB, and SEB affect the lending portfolio of SSBs in a similar way, the treatment of loans is fundamentally different. Nordea and SEB stimulate SSBs to issue transaction-based loans and to transfer loans further to Swedbank. This result supports the view of Petersen and Rajan (1995) that the presence of a competing bank keeps the small local bank from investing in relationship-based lending. Once the local SSB performs due diligence and signals the borrower quality by setting up the loan terms, the borrower may switch to a bank that interprets a loan granted by SSBs as a positive signal and takes over the client.

Meanwhile, the proximity of a branch of SHB enforces the local SSB to originate relationship-based lending and to retain loans on the balance sheet. This finding is supported by Larsen et al. (2014), who suggested that SHB and SSBs share the same business models and strategic priorities. That likeness forces both SHB and the SSB to compete by initiating more relationship-based lending, which is in line with Degryse and Ongena (2007) and Boot and Thakor (2000). This conclusion might further prompt research on banks' incentives to issue only those loans that are intended to be kept on their balance sheet. The mechanism behind these decisions may help to better understand the reasons for the failure of securitization during the global financial crisis.

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## **Chapter 9**

# **Essay D: Time for change: The role of professional self-esteem in relation to industry support of banking reforms in Sweden**

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## 9.1 Introduction

The speed and scope of regulatory amendments have increased dramatically since the global financial crisis. Recent overviews of the regulatory landscape in banking include Barth et al. (2013) and Diamond et al. (2017). Caprio et al. (2010) provided an analogy of the endless game between the regulator and the regulatees introduced by Kane (1977) to illustrate the intrinsic source of instability of the banking industry: the regulated side moves more often and more quickly than the regulator can. Moreover, Freixas and Santomero (2003, p. 9) commented: "Not only is it natural to assume that the regulators pursue their own objective in a world where their powers are limited by the legal framework, but it is also crucial to take into account that banks will react to regulation by developing new strategies, like introducing new financial innovations." The market for regulation exists and banks may develop multiple preventive strategies in order to respond to the regulatory amendments before those amendments are ratified.

How banks address new regulations depends on the strategies they adopt. Wilson and Veuger (2017) argued that a bank may adapt to changes in the regulatory environment depending on its ability to determine what actions are expected of it. They emphasized that uncertainty surrounding regulatory behavior in settings where regulatory agents exercise significant discretion can be further exacerbated by bureaucratic complexity, changing environmental conditions, and a lack of transparency in the oversight process. Such uncertainty makes it difficult for the bank to determine how an individual agent will interpret the law at any given point in time.

The ability of bankers to interpret the regulatory intentions is of crucial importance in the current low interest environment, where the forward guidance policy is used as one of the monetary policy tools (Cœuré, 2017). The principle of forward guidance policy is based on the regulator's ability to induce and maintain the banking industry's intention to act in accordance with the regulatory commitment. For example, in most countries the regulator is committed to maintaining the refinancing interest rate at a certain level (either conditioned on certain economic outcomes, or unconditionally), or to keep the established eligibility criteria

for repurchase agreement (REPO) deals constant. Calomiris (1999) emphasized that expectation of government actions will affect banks' behavior more than will government words.

In this essay, we study how these expectations are formed and influence banks' willingness to comply with the regulatory framework. In particular, we analyze bankers' willingness to comply (in short, we term it "acceptance" or "non-resistance") as a potential determinant of anticipation, and we elaborate on how various personal characteristics may influence banks' responses to regulatory change. Regulatory acceptance means that market participants comprehend the necessity of the policies for the benefit of society. In line with Fiechter et al. (2012), this means that they do not exploit social and political mechanisms to undermine the "supervisory will and ability to act". Moreover, we assess the relationship between bankers' personality traits, such as industry experience and professional self-esteem, and their levels of acceptance of new regulations.

We employed data from a survey aimed at understanding the attitude of the Swedish banking industry towards the adoption of the Basel III accord. The survey was developed by an industry insider in 2015, and, since then, it has been circulated among industry experts on a yearly basis. The population of respondents consists of bank employees (industry insiders) involved in any kind of communication with supervisory agents (i.e., top management and risk and compliance officers). In addition, data was collected from regulators, consultants and other advisors to the banking industry (industry outsiders).

We analyzed the data in two steps. First, we described the general attitude towards the recently proposed regulatory amendments, as expressed under the umbrella term "Basel III". The survey reveals a rather blunt critique of the Basel III regulations for being overly prescriptive and comprehensive to the extent that these regulations prevent managers from pursuing the business strategy of their banks. Respondents are particularly worried about how supervisors will implement their interpretations of the regulations - a worry that has increased slightly over the years among the industry insiders. According to most of the respondents, proportionality is lacking from the proposed regulations, and the fact that most of the regulations

were designed and implemented outside Sweden makes the regulations less sensitive to institutional peculiarities.

In the second step, we analyzed the extent to which self-esteem determines the respondent's anticipation. In doing so, we assessed the relation between acquiescence and anticipated effect of regulatory changes on personality traits such as industry experience and disclosed professional self-esteem. In particular, we show that respondents who rank themselves as more literate in banking operations and regulations tend to demonstrate acquiescence to a greater extent. These respondents are also more positive towards the anticipated effects of new regulations.

Our key contribution is the analysis of professional self-esteem as a potential determinant of policy anticipations. Regulatory change is a stress factor that challenges bankers to form an understanding of (1) a matter or subject of change, (2) a process of change, and (3) implications and consequences of that change. If a person is aware of any kind of changes and is confident about his or her ability to comprehend the requirements, the adaptation to the new requirement is projected to be fast. In their study of psychological distress levels, Ormel and Schaufeli (1991) showed that two-thirds of the variance in distress could be attributed to a difference in stable symptom levels, namely, the difference in personality traits and self-esteem levels.

The Swedish set-up is interesting to consider due to recent banking industry changes, which have resulted in the exit of one of the largest banks from Swedish to European supervision by the relocation of the Nordea headquarters from Stockholm (Sweden) to Helsinki (Finland). This striking decision was motivated by Nordea's refusal to comply with higher contribution fees to the Swedish stability fund. Ironically, once bailed out as Nordbanken (i.e., the ancestor of Nordea), Nordea now found it could not justify paying higher resolution fees to the stability fund. This provides a fascinating environment to analyze the evolution of acceptance and anticipation between industry insiders and outsiders of the Swedish banking industry.

The essay is structured as follows. Section 9.2 summarizes the literature on banking changes in response to changing regulatory environment and supervisory oversight. Section 9.3 outlines the study set-up. Section 9.4 describes the data col-

lection process, and Section 9.5 describes the data and sample characteristics. Section 9.6 presents the methodology and study design. Section 9.7 provides benchmark results and discussion. Section 9.8 concludes the essay.

## 9.2 Literature review

Banks act strategically in response to anticipated regulatory actions (VanHoose (2007); Ongena et al. (2013)). Boot and Thakor (1993) derived a theoretical set-up in which the supervisor adjusts its closure strategy based on the initial market belief of the quality of supervision. In their setting, the supervisor is able to monitor the bank's true asset allocation with a probability that is determined by the actual quality of the oversight performed by the supervisor. The market interprets the bank's closure as a failure of the regulator to detect inefficient asset allocation. This set-up leads to regulatory forbearance (regulatory laxity) and stimulates low bank capitalization, which leads to higher total distortion in social welfare. Thus, banks have an *ex ante* ability to cheat and to take on more risk in the first period. Boot and Thakor's (1993) model points to the importance of anticipation for the actions and reactions of the regulator and the regulatees.

The strategies that are formed during anticipation are linked to legitimacy, which may differ depending on the underlying reason to comply (Suchman, 1995). Suchman (1995) defines three types of organizational legitimacy: pragmatic, moral, and cognitive. Pragmatic legitimacy stems from political, economic, or social interdependencies based on self-interest calculations. This could be exemplified by a bank that aims for a more relaxed supervisor and relies on over-compliance as a strategy. Moral legitimacy relies on an evaluation of whether the regulation or supervision is relevant and coherent in the bank's view. The market agreement with procedures and tools used by supervisors forms moral legitimacy. Finally, cognitive legitimacy reflects the things taken for granted without normative or critical assessment.

The extent to which these strategies lead to "bad" behavior (e.g., moral hazard) among banks is determined by the ability of the supervisor to deter socially inefficient asset allocation. The government safety net has been blamed for be-

ing one of the initial causes of the global financial crisis of 2007-09 by inducing a moral hazard incentive to banks' behavior (Allen et al., 2015). Because banks expect increased regulatory forbearance during hard times, they retain risky positions during turmoil in the hope of regulatory support (Acharya and Yorulmazer, 2007). Similarly, Aliaga-Díaz et al. (2011) set up a model for counter-cyclical capital requirements; in this model, forward-looking banks anticipate that the capital requirements will fall in bad times. Consequently, these banks hold smaller capital buffers than they would in the absence of such anticipations. This means that regulators should account for the strategic actions of banks in the anticipation phase (Allen and Gale, 2016).

In principle, well-designed regulations provide the socially optimal outcome without the possibility of moral hazard. For instance, a regulatory set-up that prevents *ex ante* the possibility of bank runs was considered by Diamond and Dybvig (1983). They demonstrated that the anticipation stemming from a bank's ability to suspend convertibility of deposits prevents a bank run by removing incentives for consumers with consumption needs in the period after the run (i.e., "Type 2 agents" or "late consumers") from participating in the run.<sup>2</sup>

However, besides the regulatory design itself, other factors may still undermine the efficiency of oversight. Wilson and Veuger (2017) addressed the tension between the regulator and the bank using geographical proximity as a proxy for informational asymmetry between regulatory expectation and the bank's interpretation of anticipating regulatory expectations. They studied the compliance costs in terms of administrative charges for advisory services and corporate governance in geographically remote locations. Distant proximity incurs administrative costs for banks. The costs decline in the presence of other regulatory institutions within the same region due to information reusability and economies of scale.

As outlined by Fiechter et al. (2012), even when the regulatory framework is properly designed and the regulation is ratified, the market participants may under-

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<sup>2</sup> The late consumer will not withdraw during the first period, since she or he has higher utility from consuming late and believes that when a bank, which is spared the demand from early consumers, runs out of liquidity, it then suspends withdrawals in order to fully pay off the late consumers in the next period. The late consumer will always choose not to withdraw early, since there is no chance to be only partially reimbursed in the second period.

mine the ability of the regulator to act according to the new regulations. In Fiechter et al.'s (2012) view, the inefficiency of banking regulation and supervision, which resulted in the global financial crisis, lies in the "nuts and bolts" of the supervisory process, such as regulatory empowerment to act in line with new regulations, political support, approval or acceptance of the regulation by the industry, or industry's ability to resist policy implementations. If bankers observe some of these problems, they may adjust their compliance strategy to take advantage of the systemic weaknesses of banking regulation and supervision.

Mondak (1994) elaborated on two sources of policy legitimacy: institutional legitimacy and policy agreement. He emphasized the effect of institutional legitimacy on policy agreement: the institutional recognition alters the propensity to agree with policy. Agarwal et al. (2014) studied the discretionary supervision process driven by the Riegle Act of 1994 in the US. The Riegle Act means that there are fixed 12-month or 18-month rotations between state and federal supervisors. They discussed the laxity of supervision exerted by the state relative to the federal supervisor in light of the "race to the bottom" (banks tend to choose the more favorable supervisor) and "good cop/bad cop" supervisory strategies. The hampered pragmatic and moral legitimacy in the classification of Suchman (1995) and the lack of policy agreement in Mondak's (1994) terms inevitably lead to "rules lawyer" behavioral patterns, resulting in regulatory aversion and regulatory arbitrage (i.e., the "race to the bottom"). Thus, the bankers' attitude towards supervisors may affect the support of regulatory amendments.

From the discussion above, we suggest that the bankers' response to regulatory amendments is a complex multidimensional problem. This problem is partly addressed by this essay. The monitoring of banks is also a challenge due to the central role played by banks in the economy. Bank money is often used for transaction purposes and plays an important role in the facilitation of trade. Dang et al. (2017) argued that the money-like characteristics of bank debt is based on its information insensitivity. Furthermore, they claimed that a bank has to be opaque in order to provide credit to a firm that cannot be funded via other markets. This means that banks must remain opaque in order to ensure the proper functioning of

trade and credit markets, while at the same time they cannot be fully regulated due to "regulatory capture"-related problems.

As noted by Woodford (2012), policy anticipations are significant only if banks truly believe that the promised policy will be in place. Similarly, Bernanke and Reinhart (2004) argued that if a bank does not believe that certain policy measures will be executed, then the effect of policy anticipation is zero. A case in point can be found in the 2016-17 Italian banking crisis. Despite both the Bank Recovery and Resolution Directive and the Single Resolution Mechanism Regulation (Regulation (EU) No 806/2014) being fully operational from 1 January 2016, the Italian government approved precautionary recapitalization of several Italian banks, such as Banca Popolare di Vicenza and Veneto Banca.<sup>3</sup>

If a bank believes that an imposed regulatory amendment is likely to encumber restrictions on banking activity, it may try to avoid it by taking preventive actions. These preventive actions may be referred to as innovations. However, such innovations undermine the efficiency of the reform. They are designed so that the regulator cannot prevent every possible regulatory avoidance strategy. In line with Thakor (2012), periods in which complex new financial products are introduced are more likely to be followed by a financial crisis. In this respect, it is important to understand how banks' anticipation of regulatory amendments is actually formed.

The recent financial crisis shows that the decisions taken by the management of banks are detrimental for societal economic growth. The propensity of individuals to take a mental shortcut that relies on immediate examples that come to mind in revising beliefs introduces behavioral bias. This bias of the banks' CEOs played a significant role in the depth of the financial crisis of 2007-09 (Thakor, 2015).

Another strand of literature, which blames banks for the distortion of economic growth, is related to the "brain drain" effect. Cecchetti and Kharroubi (2012) documented the damaging effect of the fast-growing finance industry to aggregate productivity growth via the higher compensation levels in the industry. Because compensation is higher, the finance industry tends to attract the smartest specialists from production sectors, which in turn limits industrial growth and supplements it with the development of finance.

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<sup>3</sup> "Italy sets aside 17bn to wind down failing lenders", Financial Times, 2 June 2017.



To date, the most comprehensive empirical study of banking compensation determinants was based on the Swedish registry data in connection with fine-grained ability assessments from military enlistment at the age 18-19 years, including cognitive and non-cognitive test scores by Böhm et al. (2015). Böhm et al. (2015) did not find any support for the "brain drain" argument, even when accounting for talent in a rich way: pay in finance is extremely high, increasing, and largely unexplained.

Another factor, which may potentially contribute to the high remuneration in finance, is the reported working hours and related stress levels. The structural change in banking core activities due to digitization and the shift to "home banking", as well as a considerable reduction in job positions, intensified the volume of work for those who remained (Silva et al., 2007).

The changes in banking regulations with respect to policy anticipation are also related to the higher stress level among banking employees. Giorgi et al. (2017) summed up the studies of stress levels in the banking industry in response to the recent changes in banking business models and regulations. They found that most studies showed that mental health problems had increased in the banking sector, and that these problems were stress-related. The stress inside the banking industry is subject to the emerged debate about the abnormal compensation packages paid out to the executives of bailed-out banks (Faulkender et al., 2010).

Mocci et al. (2001) analyzed the psychological and occupational factors on asthenopia (visual discomfort or eye strain)<sup>4</sup> of 385 bank workers. Mocci et al. (2001) reported a negative relationship between self-esteem measured via Rosenberg's scale and visual complaints. This result may be interpreted as bankers tending to demonstrate an avoidance behavior or pretending to have disability problems whenever they do not feel competent in their positions. Pre-labeling themselves as partially physically disabled provides a protective mechanism in case of underperformance.

The reviewed literature shows a multitude of strategies that management of banks can decide to follow in anticipation of regulatory changes and the effects

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<sup>4</sup> The presence of blurred vision, ocular soreness, itching of the eyes, blinking, heaviness of the eyes, and double vision (Mocci et al., 2001)

of such changes. This essay attempts to add to the literature by analyzing professional self-esteem as a filter through which top managers choose their strategies. As illustrated by the literature review, the extent to which the industry anticipates regulatory changes to have positive or negative effects will determine their response.

We hypothesize that bankers with high professional self-esteem are better able to realize and comprehend regulations compared to bankers with low professional self-esteem. This could potentially mean that bankers with high professional self-esteem have a smaller tendency to exhibit protective mechanisms by blaming distorting regulations to secure their positions in the case of underperformance. Hence, they are more positive towards regulatory change and, as such, will display less resistance in anticipation of regulatory change.

### **9.3 Study set-up**

The banker exerts effort to adjust the bank's operations in accordance with an imposed regulation. There is no regulation specifically designed to improve the performance of banks. Thus, each regulation implies that a bank must bear the costs of implementation and compliance. The costs and efforts incurred by the bank depends on the private evaluation made by the banker.

Following Kane (2012), one might consider the following analogue. Speed limits are set up to ensure traffic safety, but they also imply longer traveling times. A driver wants to minimize fuel consumption and the time to destination. Under the assumption that the optimal driving speed is higher than the permitted speed, the driver can choose either to exceed the speed limit or to bear the costs of inefficient driving. By exceeding the speed limit, the driver may be sanctioned. The driver considers the probability of being fined and the penalty rate. If the traffic regulation is designed properly, the driver chooses to keep to the speed limit and incurs the cost of inefficient driving. The same logic applies to the banker. If the probability of being fined and/or the penalty rate are small enough, the banker may find it profitable to "speed".

The current regulatory regime is based on fines and sanctions imposed by supervisors. Expanding on the driving analogy, the driver may acknowledge a certain safety implication of breaching the speed limit. Higher speed means that there is an increased risk to other road users. Given the potential implications of speeding, such as road accidents and infrastructure damage, the driver may drop his or her speed as a precaution, when, for instance, passing a school area or a retirement facility. Similarly, the banker may consider the systemic implications of his or her operations and refrain from certain activities that could have implications for financial system stability.

For the purpose of this essay, we assumed that each regulation is designed to maximize societal economic growth and to minimize the frequency and costs of financial crises. Given that every bank is better off in a growing economy, each bank should also be better off if all banks in the economy follow the regulations.

If the banker does not believe that the imposed regulatory amendments improve long-term growth, and hence the performance of the bank, the banker may choose to act strategically via financial innovation, regulatory arbitrage, and so on. In this essay, we study how industry insiders and industry outsiders perceive the Basel III regulations and their implications for bank competitiveness and industry development. In line with Mocchi et al. (2001), we hypothesize that a precautionary expressed disapproval of the regulations provides an excuse for the bankers to justify lower performance in the future and gives a signal of managerial readiness to execute the regulatory avoidance strategies. While the self-confident professionals demonstrate higher readiness to operate in the strengthened regulatory environment and tend to show greater appreciation of the regulatory efforts, the low self-esteem industry participants are more prone to criticize any regulatory change.

## **9.4 Survey design**

This study is based on a questionnaire that was sent to bank representatives in 2016, 2017, and 2018. The population of the respondents consisted of two distinct categories: insiders and outsiders. The industry insiders were mainly recruited via

their participation in relevant committees of Sweden's two main banking industry organizations: the Swedish Bankers Association and the Swedish Savings Banks Association. Prior to each round of the survey, both associations assisted in the identification of relevant respondents by providing up-to-date information about which individuals were represented in the relevant committees.

The industry outsiders are mainly well-known consultants in the area of regulation. Some of them were suggested by industry insiders to be added to the sample group as they are former industry insiders or regulators now active in professional networks. In addition, industry outsiders also consist of advisors, supervisory and regulatory committee members, and so on, who are collectively dealing with the Swedish banking industry. This group was used as a benchmark because they were expected to have a broader and more holistic view on banking, including an openness to non-traditional banking solutions. Furthermore, because they are not directly paid conditionally on the performance of traditional banking business models, they may be expected to be less biased towards the regulations.

The non-probability sampling strategy has obvious implications for the external validity of the study (Shadish et al., 2002). The approach was chosen because it was seen as a good way to attract respondents via the banking industry organizations, mainly the Swedish Bankers' Association, and to attain a high response rate.

The collection process of survey data was the following. First, an email was sent out a couple of weeks prior to the survey with an invitation to participate. The purpose was to validate email addresses and create an interest for the survey. Second, the survey was sent out via email with a personal link. Two to three reminders were distributed during the time the survey was open.

The survey results are anonymous. Specific questions were asked in order to identify the type of respondent (i.e., insider or outsider) and professional traits based on self-disclosure. The average response rate for the three surveys was more than 30 % in all three years. In 2016, the survey was sent to 241 insiders (response rate 41 %) and 50 outsiders (response rate 54 %); in 2017, it was sent to 279 insiders (response rate 33 %) and 62 outsiders (response rate 48 %); and, in 2018, it was sent to 359 insiders (response rate 36 %) and 99 outsiders (response rate 31 %).

The respondents were asked to reflect upon a set of statements relating to the influence of regulation on the Swedish banking industry. The statements used a Likert scale ranging from one to five. Each of the integers from one to five implies a specific degree of support for a particular statement, ranging from strongly disagreeing to strongly agreeing.

## 9.5 Summary statistics and stylized facts

The survey consisted of two parts: personal and industry-specific information, and statements. The overall statistics for personal and industry-specific information are presented in Table 9.1. The industry insiders' sample was tagged by the type of current employment of the respondent: small bank (total assets - TA < 50 bn SEK), medium bank (TA 50 - 500 bn SEK), and large bank (TA > 500 bn SEK). The respondents were requested to characterize their specialization and level of expertise. Specialization in the major banking subjects is a dummy variable (yes or no). Competence was reported according to a self-assessed level (from very poor to very good) of proficiency in such subjects as banking regulations, laws, and banking operations.

The descriptive statistics indicate that the experience and overall self-assessed level of knowledge are above moderate in the sample (i.e., greater than three). The respondents were expected to be in, or close to, the top management as it is strategic questions that are considered in the committees where the consultations on upcoming changes or new regulations are discussed and answered. The banks give almost all their feedback on consultations via the Swedish Bankers Association or the European Banking Federation.

The reported level of competence in the banking-related subjects, which is partly presented in Table 9.1, may be interpreted as noisy signals of **professional self-esteem**. Accordingly, we used this self-evaluation of skills to assess whether self-esteem affects the attitude towards regulatory amendments. We further imply that once someone has self-proclaimed as an industry expert (i.e., by self-reporting a high level of skills), he or she is discouraged from making claims in advantage of

Table 9.1: Descriptive statistics

The table reports descriptive statistics. **Size** is a categorical variable, ranging from 1 to 3, that is related to Total Assets of < 50B SEK, 50–500B SEK, and > 500B SEK respectively. The variable years yields the working experience in the financial industry, ranging from 1 to 6, which equals less than 2 years, 2-5 years, 5-10 years, 10-15 years, 15-20 years, and more than 20 years, accordingly. **Specializations** are dummy variables. **Competence** refers to the level of knowledge in each category of banking activity, with values from 1 (equal to very limited knowledge) up to 5 (high degree of competence).

Variable	Total		Industry insiders		Others			
	Mean	SD	Min	Max	Mean	SD	Mean	SD
size	-	-	1	3	2.02	.87	-	-
years	4.70	1.28	1	6	4.63	1.26	4.95	1.33
<b>Specialization in</b>								
Capital adequacy	.37	-	0	1	.35	-	.44	-
Liquidity risk / Treasury	.29	-	0	1	.27	-	.33	-
Law	.13	-	0	1	.12	-	.23	-
IT / Information Security	.07	-	0	1	.04	-	.16	-
<b>Competence in</b>								
Overall understanding of the regulations	3.91	.97	1	5	3.94	.96	3.79	1.04
Capital adequacy and Liquidity regulations	3.60	1.20	1	5	3.62	1.19	3.46	1.31
The implications of digitalization for banks	3.47	1.12	1	5	3.52	1.10	3.14	1.18
Respondents N			433				333	
							100	

the industry. In essence, this means that the self-assessment should make respondents more honest in their answers.

For example, the scope of regulatory instructions for the recent regulation is significantly improved. Such efforts would most probably be recognized by a respondent that disclosed his or her proficiency in banking regulation rather than by a respondent who did not disclose this. Moreover, we tried to check this hypothesis against the sample of outsiders, who are proficient in banking regulations.

From a methodological perspective, it would be best to use a purely randomized experiment where respondents answered a survey with and without self-assessment sections in order to evaluate the influence of self-esteem on anticipation. However, in our group of respondents (top management level), such an experiment would likely generate a very low response rate. Additionally, a survey with a larger amount of questions can be expected to yield a lower number of completed surveys.

This is because the longer the survey, the more respondents would likely abandon it in the middle of the questionnaire. Given the uncertainty about response rates and the different probabilities of getting answers on surveys of different length, our approach was the best option.

Besides personal and industry-specific information, the survey was organized in the following blocks: statements related to regulatory efficiency - rules (see Table A1); statements related to banking compliance and effect of being legitimate - *compl* (see Table A2); the effects of regulation on bank competition - *comp\_b* (see Table A3); the effect of regulation on bank competitiveness in relation to shadow banks - *comp\_o* (see Table A4); the effect of regulation on growth and development - *growth* (see Table A5). Overall, the **major report** for the benchmark subsample (i.e., industry outsiders) on each block may be summarized as follows:

- **Rules** (Table A1, Panel A): The scope of banking operations under regulatory control is expanding, despite regulations and other supervisory disclosures not being clearly formulated. Moreover, there was uncertainty among the respondents in terms of what regulations will follow, and how upcoming regulatory amendments will be implemented. This uncertainty is partially due to most of the regulations deriving from non-Swedish regulatory authorities.
- **Compliance** (Table A2, Panel A): The process of adaptation to the current regulatory framework brings structure and orderliness to all banking activities. This limits the authority of bank management and imposes discipline over the structure of the whole banking organization.
- **Competition within banks** (Table A3, Panel A): The heightened regulatory burden induces structural changes in banking competition by increasing entry barriers. The tougher competition limits the diversity of banking products and increases competition for managers and clients.
- **Competition with shadow banks** (Table A4, Panel A): The competition from non-regulated financial intermediaries continued to increase in the next two years following the year of the survey. This means that customers switched regulated banking products and services for more flexible and less regulated products and services. Nevertheless, the respondents were hopeful that the

players offering such products and services would experience stricter regulations in the future.

- **Growth** (Table A5, Panel A): The further development of banking products is restricted by the regulatory framework. The compliance procedures blur the growth focus and lower the ability to adapt to the future challenges of the banking industry.

The presented statements, supported by most specialists in this field, may look quite pessimistic. Given the increasing speed and frequency of regulatory amendments, it is important to understand the profile of bankers who are ready to act in the new environment. The profile of such people is of interest for this essay. We aim to understand the importance of the respondent profile and to describe the common patterns currently dominating the Swedish banking industry.

## 9.6 Methodology and model design

For the study design, we employed two steps of estimations. This section provides the specificity methods. First, we describe the straightforward analyses used for tractability and comparability purposes; then, we shortly underline the main specifics of the Rossi et al.'s (2001) model. As noted above, we chose the industry outsiders as a benchmark and scaled the answers of industry insiders by means of the answers given by industry outsiders (also referred to as the major report). The outsiders tended to provide more unbiased opinions; therefore, their answers could serve as a benchmark for an opinion deviation analysis. This procedure allowed us to get rid of variations in means from year to year. Consequently, we could consolidate the answers of all surveys into one dataset.

The second step involved employing the basic model and the Rossi et al.'s (2001) model for multivariate ordinal (i.e., based on a Likert scale) survey data with scale usage heterogeneity.<sup>5</sup> Both of these models aim to estimate the respondent-

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<sup>5</sup> Analysis of Multivariate Ordinal survey data with scale usage heterogeneity (as in Rossi et al. (2001)) is implemented in R package 'bayesm'(Rossi, 2018) available on: <https://CRAN.R-project.org/package=bayesm>



specific parameters, which were subsequently used to estimate the respondent- and industry-specific determinants of disagreement with the major report.

The true attitude to the survey question is a continuous latent variable with an unknown distribution of cut-off points. One possible approximation of the respondent's agreement function is the perceived probability of the statement being truthful. Thus, the cut-off points on the Likert scale were distributed via a parameter that is similar to risk aversion. In other words, one respondent may choose five (strongly agree) under the perceived probability of the statement being true of at least 70 %, while a more "risk-averse" respondent would choose five only if the perceived probability of the statement being true is more than 90 %. The major advantage of this representation is that the middle score signals uncertainty about the statements. Hence, the choice of three will become a purely uninformative signal, where true and false are equally possible. This allowed us to aggregate "Do not know", "NA", and mid-score, and to interpret them as equally uninformative. We focused only on the explicitly expressed opinions concerning each statement in our analysis.

### 9.6.1 The basic model

The following model description is based on the statement of the **Rules** block. The summary statistics for each block are reported in the Appendix. The explicitly expressed attitude of the respondent is presented via the parameter *observed ratio of opinion offer - Expr\_%*, and is equal to all respondents of the corresponding type, net of those chosen "non-informative" options scaled by total.

Our benchmark constitutes the expressed attitude towards each statement by the industry outsiders. Formally, the separation between the two groups are made such that the population of industry insiders are denoted  $\Phi$ , with the corresponding sample  $\phi$ , whereas the population of industry outsiders are denoted  $\Theta$ , with a corresponding sample  $\theta$ . Having the set of expressed attitudes towards statement  $j$  ( $j \in \{1, M\}$ ) by respondent  $i$  ( $i \in \{1, N\}$ ) from the sample of outsiders -  $i \in \theta$ , i.e.  $x_{ij}$ , we define the benchmark for statement  $j$  for period  $t$  by:

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$$major_{jt} = \frac{1}{n_{jt}} \sum_{i=1}^N x_{it} 1\{(3 - x_{it})(3 - \bar{x}_{it}) > 0\}, \text{ if } i \in \theta, \text{ with} \quad (9.1)$$

$$n_{jt} = \sum_{i=1}^N 1\{(3 - x_{it})(3 - \bar{x}_{it}) > 0\}. \quad (9.2)$$

The caveat of this approach is that  $x_{it}$  in equation 9.1 is included for  $major_{jt}$  purposes calculations only if the row mean  $\bar{x}_{it}$  and  $x_{it}$  lie on the same side of the numeric line separated at the point of three. For example, if row mean  $\bar{x}_{it}$  (reported in 9.2) is less than 3, then only  $x_{it} < 3$  are included. Formally, the insiders' disagreement ( $\Delta_{ijt}$ ) with the major report on statement  $j$  for time  $t$  is specified by equation 9.3:

$$\Delta_{ijt} = \begin{cases} 0, & \text{if } (3 - x_{ijt})(3 - major_{jt}) \geq 0 \\ |x_{ijt} - major_{jt}|, & \text{if } (3 - x_{ijt})(3 - major_{jt}) < 0 \end{cases}, i \in \phi. \quad (9.3)$$

Next, we summed up  $\Delta_{ijt}$  for all statements within each of the five blocks. An example of the results is provided in Figure 9.1, which shows a breakdown of possible patterns in the data. While the representation in Figure 9.1 is quite artificial, it helps to estimate a simplified distribution of the opinions in the sample. The X-axis is a log-scaled disagreement  $\Delta_i$  of insiders with the major report over the set of **rules**-related statements, and the Y-axis is log-scaled disagreement on **growth**-related statements. While 17 % of the insiders agreed with the major report on **rules** and on **growth**, 37 % of the insiders considered only **rules** in the major re-

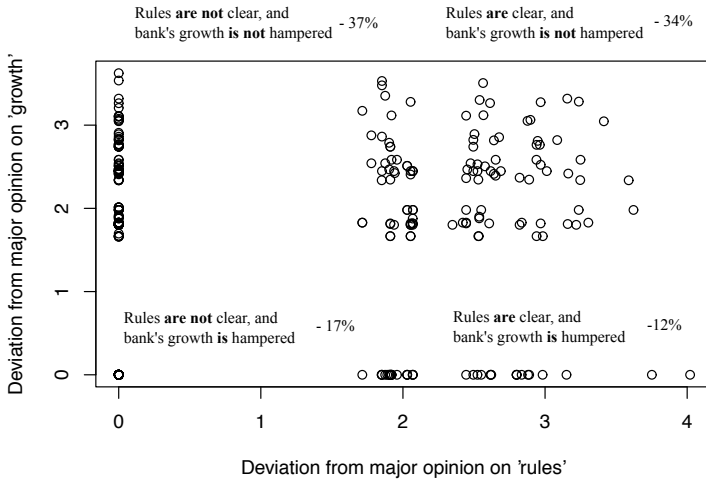


Fig. 9.1: The log-scaled disagreement of insiders with benchmark on *rules* and *growth* set of statements.

port to be in line with their views and expectations, 12 % of the insiders had the opposite view, and 34 % disagreed with both statements.

### 9.6.2 Introduction of the Rossi et al.'s (2001) model and a performance comparison with the basic model

Following the notions of Rossi et al. (2001), the vector of the latent responses (i.e. true attitude towards statement  $j$ ) of respondent  $i$  ( $i \in \{1, N\}$ ) to question  $j$  ( $j \in \{1, M\}$ ),  $-y'_i = [y_{i1}, \dots, y_{iM}]$ , defined by equation 9.4, is normally distributed and discredited by a set of cut-offs  $[c_0, \dots, c_k]$ , with  $k$  – an array of discrete choices from 1 to  $k$  (in our survey design  $k=5$ ).

$$x_{i,j} = k, \text{ if } c_{k-1} \leq y_{ij} \leq c_k. \tag{9.4}$$

The cut-off values lie on the parabola  $a + bk + ek^2$  with  $a = 0.5$  and  $b = 1$ . The coefficient  $e$  is a parameter to allow skewness and non-linear distribution of cut-offs with a prior  $e = 0$ . The underlying latent continuous variable is a sum of means for question  $j$  ( $\mu_j$ ), respondent specific parameters  $\tau_i$  and  $\sigma_i$  and the standardized latent variable ( $z_{ij}$ ), which can be formalised as:

$$y_i = \mu + \tau_i t + \sigma_i z_i, \text{ with } z_i \sim N(0, \Sigma). \quad (9.5)$$

Model 9.5 incorporates the respondent-specific location  $\tau_i$  and scale shift  $\sigma_i$ , estimated via the Markov chain Monte Carlo algorithm (for the detailed description of the model implementation, see Rossi et al. (2012)). While Rossi et al. (2001) focused on  $z_{ij}$  as an indicator of true "customer satisfaction", they emphasized the possibility of considering  $\tau_i$  as a respondent-specific location shift towards either the low or the high end of the scale. In essence, this means that if a specific respondent tends always to select five, we could adjust for this tendency. To proceed, we estimated the respondent-specific tendency for each block, where  $\tau_i$  represents the tendency of each respondent to answer in a certain direction over a set of statements with mean  $\mu$ .

Table 9.2: The comparison of model performance based on 20K draws with raw summary statistics over the set of questions for each block

The scale in the table reflects the degree of average support -  $\mu$  parameter for a sample established view (major report) on a scale from 1 to 5. IO stands for industry outsiders; II - industry insiders.

	Simulations						
	All questions			Block		Sample	
	IO	II	Total	Total	IO	II	Total
Agreement with <b>Rules</b> major opinion	3.96	3.78	3.78	3.85	3.78	3.7	3.72
<i>average std. dev.</i>	[.16]	[.08]	[.06]	[.07]	[.98]	[1.02]	[1.01]
Agreement with <b>Compl</b> major opinion	3.8	3.79	3.75	3.36	3.32	3.35	3.34
<i>average std. dev.</i>	[.16]	[.08]	[.06]	[.06]	[.94]	[.98]	[.97]
Agreement with <b>Comp.b</b> major opinion	3.77	3.75	3.71	3.59	3.55	3.53	3.53
<i>average std. dev.</i>	[.16]	[.08]	[.06]	[.06]	[.90]	[.92]	[.92]
Agreement with <b>Comp.o</b> major opinion	3.43	3.51	3.45	3.72	3.68	3.6	3.62
<i>average std. dev.</i>	[.15]	[.07]	[.06]	[.06]	[.90]	[.99]	[.97]
Agreement with <b>Growth</b> major opinion	3.52	3.54	3.49	3.52	3.34	3.5	3.46
<i>average std. dev.</i>	[.15]	[.07]	[.06]	[.06]	[.90]	[1.01]	[.99]

We estimated the respondent-specific location shift over the questions related to subject-related blocks of questions. The estimated location shift  $\tau_i$  represents the location-specific shift for each respondent over the set of questions with question mean  $\mu$ . In order to illustrate the model performance with a prior default, we present the estimation of the model parameters conditional on the block of questions described previously in comparison with the sample means.

Table 9.2 presents the summary statistics of the  $\mu$  parameter over the block of questions related to the effect of the Basel III regulation. For instance, the first line of Table 9.2 should be interpreted as follows: The agreement with the major report on **Rules** is measured on a Likert scale from 1 to 5. Based on raw sample means, the agreement with the *Rules\_major* is **3.78** for industry outsiders (IO in column 5) and **3.7** for industry insiders (II in column 6). In contrast, the means of the estimated  $\mu$  are **3.96** for outsiders (IO in column 1) and **3.78** for insiders (II in column 2). The higher estimated means of  $\mu$  may reflect different location shift patterns of the subsample groups. In other words, some respondents consistently "underrated" the statements. That fact leads to a negative respondent-specific shift  $\tau$  and higher estimated means  $\mu$ .

Table 9.3: Summary Statistics

The table reports the summary statistics for  $\Delta$  calculated according to Equation 9.3 and aggregated to level of blocks by summing up. Parameter  $\tau$  represent the respondent-specific location shift around parameter described in Table 9.2.

<i>Variable name</i>	<i>Abriviation</i>	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
$\Delta$ estimated over <b>Rules</b> block	<i><math>\Delta\_Rules</math></i>	416	1.95	2.72	0	0	2.63	16.53
$\Delta$ estimated over <b>Compliance</b> block	<i><math>\Delta\_Compl</math></i>	416	2.59	2.85	0	0	4.2	14
$\Delta$ estimated over <b>Competition_banks</b> block	<i><math>\Delta\_Comp\_b</math></i>	416	1.64	2.19	0	0	2.4	17
$\Delta$ estimated over <b>Competition_others</b> block	<i><math>\Delta\_Comp\_o</math></i>	416	1.94	2.32	0	0	3.18	10.73
$\Delta$ estimated over <b>Growth</b> block	<i><math>\Delta\_Growth</math></i>	416	2.71	2.61	0	0	4.32	12.45
$\tau$ estimated over <b>Rules</b> block	<i><math>\tau\_Rules</math></i>	416	-.01	.58	-1.33	-.45	.38	1.49
$\tau$ estimated over <b>Compliance</b> block	<i><math>\tau\_Compl</math></i>	416	-.01	.45	-1.04	-.35	.28	1.69
$\tau$ estimated over <b>Competition_banks</b> block	<i><math>\tau\_Comp\_b</math></i>	416	-.01	.34	-.99	-.24	.20	1.26
$\tau$ estimated over <b>Competition_others</b> block	<i><math>\tau\_Comp\_o</math></i>	416	-.01	.44	-1.02	-.34	.29	1.34
$\tau$ estimated over <b>Growth</b> block	<i><math>\tau\_Growth</math></i>	416	-.01	.43	-1.29	-.32	.25	1.16
$\tau$ estimated over <b>all</b> questions	<i><math>\tau\_all</math></i>	416	-.09	.31	-.84	-.29	.09	.94

The procedure outlined above helps us to estimate the effect of self-disclosure on the expressed opinions over the subject-related blocks of questions. The self-disclosure reflects professional self-esteem, measured by the degree of self-reported knowledge in subjects related to the effect of upcoming regulations. Respondents were asked to rank their expertise from a very poor to a very good level of expertise. In order to show the relationship between self-esteem and regulation approval, we relate the opinion of each respondent to the predominant opinions in the sample summarized earlier. The support of the major opinion is measured in two ways: the basic straightforward analysis -  $\Delta\_BlockX$ ; and the Rossi et al.'s (2001) model with scale usage heterogeneity -  $\tau\_BlockX$ . The summary statistics of the given variables are presented in Table 9.3.

Further, we tested the relation of the designed variables and the professional self-esteem level via ordinary least squares estimations. Given the anonymous responses, both  $\tau$  and  $\Delta$  might be a function of unknown population characteristics. In order to address this concern in the best possible way, we assumed that  $\tau$  and  $\Delta$  were determined by a common set of omitted variables. Hence, we estimated first how much of  $\tau$  variance may be attributed to direct disagreement with the common view  $\Delta$ ; then, we utilized the unexplained residual error term to assess the effect of self-esteem. Section 9.6 presents the results of these estimations and discusses the policy implications of our findings.

## 9.7 Results and discussions

The point of interest of this study is the variation of answer patterns across different respondent groups given the level of the respondents' self-disclosure. The baseline results are presented in Table 9.4. Overall, the respondents with high self-disclosed proficiency in banking regulations and operations demonstrate less agreement with the major opinion. On average, they considered regulations and instructions to be sufficiently clear and that regulatory and supervisory authorities are successful in communicating how the regulations will be introduced. They also tended to agree more with the delegation of regulatory initiatives to Brussels.

**Table 9.4: Baseline results**

The table reports the relation between self-esteem and respondents' specific location shift  $\tau$  over a block of statements related to regulations, and this relationship's effect on compliance, competition within banks and with non-regulated entities, and bank's growth prospects.

The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

Panel A: <i>Dependent variable - <math>\tau</math> estimated over Block X</i>	<i>Competition</i>				Growth
	Rules	Compliance	within banks	with shadow banks	
	(A.1)	(A.2)	(A.3)	(A.4)	(A.5)
$\Delta$ estimated over Block X	-.06*** (.005)	-.05*** (.003)	-.03*** (.004)	-.03*** (.004)	.13*** (.01)
Constant	.76*** (.02)	.79*** (.01)	.73*** (.01)	.73*** (.01)	
R <sup>2</sup>	.27	.36	.18	.11	.45
Adjusted R <sup>2</sup>	.27	.36	.18	.11	.45
Residual Std. Error	.27	.18	.16	.21	.52
F Statistic	152.28***	231.90***	92.18***	53.11***	344.78***
df	(df = 1; 414)	(df = 1; 414)	(df = 1; 414)	(df = 1; 414)	(df = 1; 415)
Panel B: <i>Dependent variable - residuals <math>\tau</math> estimated in Panel A</i>					
	(B.1)	(B.2)	(B.3)	(B.4)	(B.5)
Self-esteem	-.04** (.01)	-.02** (.01)	-.03*** (.01)	-.03** (.01)	-.22* (.11)
Self-esteem:Experience	.01*** (.003)	.004** (.002)	.01*** (.002)	.01*** (.002)	.01* (.004)
Constant					.98** (.39)
R <sup>2</sup>	.02	.01	.03	.02	.04
Adjusted R <sup>2</sup>	.01	.01	.03	.01	.04
Residual Std. Error	.27	.18	.15	.21	.22
F Statistic	3.49**	2.62*	7.47***	3.58**	9.05***
df	(df = 2; 414)	(df = 2; 414)	(df = 2; 414)	(df = 2; 414)	(df = 2; 413)
Observations	416	416	416	416	416

The outcome of the following analyses suggests that the more the respondent assessed him or herself as professionally knowledgeable, the more positive the respondent was towards regulatory changes. Such respondents predict less damage to the banking industry caused by regulations. Interestingly, more experienced respondents were marginally less optimistic towards regulatory changes. The straightforward estimation of disagreement measured by  $\Delta$  yields the same results. The disagreement with the major opinion increased with higher levels of self-esteem (see Table 9.5).

Table 9.5: Supplementary results

The table reports the relation between self-esteem and the straightforward estimation of disagreement measured by  $\Delta$  over a block of statements related to regulations, and this relationship's effect on compliance, competition within banks and with non-regulated entities, and bank's growth prospects.

The significance levels are at \* $p < 0.1$ ; \*\* $p < 0.05$ ; \*\*\* $p < 0.01$ .

Panel C: <i>Dependent variable - <math>\Delta</math> estimated over Block X</i>	<i>Competition</i>				Growth (C.5)
	Rules (C.1)	Compliance (C.2)	within banks (C.3)	with shadow banks (C.4)	
Self-esteem	.41*** (.14)	.76*** (.15)	.40*** (.11)	.76*** (.12)	.86*** (.14)
Self-esteem:Experience	.03 (.03)	-.01 (.03)	.01 (.02)	-.05* (.02)	-.02 (.03)
R <sup>2</sup>	.35	.46	.37	.42	.53
Adjusted R <sup>2</sup>	.35	.45	.36	.42	.53
Residual Std. Error (df = 414)	2.70	2.85	2.18	2.30	2.58
F Statistic (df = 2; 414)	112.10***	172.97***	120.24***	151.77***	234.67***
Observations	416	416	416	416	416

While the effect of the level of confidence on regulation acceptance is extremely difficult to study given the data scarcity and the number of methodological issues, the potential policy implications are quite straightforward. The enhanced literacy about regulatory intentions, together with improved communication about policy implications, may improve the readiness of market participants more closely to comply and adhere to regulations, thereby benefiting overall financial stability.

## 9.8 Conclusions

The process of banking regulatory change is a long path from the initial regulatory initiative or proposal to the ratification and implementation. The baseline of three decades of bank regulation, since the deregulation in the 1980s, is the setting up of limits, that is, setting parameters for banking activities. One of the longest lasting limits is the Basel I Capital Adequacy Regulation, which limited equity and subordinated debt with respect to risk-weighted assets.



Typically, the enforcement of the latest regulation (based on the introduction of the Basel II accord and the transition towards the Basel III accord) is subject to gradual implementation in order to smooth the industry compliance shock. The window between the issue of the first draft of a new regulation and full enforcement is open for manipulation by the industry. The more resilient and empowered the representatives of the banking industry are, the longer that window has to be open, and the more amendments have to be made between the first draft and the ratified version. One of the most efficient methods of delaying the requirement adoption is to abuse the scrutiny of regulation enforcement. The underlying conflict about an anticipation of regulatory effects introduces frictions to the ratification of the restrictive measurement in the case when there are high social costs of imposing the planned requirements.

It is well established in the literature that banks act strategically in response to anticipated regulatory action. This essay adds to the literature by analyzing one channel through which the strategic actions are determined, namely, professional self-esteem. In particular, in our sample professionals with higher levels of self-esteem also seemed less worried about their abilities to manage regulatory change. This finding supports the recent regulatory efforts to improve communication strategies and facilitate the understanding of the regulatory framework. Unfortunately, as of 2018 most of the efforts address employees of the European central banks and are optional for European banks. The relatively scarce literature and the current analysis suggest that an improvement in the direction of the facilitation of literacy in the banking regulation may facilitate the support of regulatory initiatives by banking industry.

As outlined in the literature review, even when regulations are properly designed and accepted, supervision still needs to be efficient. Although our study has not directly focused on supervision, it is notable that respondents with high professional self-esteem also seemed less worried about having a supranational supervisor. The extent to which this supervisor is more difficult to manipulate (i.e., strategic actions are less useful) could be an interesting avenue for further research. Moreover, if managers with high professional self-esteem are better equipped to manage in an environment with persistent change and supranational supervision, perhaps pro-

professional self-esteem should be taken into consideration when outlining the characteristics that determine pay. If, as indicated by our study, managers with high professional self-esteem are better equipped to manage processes of change, they should perhaps also be better paid - so long as this is a desirable trait.

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## **A Summary statistics by statement**

Appendix A presents the statements relating to each category of questions as well as the summary statistics per statement. Table A1 describes the attitude towards the regulation-related statements. Effect of compliance on banking activity is presented in Table A2. Table A3 summarizes the industry insiders and outsiders on the effect of regulatory amendments on the banking competition. The expectation regarding the future role of shadow banking in light of the Basel III introduction is provided by Table A4. Table A5 presents the statistics on the industry insiders and outsiders beliefs about the growth restrictions imposed by the Basel III adoption.

Table A1: Notations and Major Report Values: *Statements Related to Regulatory Efficiency*

The table presents notations of the statements included to the *Rules* variable. The first part of descriptive statistics - Panel A, presents the mean of the major opinion within industry outsiders. Stars in Panel A stand for the Kruskal-Wallis H test between answers for previous against subsequent year. The second part of descriptive statistics - Panel B, presents similar statistics for industry insiders. Stars in Panel B stand for the Kruskal-Wallis H test between answers of industry insiders and outsiders. Agreement rate (*Agm*) in percentage reports the portion of the respondents expressing similar view (neutral or strict opinion). *Expr.%* (i.e. *observed ratio of opinion offer*) presents the portion of respondents expressed their opinion regarding certain statement (all respondents of corresponding type net of those chosen 'non-informative' options scaled by total). The third part of descriptive statistics - Panel C, provides the descriptive of Disagreement -  $dargm-\beta_{it}$ , between industry insiders and dominated view of industry outsiders (mean) with at least one non zero  $dargm-\beta_{it}$  in the set of expressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Statement	Var	Panel A Industry outsiders				Panel B Bankers			Panel C Disagreement			
		Year	Mean	Agm	Expr	Mean	Agm	Expr	Mean	St. Dev.	Min	Max
		$Y$	$\bar{x}$	$agm$	$expr$	$\bar{x}$	$agm$	$expr$	$\bar{\Delta}$	$\sigma$	$min$	$max$
The rules are clear	exp.7.1	16Y	1.43	73.7	70.4	1.72	71.9	65.3	1.07	1.37	0	3.57
		17Y	1.87	75	69	1.66	62.3	65.6	1.26	1.2	0	3.13
		18Y	1.6	74.1	67.5	1.69	67	70.5	1.26	1.32	0	3.4
Regulators are sufficiently clear in their regulations and instructions	exp.7.2	16Y	1.53	71.4	77.8	1.66	79.4	64.3	.76	1.25	0	3.47
		17Y	1.56	90	69	1.64	74.6	76.3	1.1	1.3	0	3.44
		18Y	1.68	76	62.5	1.71	78.7	69	.77	1.17	0	3.32
There is no uncertainty about how the regulators will follow up the application of the regulations and instructions	exp.7.3	16Y	1.56	88.9	66.7	1.54	86.3	74.5	.62	1.21	0	3.44
		17Y	1.78	100	79.3	1.59	84.7	77.4	.63	1.09	0	3.22
		18Y	1.58	82.8	72.5	1.65	89.5	81.4	.48	1.06	0	3.42
There is sufficient proportionality in the rules between large and small banks	exp.7.4	16Y	1.68	95.7	85.2	1.45	83.6	62.2	.5	0.97	0	2.32
		17Y	1.65	87	79.3	1.5	88.1	63.4	.44	1.01	0	3.35
		18Y	1.63	93.1	72.5	1.49	91	77.5	.4	0.98	0	3.37
The regulatory changes in recent years are very detailed in how banks should operate	exp.7.6	16Y	4.63	90.5	77.8	4.56	87.7	74.5	.49	1.01	0	3.26
		17Y	4.57	95.5	75.9	4.36	94.9	84.9	.23	0.72	0	2.43
		18Y	4.63	90	75	4.55	90.4	72.9	.34	0.82	0	2.3
The fact that the regulations are initiated/decided in Basel/EU, rather than locally, is not important.	exp.9.4	16Y	1.59	81	77.8	1.53	82.9	71.4	.72	1.24	0	3.41
		17Y	1.61	81.8	75.9	1.55	82.1	72	.83	1.35	0	3.39
		18Y	1.39	84.8	82.5	1.42	76	77.5	1.09	1.39	0	3.61
<b>Rules [N=149]</b>	<i>rules</i>								11.21	7.31	4.55	54.74

Table A2: Notations and Major Report Values: *Statements Related to Banking Compliance and Effect of being Legitimate*  
 The table presents notations of the statements included to the *Compliance* variable. The first part of descriptive statistics - Panel A, presents the mean of the major opinion within industry outsiders. Stars in Panel A stand for the Kruskal-Wallis H test between answers for previous against subsequent year. The second part of descriptive statistics - Panel B, presents similar statistics for industry insiders. Stars in Panel B stand for the Kruskal-Wallis H test between answers of industry insiders and outsiders. Agreement rate (*Agrm*) in percentage reports the portion of the respondents expressing similar view (neutral or strict opinion). *Expr\_%* (i.e. *observed ratio of opinion offer*) presents the portion of respondents expressed their opinion regarding certain statement (all respondents of corresponding type net of those chosen 'non-informative' options scaled by total). The third part of descriptive statistics - Panel C, provides the descriptive of Disagreement -  $dargm.\beta_{it}$ , between industry insiders and dominated view of industry outsiders (mean) with at least one non zero  $dargm.\beta_{it}$  in the set of expressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Statement	Var	Year	Panel A			Panel B			Panel C			
			Industry outsiders			Bankers			Mean	St. Dev.	Min	Max
			Mean	Agrm	Expr	Mean	Agrm	Expr	$\bar{\Delta}$	$\sigma$	min	max
The ↑ risk of sanctions (↑€5M) VS banks and/or its boards/CEO have made banks ↑ cautious in their decision making	exp_7.5	16Y	4.33	66.7	66.7	4.23	62	51	.84	1.27	0	3.33
		17Y	4.19	94.1	58.6	4.31	66.7	51.6	.66	1.07	0	3.19
		18Y	4.36	82.4	42.5	4.38	58.4	59.7	.97	1.28	0	3.36
The processes that are essential under the regulations are easy to identify and document	exp_15.1	16Y	4.5	46.2	48.1	4.25	80	55.1	1.2	1.41	0	3.5
		17Y	4	60	34.5	4.28	56.1	61.3	1	1.16	0	3
		18Y	4.2	62.5	60	4.16	54.9	70.5	1.17	1.25	0	3.2
Regulatory changes are positive because it makes banks develop clearer and more systematic processes	exp_15.5	16Y	4.46	76.5	63	4.37	85	61.2	.4	0.98	0	3.46
		17Y	4.12	92.9	48.3	4.25	85.2	65.6	.34	0.79	0	2.12
		18Y	4.35	77.3	55	4.32	71.3	67.4	.77	1.23	0	3.35
Banks are becoming more and more centralized	exp_18.2	16Y	4.42	75	59.3	4.29	76.3	60.2	.66	1.24	0	3.42
		17Y	4.11	60	51.7	4.33*	80.3	65.6	.52	1.04	0	3.11
		18Y	4.3	69	72.5	4.23	74.7	67.4	.68	1.18	0	3.3
The scope of action given by the boards to the bank management has diminished as a result of regulatory changes	exp_18.3	16Y	4.17	92.3	48.1	4.3	79.7	60.2	.45	0.92	0	3.17
		17Y	4.31	81.2	55.2	4.31	78.7	65.6	.55	1.02	0	3.31
		18Y	4.28	69.2	65	4.26	82.4	65.9	.44	0.97	0	3.28
Bank organizations will become increasingly hierarchical	exp_18.4	16Y	4.25	80	55.6	4.21	71.7	61.2	.65	1.06	0	3.25
		17Y	4.1	66.7	51.7	4.25	71.4	60.2	.6	0.96	0	2.1
		18Y	4.4	62.5	60	4.33	74	59.7	.64	1.17	0	3.4
<b>Compliance [N=249]</b>	<i>compl</i>								11.15	7.38	4	39.66

Table A3: Notations and Major Report Values: *Statements Related to Competition within Banking Industry*

The table presents notations of the statements included to the *Competition\_banks* variable. The first part of descriptive statistics - Panel A, presents the mean of the major opinion within industry outsiders. Stars in Panel A stand for the Kruskal-Wallis H test between answers for previous against subsequent year. The second part of descriptive statistics - Panel B, presents similar statistics for industry insiders. Stars in Panel B stand for the Kruskal-Wallis H test between answers of industry insiders and outsiders. Agreement rate (*Agm*) in percentage reports the portion of the respondents expressing similar view (neutral or strict opinion). *Expr\_%* (i.e. *observed ratio of opinion offer*) presents the portion of respondents expressed their opinion regarding certain statement (all respondents of corresponding type net of those chosen 'non-informative' options scaled by total). The third part of descriptive statistics - Panel C, provides the descriptive of Disagreement -  $dargm-\beta_{it}$ , between industry insiders and dominated view of industry outsiders (mean) with at least one non zero  $dargm-\beta_{it}$  in the set of expressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Statement	Var	Panel A				Panel B			Panel C			
		Industry outsiders				Bankers			Disagreement			
		Year	Mean	Agm	Expr	Mean	Agm	Expr	Mean	St. Dev.	Min	Max
	Y	$\bar{x}$	agm	expr	$\bar{x}$	agm	expr	$\bar{\Delta}$	$\sigma$	min	max	
The entry barriers for new banks in Sweden have increased due to the increased regulation	exp_9.2	16Y	4.73	91.7	88.9	4.75	98.6	73.5	.06	0.41	0	2.73
		17Y	4.67	87.5	82.8	4.59	94.1	73.1	.17	0.7	0	3.67
		18Y	4.67	93.8	80	4.6	93.9	76.7	.24	0.8	0	3.67
The increased regulation is positive for the banks competitiveness	exp_9.3	16Y	1.71	73.7	70.4	1.67	76.8	57.1	.48	1.06	0	3.29
		17Y	1.83	85.7	48.3	1.67	82.1	60.2	.28	0.81	0	3.17
		18Y	1.58	88.9	67.5	1.59	72.6	65.1	.64	1.18	0	3.42
Banks' products and the way they provide them will be more equal between banks as a result of the regulation	exp_9.6	16Y	4.21	87.5	59.3	4.38	90.6	65.3	.32	0.84	0	3.21
		17Y	4.27	78.9	65.5	4.35	86.4	71	.31	0.83	0	3.27
		18Y	4.39	81.8	55	4.29	91.4	72.1	.23	0.71	0	2.39
Synergies through shared services / processes / systems between banks will increase in the future	exp_9.7	16Y	4.12	100	59.3	4.48	73.8	42.9	.38	0.91	0	3.12
		17Y	4.31	80	69	4.26	82.5	61.3	.32	0.84	0	3.31
		18Y	4.3	80	62.5	4.3	88.5	67.4	.17	0.65	0	3.3
The changes in the liquidity rules imply increased competition for consumers and corporate customers' money	exp_9.8	16Y	4.09	78.6	51.9	4.29	68.9	45.9	.36	0.84	0	3.09
		17Y	4.22	64.3	48.3	4.29	70.5	47.3	.49	1.05	0	3.22
		18Y	4.19	72.7	55	4.25	80	50.4	.39	0.94	0	3.19
In the last 0-2 years, it has become more difficult to recruit managers to the banks	exp_18.5	16Y	4.33	90	37	1.75**	51.6	31.6	.67	1.21	0	3.33
		17Y	4.11	75	41.4	4.29	58.3	38.7	.6	1.1	0	3.11
		18Y	4.18	64.7	42.5	4.42	47.3	42.6	.56	1.03	0	3.18
<b>Competition_banks [N=214]</b>	<i>comp_b</i>								10	5.72	4.59	29.71



Table A4: Notations and Major Report Values: *Statements Related to Competition from Non-banking Installments*

The table presents notations of the statements included to the *Competition\_others* variable. The first part of descriptive statistics - Panel A, presents the mean of the major opinion within industry outsiders. Stars in Panel A stand for the Kruskal-Wallis H test between answers for previous against subsequent year. The second part of descriptive statistics - Panel B, presents similar statistics for industry insiders. Stars in Panel B stand for the Kruskal-Wallis H test between answers of industry insiders and outsiders. Agreement rate (*Agrm*) in percentage reports the portion of the respondents expressing similar view (neutral or strict opinion). *Expr.%* (i.e. *observed ratio of opinion offer*) presents the portion of respondents expressed their opinion regarding certain statement (all respondents of corresponding type net of those chosen 'non-informative' options scaled by total). The third part of descriptive statistics - Panel C, provides the descriptive of Disagreement - *dargm.β<sub>it</sub>*, between industry insiders and dominated view of industry outsiders (mean) with at least one non zero *dargm.β<sub>it</sub>* in the set of expressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Statement	Var	Panel A			Panel B			Panel C				
		Year	Industry outsiders			Bankers			Disagreement			
			Mean	Agrm	Expr	Mean	Agrm	Expr	Mean	St. Dev.	Min	Max
		$\bar{Y}$	$\bar{x}$	$\bar{agr}_m$	$\bar{expr}$	$\bar{x}$	$\bar{agr}_m$	$\bar{expr}$	$\bar{\Delta}$	$\sigma$	$min$	$max$
The banking industry will get increased competition from other players within 0-2 years	exp_12.1	16Y	4.38	100	88.9	4.52	89.6	68.4	.42	1	0	3.38
		17Y	4.5	90.9	75.9	4.57	91.9	79.6	.3	0.86	0	3.5
		18Y	4.77**	97.2	90	4.67	95.2	96.1	.23	0.77	0	2.77
Shadow banks or other players are easier to develop specific customized solutions than the banks	exp_12.2	16Y	4.44	94.7	70.4	4.43	83.1	66.3	.68	1.21	0	3.44
		17Y	4.43	82.4	58.6	4.42	82.6	74.2	.6	1.14	0	3.43
		18Y	4.42	94.3	87.5	4.49	81.1	82.2	.77	1.28	0	3.42
Competition makes it more difficult to differentiate the Banks products against other peoples offers	exp_12.3	16Y	4.18	78.6	51.9	4.36	75	57.1	.81	1.23	0	3.18
		17Y	4.14	58.3	41.4	4.19	77.8	58.1	.53	1.03	0	3.14
		18Y	4.31	81.2	80	4.36	80.4	71.3	.62	1.1	0	3.31
Asset managers (or similar players) will receive a smaller share of the value in customer offer within 0-2 years	exp_12.4	16Y	4.4	71.4	51.9	4.43	66.7	45.9	.93	1.34	0	3.4
		17Y	4.29	63.6	37.9	1.71	49	52.7	1.15	1.33	0	3.29
		18Y	4.23	61.9	52.5	4.23	54.4	61.2	1.24	1.29	0	3.23
The "non-regulated" actors will be more regulated within 0-2 years.	exp_12.6	16Y	4.47	90.5	77.8	4.26	86.9	62.2	.5	1.08	0	3.47
		17Y	4.4	90.9	75.9	4.38	85.9	76.3	.5	1.08	0	3.4
		18Y	4.43	93.8	80	4.4	88.7	75.2	.4	0.96	0	3.43
The banks have unique and hard-plagued processes that give rise to a competitive edge	exp_15.2	16Y	1.62	53.3	55.6	1.63	77.6	50	.64	1.14	0	3.38
		17Y	1.5	85.7	24.1	1.68	66.7	61.3	.94	1.3	0	3.5
		18Y	1.82	78.6	70	1.71	82.1	65.1	.52	1.05	0	3.18
<b>Competition_others [N=214]</b>	<i>comp_o</i>								10	5.72	4.59	29.71

Table A5: Notations and Major Report Values: *Statements Related to Growth and Development Constraints in Result of Regulatory Changes*  
 The table presents notations of the statements included to the *Growth* variable. The first part of descriptive statistics - Panel A, presents the mean of the major opinion within industry outsiders. Stars in Panel A stand for the Kruskal-Wallis H test between answers for previous against subsequent year. The second part of descriptive statistics - Panel B, presents similar statistics for industry insiders. Stars in Panel B stand for the Kruskal-Wallis H test between answers of industry insiders and outsiders. Agreement rate (*Agrm*) in percentage reports the portion of the respondents expressing similar view (neutral or strict opinion). *Expr.%* (i.e. *observed ratio of opinion offer*) presents the portion of respondents expressed their opinion regarding certain statement (all respondents of corresponding type net of those chosen 'non-informative' options scaled by total). The third part of descriptive statistics - Panel C, provides the descriptive of Disagreement -  $dargm\text{-}\beta_{it}$ , between industry insiders and dominated view of industry outsiders (mean) with at least one non zero  $dargm\text{-}\beta_{it}$  in the set of expressions. \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Statement	Var	Panel A Industry outsiders				Panel B Bankers			Panel C Disagreement			
		Year	Mean	Agrm	Expr	Mean	Agrm	Expr	Mean	St. Dev.	Min	Max
		$Y$	$\bar{x}$	$agrm$	$expr$	$\bar{x}$	$agrm$	$expr$	$\bar{\Delta}$	$\sigma$	$min$	$max$
The changes in the capital adequacy rules imply restrictions on what products the bank offers	exp_9.1	16Y	4.38	92.9	51.9	4.35	78.7	48	.43	1.01	0	3.38
		17Y	4.55	78.6	48.3	4.43	71.2	55.9	.68	1.19	0	3.55
		18Y	4.27	81.5	67.5	4.26*	61	63.6	.77	1.2	0	3.27
The process of preparation for upcoming unresolved decisions implies restrictions on the business development of banks	exp_9.5	16Y	4.06	94.1	63	4.54*	83.9	63.3	.4	0.93	0	3.06
		17Y	4.11	94.7	65.5	4.48**	90.9	71	.21	0.64	0	2.11
		18Y	4.26	76	62.5	4.32	88.9	76.7	.24	0.73	0	3.26
Changes in the regulation reallocate all banks' development resources to ensure regulatory compliance $\implies$ R&D spendings $\downarrow$	exp_12.5	16Y	4.25	84.2	70.4	4.3	82	62.2	.43	0.95	0	3.25
		17Y	4.27	64.7	58.6	4.42*	82.1	72	.5	1	0	3.27
		18Y	4.35	56.7	75	4.29**	85.1	72.9	.34	0.89	0	3.35
Your bank is fast at adjusting its business model based on digitization	exp_12.7	16Y	1.5	66.7	55.6	4.37**	60.3	59.2	1.62	1.48	0	3.5
		17Y	1.71	53.8	44.8	4.29*	63	58.1	1.49	1.33	0	3.29
		18Y	1.93	63.6	55	4.33***	65.9	63.6	1.23	1.25	0	3.07
Banks need to be bigger (get more volume) in order for their processes to be optimal (win economies of scale)	exp_15.4	16Y	4.25	57.1	51.9	4.41	61.7	61.2	.93	1.25	0	3.25
		17Y	4.25	57.1	24.1	4.41	68.8	68.8	.88	1.27	0	3.25
		18Y	1.75	50	60	4.42	61.9	75.2	1.51	1.38	0	3.25
In the past 0-2 years, it has become $\uparrow$ difficult for managers recruited outside the banking industry to adapt to regulatory requirements at banks.	exp_18.6	16Y	4.36	87.5	59.3	4.39	93.9	50	.13	0.59	0	3.36
		17Y	4.5	100	55.2	4.5	95.1	65.6	.13	0.55	0	2.5
		18Y	4.41	91.7	60	4.49	90	62	.21	0.75	0	3.41
<b>Growth [N=284]</b>		<i>growth</i>							10.44	6.53	4.25	36.51