Norwegian School of Economics

Bergen, Spring 2024

Savings Banks or Super Banks?

An Empirical Study on the Impact of Equity Certificates' Unique Features on Pricing

Sverre Sandrup Futsæter & Henrik Blekeli Spiten

Supervisor: Karin Thorburn

Master Thesis, Economics and Business Administration

Major: Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

Acknowledgements

This thesis marks our completion of the Master of Science in Economics & Business Administration program at the Norwegian School of Economics. Given our shared interest in Norwegian capital markets and our major in Financial Economics, we aimed to select a topic that is both of current interest and where our research could make a valuable contribution.

Following productive discussions with our supervisor, Professor Karin Thorburn, we were inspired to explore the pressing matter of Norwegian savings banks and their unique Equity Certificates. The gap in existing literature on Equity Certificate pricing further motivated us to conduct an empirical study on this topic. We would like to express our sincere gratitude to Professor Karin Thorburn for her invaluable expertise, guidance, support, and straightforwardness throughout the writing process. Her confidence in our ability to examine this predominately unexplored field of research has been encouraging.

Acquiring an in-depth understanding of this historically significant and relevant topic has been a rewarding challenge. We would like to extend our gratitude to Fridtjof Berents (Toluma), Joar Johnsen (Eksfin), Håkon Astrup (DNB Markets), and Marina Tarakanova (Norne Securities) for invaluable discussions and insights during various phases of our thesis.

Finally, we would like to thank our families and girlfriends for their unwavering support, fellow students for making our five years of studies such a memorable time, and each other for a great partnership throughout the process.

Norwegian School of Economics

Bergen, June 2024

Sverre Sandrup Futsæter

Henrik Blekeli Spiten

Abstract

Equity Certificates ("ECs") have been pivotal in providing Norwegian savings banks with access to capital and maintaining their competitive market position. ECs are distinctively characterized by their complex equity structure, downside protection, and limited voting rights. Despite ECs' significance, their pricing dynamics have been subject to meager academic research, partly due to being confined to the small Norwegian market. This motivated us to conduct a preliminary empirical study on the impact of ECs' unique features on pricing. Specifically, we hypothesize that (1) the market values the downside protection in ECs, and (2) their unique features contribute to pricing discrepancies compared to shares.

We investigate our hypotheses through panel data regressions utilizing the Price-to-Book ("P/B") ratio as a dependent variable. For all models, we utilize a self-constructed novel dataset of all listed Norwegian savings banks with 1764 unique bank-quarter observations, from 2005-Q1 to 2023-Q4. This research is an initial step toward building a solid foundation rooted in empirical analysis on the subject of EC pricing dynamics.

We find a positive relationship between the downside protection of ECs and the P/B ratio. However, we find inconclusive evidence that this positive effect is greater during periods of financial instability, contrary to what financial theory would suggest. Our models' inability to yield conclusive results during crises may be attributed to ambiguous interpretations of the downside protection proxies in such periods. Surprisingly, being an EC bank, as opposed to a share bank, seems to negatively influence pricing. This implies that ECs' downside protection is overshadowed by features such as instrument complexity and limited voting rights. Finally, our quasi-experiment yields inconclusive results on the effect of converting ECs to shares.

Overall, the thesis concludes that the market understands the unique equity structure of ECs, at least to some extent, and prices them accordingly. Beyond the pricing dynamics, our research raises questions about whether the capital structure serves its intended purpose. Thus, the findings of our thesis may offer meaningful insights to key stakeholders.

Keywords – Equity Certificates, Norwegian Savings Banks, Price-to-Book Ratio

Table of Contents

List of Figures

List of Tables

1 Introduction

Savings banks play a crucial role in Norwegian society, but their capital structure is currently undergoing investigation. For over two centuries, savings banks have shaped local communities through safe-keeping savings, handing out gifts, and facilitating loan access to both consumers and companies. With 86 savings banks spread across the country, the Norwegian banking industry is far less consolidated than its European counterparts. A critical component in ensuring the longevity of Norwegian savings banks has been their unique equity instrument: Equity Certificates ("ECs"). In this thesis, we will examine the impact of ECs' unique features on pricing.

Since their inception in 1987, ECs have been pivotal in providing savings banks with access to capital and maintaining their competitive market position. However, the European Banking Authority ("EBA") has recently criticized ECs as an equity instrument (Finanstilsynet, 2022). More specifically, their criticism targets the complex equity structure of ECs and asymmetric participation in gains and losses, resulting in the on-going investigation commissioned by the Ministry of Finance. The unique features of savings banks and their pricing have caught the attention of several stakeholders, such as Gaute Eie (2024), CIO of Eika Kapitalforvaltning:

"Savings banks is the last mispriced pocket globally. If foreigners understood the low risk they would come running, but they don't."

Such mispricing may be related to the reduced downside risk exposure in ECs compared to shares, due to the way losses are distributed. The equity of EC banks is divided into two groups: (1) EC capital which is held by EC investors, and (2) Ownerless Capital which in theory is owned by society. The core reason why ECs may have reduced downside risk exposure is that losses are distributed regardless of their ownership of total equity, but rather based on a loss-hierarchy where the Ownerless Capital has less priority. Consequently, the Ownerless Capital may cover losses above their proportional share. Due to these dynamics, ECs are also known as "shares with airbags".

In line with financial theory, the downside protection outlined above should be valued by investors. However, ECs are unique to Norway, and there is a gap in the literature on the topic of EC pricing dynamics. Moreover, beyond their risk-reduction capabilities, ECs are also distinctively characterized by a complex capital structure and limited owner rights, which may not be fully understood by the market. These uncertain and unexplored surroundings around the pressing matter of ECs have sparked our curiosity, motivating us to conduct a preliminary empirical study based on the following research question:

How does the market price Norwegian Equity Certificates?

In this thesis, we will examine the impact of ECs' unique features on pricing. More specifically, we posit that (1) the market values the downside protection in ECs, and (2) the distinctive characteristics of ECs lead to pricing discrepancies compared to shares. We use the Price-to-Book ("P/B") ratio as a dependent variable and various risk-reduction proxies and instrument type as independent variables in a series of panel data regression models. Additionally, we employ a Difference-in-Differences ("DiD") approach to analyze the effect of converting ECs to shares. For all our models, we utilize a self-constructed novel dataset of all listed Norwegian savings banks with 1764 unique bank-quarter observations, from 2005-Q1 to 2023-Q4.

We find that increased downside protection captured by our selected risk-reduction proxies ("RRPs"), exhibits a significant positive relationship with the P/B ratio of EC banks. This relationship is robust across all three RRPs. Discovering this pricing effect implies that the market understands the complex equity structure and prices ECs accordingly. Yet, it remains uncertain as to whether the pricing dynamics fully capture the reduced risk exposure. Moreover, the risk-reducing capabilities of ECs do not exhibit a significantly greater effect on pricing during periods of financial instability, contrary to what financial theory would suggest. However, a greater impact in crises cannot be ruled out, as our RRPs may inherently reflect solidity and other factors that are negatively correlated with the P/B ratio in such periods.

Concerning differences in pricing between ECs and shares, we find that ECs are priced at significantly lower P/B ratios, possibly due to their unique features. We posit that a combination of other factors overshadows the downside protection. This assertion is supported by our previous findings, which suggest that the market acknowledges and incorporates the risk-reduction capabilities in the pricing of ECs.

One might argue that converting from ECs to shares could crystallize value in savings banks and increase the banks' perceived value. However, our quasi-experiment does not yield conclusive results on the effect of converting ECs to shares and should not be interpreted with causality due to several limiting factors.

Beyond the pricing dynamics of ECs, we find reasons to suggest that ECs may not be the optimal equity instrument for savings banks if the goal is to ensure the long-lasting tradition of giving back to society. This is due to the intricate mechanisms and potentially dysfunctional incentive structures within the unique equity structure of ECs, which may raise questions about whether the capital structure serves its intended purpose.

The findings of our thesis provide meaningful insights to the savings banks, investors, regulators, and commentators. Furthermore, our novel contribution to academic literature highlights the existing gaps in the literature and need for further research. But perhaps more importantly – the results could influence the direction of savings banks going forward.

The overall aim of this thesis is to increase understanding of EC pricing dynamics. First, we provide an in-depth examination of the background and framework of savings banks and ECs, along with applicable financial theories in Chapter 2 and 3, respectively. Our aim is to establish a robust foundation that will be applied throughout this thesis. We build on this foundation to intuitively develop our hypotheses in Chapter 4, which are designed to explore our main research question. Subsequently, we construct a data sample tailored to our hypotheses and empirical methodology and outline the data sampling process in Chapter 5. We then empirically test these hypotheses by formulating a methodological approach presented in Chapter 6. In Chapter 7, we present and analyze the results of our methodological approach and discuss potential implications of our findings. Finally, we conclude our thesis by summarizing the findings and their potential implications in Chapter 8.

2 Background & Framework

To establish a robust foundation for our study, we aim to provide a detailed framework for understanding ECs and their role as equity instruments in savings banks. Consequently, this chapter will first outline the background and history of Norwegian savings banks. We will then narrow our focus to the mechanisms behind ECs and their distinctive characteristics.

2.1 History of Norwegian Savings Banks

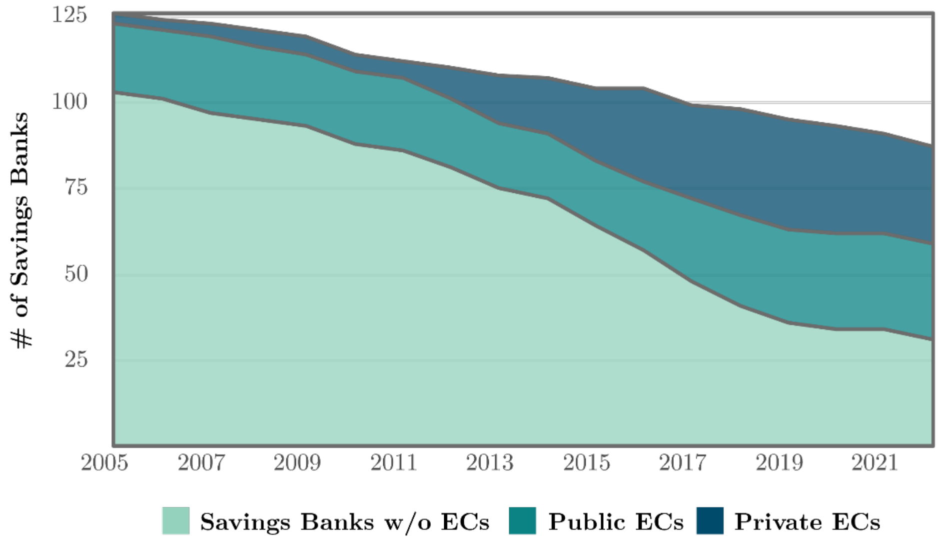
The history of Norwegian savings banks begins with the establishment of Christiania Sparebank in 1822 to offer the public a safe place for their savings (Meinich, 2023). Over the following decades, the number of banks increased in response to rising demand for both borrowing and saving, peaking at more than 600 banks in the 1930s.

The banks originally received funding from contributors in the local community, who injected capital to establish the savings bank and received a place on the Board of Trustees (Meinich, 2023). As a result, the founding capital was ownerless, and the banks became ownerless institutions. Therefore, the main characteristic of a savings bank is that the entire bank, or a part of it is ownerless (Sparebankforeningen, 2023). Since the founding capital of savings banks originates from society, the banks donate portions of their earnings back to society for public benefit from the Ownerless Capital.

Originally, the distinctive capital structure of savings banks only allowed for growth in equity through retained earnings (Meinich, 2023). With increased competition in the 1960s, the number of savings banks plummeted the following 30 years. However, in 1987 the savings banks were allowed to issue ECs to defend their market position from increasing international competition. The first ECs were issued the following year, and over the next decades, other banks followed. As of 2024, 86 savings banks remain, and 68 of them have issued ECs (Sparebankforeningen, 2023), as detailed in Figure 1 on the following page.

Figure 1: Evolution of ECs in Norwegian Savings Banks

The stacked line chart presents the annual distribution of savings banks in Norway from 2005 to 2022 categorized by their issuance of ECs (Bankenes Sikringsfond, 2024). The number of banks has steadily declined since 2005 due to market consolidation. There has been a relative increase in the use of ECs, particularly in private savings banks.



Market consolidation in the banking industry is a well-known global phenomenon. This consolidation primarily stems from advancements in digitalization, accompanied by heightened governance and reporting requirements. Conversely, the Norwegian banking industry is less concentrated than its European peer countries, largely due to the continued existence of local savings banks (Menon Economics, 2023). Savings banks have survived by forming alliances, where they share technology platforms, asset management, insurance, and other services (Sparebankforeningen, 2024). This has allowed the savings banks to remain cost efficient and competitive in the Norwegian banking industry.

ECs have also been instrumental in providing access to capital and ensuring the continued survival of savings banks. However, in recent years, the EBA has criticized ECs as an equity instrument (Finanstilsynet, 2022). Their criticism specifically targets the design of the EC instrument and its complexity. For ECs to be added to EBA's CET1 list[1] these issues must

[1] EBA keeps an updated list of Common Equity Tier 1 (CET1) instruments of EU institutions. This list is monitored and updated on a regular basis.

be addressed (European Banking Authority, 2022). As a result, the Ministry of Finance has commissioned a public investigation into the Norwegian Savings banks' capital structure. The committee is set to present its assessments in late 2024. What are these unique ECs that have supported the longevity of Norwegian savings banks and now face scrutiny from the EBA?

2.2 Equity Certificates

ECs as an equity instrument is unique to Norway with its own distinctive characteristics. In this section, we will break down the mechanisms behind ECs and their function for savings banks. ECs two main functions are raising capital and acting as a means of settlement in mergers or acquisitions, thus aligning them in motive with shares (Banklovkommisjonen, 2009). In 2009 new legislation came into effect, aimed at making ECs a more attractive financial instrument for investors, while preserving the traditional savings bank structure. As a result, ECs became more akin to shares and the different equity groups were treated more equally. In the following subsections, we will elaborate on ECs' mechanisms following this legislative change, and briefly review ECs' investor characteristics. There are mainly two distinctions that separates ECs from shares: (1) the equity structure, and (2) the voting rights.

2.2.1 The Unique Equity Structure of Equity Certificates

Equity Structure

The equity structure of EC banks is unique in that the equity is divided into two groups: Ownerless Capital and EC capital. The former is owned by the bank itself and consists of the founding capital and retained earnings accumulated on the founding capital, thus making it ownerless (Sparebankforeningen, 2021). On the balance sheet, the Ownerless Capital is reflected in the primary capital fund, the gift fund, and the compensation fund. Conversely, the EC capital belongs to the EC owners which consists of paid-in capital along with its respective accumulated returns. On the balance sheet, this equity group is reflected in the equity certificates, the premium fund, and the Equalization Reserve ("EQR").

Profit & Loss Distribution

A key distinction of ECs compared to shares lies in the distribution of earnings to equity holders. While shareholders are entitled to a claim on the entire equity, EC holders have claims only on the EC capital's share of the total equity. This share is termed the EC fraction and is used to proportionally distribute profits to the EC capital and Ownerless Capital (Banklovkommisjonen, 2009). The EC fraction represents the ratio of EC capital to the total book value of equity and is calculated at year end to distribute profits in the subsequent year.

For example, if the EC capital constitutes 25% of the equity at the end of 2022, then 25% of the profits in 2023 will be allocated to the EQR, with the remaining 75% going to the primary capital fund that belongs to the Ownerless Capital. Ceteris paribus, the EC fraction may increase within the year through new issuance of ECs or through contributions to society from the Ownerless Capital. Conversely, the EC fraction decreases if dividends to EC holders from the EQR exceeds gift distributions. In fact, many investors are skeptical of decreasing EC fractions over time due to disproportionate high dividends to EC holders.

Distributing gifts to society may help maintain a fixed EC fraction over time. However, not all banks distribute gifts to society from the Ownerless Capital. Several banks have converted parts of their Ownerless Capital to a trust which owns ECs in the Bank. This is usually done in accordance with an EC issuance, merger, or other changes in the equity structure. For example, Sparebanken Østlandet has a trust owning roughly half of all issued ECs, and also Ownerless Capital owning 30% of the total equity. The trusts receive dividends like regular EC holders and are among Norway's largest contributors to society through gifts.

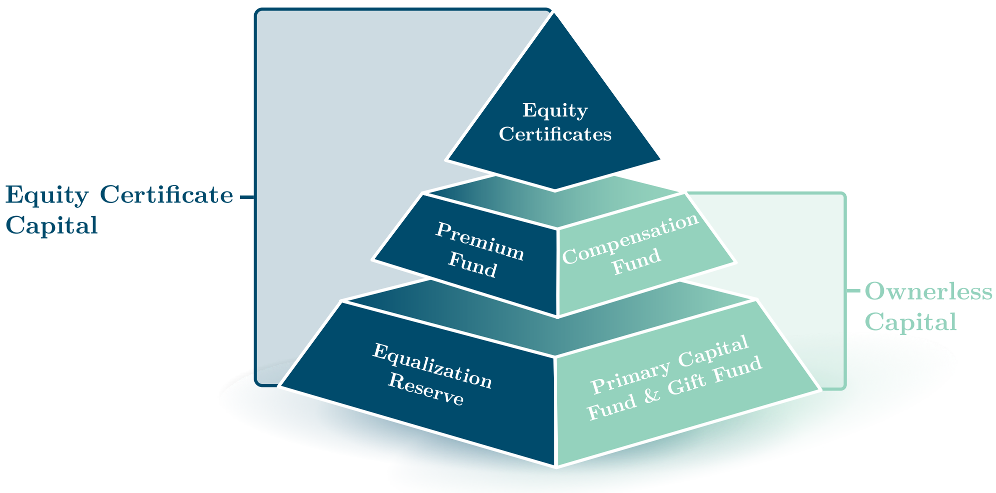
Another approach to maintain a fixed EC fraction is introducing customer dividends. Then, profits allocated to the Ownerless Capital is distributed as dividends to the banks customers based on the size of their loans and deposits. This may maintain a fixed EC fraction as an equal amount of capital is distributed from both equity groups.

The method of distributing profits through the EC fraction is to some extent fundamentally similar to that of shares, and if the EC fraction is 100%, they are identical. Even with an EC fraction of less than 100%, the core pricing dynamics remain largely unaffected, except for adjustments relative to the proportional claim on equity. Ceteris paribus, the price of an EC bank should simply be the share price of an identical bank multiplied with the EC fraction. However, what sets the equity structure of EC banks apart is the distribution of losses.

While profits are proportionally distributed to the EC capital and Ownerless Capital in line with the EC fraction, the distribution of losses follows a different mechanism. This is due to the hierarchy of loss absorption in EC banks, as depicted in Figure 2.

Figure 2: Hierarchy of Loss Absorption in EC Banks

This figure illustrates the hierarchy at which losses are absorbed. Losses are absorbed with priority from the bottom tier to the top tier. The bottom tier consists of the EQR, the primary capital fund, and the gift fund, while the second tier consists of the premium fund and compensation fund. Equity certificates are located at the top of the hierarchy. Unlike profits, which are distributed in line with the EC fraction, losses are allocated proportionally based on the ratio of the EQR to the total capital at the bottom tier. The funds at each level must be depleted before moving up to the next tier.



As illustrated by Figure 2, losses are absorbed with priority from the bottom tier, where the Tier 3 ("T3") EC capital and Ownerless Capital are located. Loss allocation adheres to the ratio of the T3 EC capital to the total T3 capital (Banklovkommisjonen, 2009), and we term this ratio the T3 fraction. In other words, losses are distributed regardless of the EC fraction, creating a divergence between the ownership of profits and losses. This is the asymmetric participation in gains and losses that EBA has criticized, and contrasts with the harmony in earnings distribution found in traditional share banks.

The above dynamics predominantly favors EC holders as the majority of EC capital is positioned at the top of the loss hierarchy. In contrast, most of the Ownerless Capital is located at the bottom tier. Consequently, the EC fraction typically exceeds the T3 fraction, allowing EC holders to benefit more from profits while bearing a smaller proportion of losses. This disparity can be further exacerbated following a loss, as the Ownerless Capital disproportionally covers these losses. As a result, the EC fraction increases, while the T3 fraction remains unaffected.

To illustrate the extent of potential downside protection for investors in EC banks, one might consider the case of Hol Sparebank. In 2008, Hol Sparebank incurred a loss fully absorbed by its Ownerless Capital as the EQR was insignificant, yielding a T3 fraction of 0%. Conversely, the EC fraction stood at 26% and increased by 0.5 percentage points due to the above outlined dynamics. Therefore, in the subsequent profitable year, the EC holders received 26.5% of the profits. This demonstrates how the EC holders suffered zero consequences from the poor performance in 2008 and even increased their profit share in the following year. Essentially, the EQR may act as a cap on downside risk exposure for EC holders, provided the Ownerless Capital is able to absorb any losses above this threshold. These protective features are why ECs are often referred to as “shares with airbags” (Slyngstadli, 2022).

Value of Downside Protection

Continuing from the above premise, the commonly emphasized downside protection in ECs primarily depends on the size of the EQR relative to the T3 Ownerless Capital, and the degree of divergence from the EC fraction. In fact, ECs can be considered a risk-free investment if the EQR is depleted and the T3 Ownerless Capital is sufficient to cover any potential losses. However, the “airbag” is not infinite. Nevertheless, the loss distribution still favors the EC capital, and we can estimate a hypothetical value of ECs’ unique loss properties, as illustrated in Figure 3 on the next page.

Figure 3: Value of Downside Protection in ECs

This figure illustrates a hypothetical value of loss distribution to EC holders in the left column and Ownerless Capital in the right column and is based on interpretation of the legislation of 2009 (Banklovkommisjonen, 2009). The size of the T3 capital of each equity group and net income loss is provided in the first row. The difference between the proportional share according to the EC fraction and the actual loss distribution share (T3 fraction) quantifies the value of the unique loss distribution mechanics for each equity group. Observe that the payoffs bear similarities with those of a call option as we will later discuss in Section 3.4.

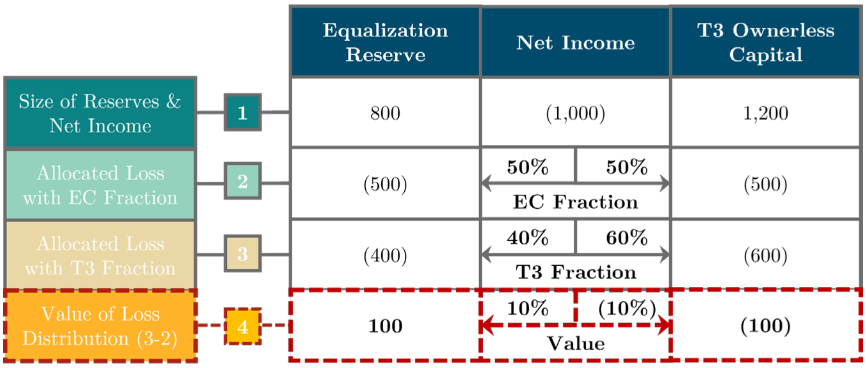


Figure 3 presents a scenario where an EC bank incurs a loss of $1,000. In line with the EC fraction of 50%, the proportional share of the loss to EC holders, based on their equity ownership, is $500. However, losses are distributed according to the T3 fraction, resulting in a disproportionate coverage of losses. Consequently, the EC capital contributes only $400 toward their proportional loss of $500, as measured by their ownership in the savings bank. Thus, in this example, the value of the reduced downside risk exposure is represented by the difference between their proportional share and the actual loss covered. Specifically, the value to EC holders is $100, or 10% of the absolute loss. This value effectively arises from a wealth transfer from the Ownerless Capital to the EC capital - there is no such thing as a free lunch.

2.2.2 Voting Rights

The other main distinction that separates ECs from shares is voting rights. While shareholders possess 100% of the voting rights in a firm, EC holders are prohibited from having the majority vote. In this subsection, we will briefly expand on why that is.

Voting rights are distributed between the two equity groups. EC holders possess 20 to 40 percent of the votes at The General Assembly ("GA"), either individually or through representatives. The exact percentage is determined by each bank in their statutes and is independent of the EC fraction. As a result, EC owners could have a voting share that is either smaller or larger than their equity share in the bank.

The main reason for restricting EC owners' voting rights is to prevent them from achieving a majority position at the GA, regardless of their equity ownership in the bank. This restriction is designed to ensure that savings banks remain controlled by the local community and to deter external investors from acting against the interests of these communities. Legislative changes in 2009 allowed banks to implement special majority requirements (two-thirds of EC owner votes) for decisions specifically concerning the EC capital. Such decisions could include raising or reducing EC capital, mergers, and converting ECs to shares. Each bank must individually decide whether to incorporate these special majority requirements and determine which decisions they will apply to.

Further, distribution of dividends and protection against dilution have been of concern to investors. Prior to 2009, legislation restricted the size of gifts to society from the Ownerless Capital, while there were no similar restrictions on dividends to EC holders. As a result, the EC fraction of total equity was gradually diluted. The 2009 legislative changes were intended to prevent this dilution and to equalize the treatment of the two forms of equity. The committee advocated for maintaining a stable EC fraction over time. Despite these changes, unequal distribution of earnings and accompanying dilution have persisted. For example, the EC fraction of Sparebanken Øst has experienced a consistent annual decline since 2009.

Today, most of the largest EC banks have incorporated special majority requirements to protect the best interests of EC owners and make them more appealing to investors. Nevertheless, restricted voting rights remains a drawback of ECs, and investors must individually decide how much this is emphasized.

2.2.3 Investor Characteristics

Given that ECs represent a unique equity instrument confined to Norway, we aimed to identify what differentiates EC investors from conventional investors through interviews with industry professionals. The interviews followed a semi-structural framework, and we tailored a broad interview guide for each interview. An overview of interview participants is provided in Table 9 of Appendix 10.1. In this final subsection of the chapter, we briefly outline the distinctive investor characteristics that we identified in the interviews. Two main distinctions emerged: (1) foreign investor skepticism, and (2) the perception of ECs as a savings product.

Industry experts emphasized a general skepticism among foreign investors towards ECs. As ECs are unique to Norway with no similar equity instruments abroad, foreign investors often struggle to comprehend their complex mechanisms. This uncertainty is generally undesirable. Given Norway's small market size, foreign investors tend to avoid ECs altogether rather taking the time to understand their features. If an investor wants exposure to the Norwegian banking sector or broader economy, DNB or Oslo Børs Benchmark Index ("OSEBX") can be used as vehicles. Notably, ECs are also mostly excluded from major Norwegian indices. Thus, foreign EC investors are typically sophisticated investors specialized in the financial sector.

The second identified distinction is that a significant portion of the Norwegian EC investor base treat ECs as a savings vehicle rather than a typical investment. These investors are usually less sophisticated, and opt to use ECs as a stable, long-term savings product within their local bank due to their relatively high and stable dividends. This demographic can be characterized as being non-active traders that are more price inelastic as they do not engage in rigorous portfolio assessments. A subset of these long-term investors are the trusts made up of converted Ownerless Capital from merged banks. The trusts are mandated to serve as stable owners and aim to continue the savings banks' legacy (Sparebankforeningen, 2021).

These investor characteristics suggest that ECs may inherently be less liquid (trade less frequently) than shares, ceteris paribus. Firstly, there is a lack of foreign investor interest, and the subset of interested foreign investors are typically specialized in the financial sector. To some extent, this makes their choice to invest conditional on their specific investment mandates. Secondly, the prevalence of local, non-active traders who are less price-sensitive can further restrain liquidity. This effect is exacerbated by ECs' exclusion from major indices. Thus, we posit that the liquidity and investor characteristics of ECs are important, distinctive factors that should be considered in our empirical approach. In fact, SR-Bank's conversion from ECs to shares was partly motived by gaining better access to capital (Oslo Børs, 2010).

3 Theory

The previous chapter provided a detailed framework for understanding ECs. In this chapter, we aim to further expand upon this framework by establishing academic benchmarks that are essential for assessing EC pricing dynamics. We will introduce several influential financial theories to aid in effectively interpreting our findings and understanding their potential implications. The theories in the following sections offer insights into the risk-return tradeoff, capital structure, efficient markets, binomial options pricing, and the P/B ratio. Finally, we review previous literature and studies that relate to our research question.

3.1 The Risk-Return Tradeoff

The risk-return tradeoff is a foundational investment principle that can be applied in the context of ECs downside risk protection. This principle states that to achieve higher returns, investors must take on increasing levels of risk (Chen, 2024). In the context of investing, risk may be defined as the likelihood of losing an amount of your investment. Generally, risk can be divided into systematic and unsystematic risk (IBF, 2024). Systematic risk cannot be reduced through diversification and is inherent to the market. Unsystematic or idiosyncratic risk represents the risk of a specific security and can be eliminated through diversification. Consequently, the risk-return tradeoff does not always apply, as investors generally favor financial instruments that offer an attractive risk-reward relationship. Markowitz (1952) argues that every investor in the market is risk averse.

For example, consider two savings banks with equal expected return, but one bank has less systematic risk than the other. This could be due to one bank having ECs with inherent downside protection, as detailed in Subsection 2.2.1, as opposed to shares. Then the bank with ECs would be less sensitive to the market and exhibit less systematic risk. A risk-averse investor would prefer the EC bank in this scenario due to less systematic risk, irrespective of the investors level of risk aversion.

3.2 Capital Structure

In our previous discussion in Subsection 2.2.1, we imply that the equity structure of EC banks should influence pricing dynamics of ECs. However, Modigliani & Miller (1958) argues that, under certain assumptions, firm value is determined solely by future cash flows, regardless of how the firm is financed. When the assumptions hold, borrowing capital does not offer any advantage to issuing equity, making capital structure irrelevant to investors. In practice, real-world financial markets are affected by market frictions that violate the theorem's assumptions such as taxes, bankruptcy costs, and asymmetric information.

Donaldson (1961) presents evidence showing that firms prefer internal funds over external funds. Myers & Majluf (1984) build on these results, suggesting that information asymmetries between insiders (managers) and outsiders (investors) create an adverse selection problem. This concept is known as the pecking-order theory, which states that information-sensitive capital is the least preferred type of capital. Internal financing is favored, followed by debt, and finally equity.

Thus, in practical terms, capital structure does influence firm value. In the case of Norwegian savings banks, understanding the equity structure and its implications is crucial for assessing the value of an individual bank.

3.3 The Efficient Market Hypothesis

Accurate pricing of ECs' lower risk exposure and unique features depends on the market's understanding of the instrument and its access to relevant information. The Efficient Market Hypothesis ("EMH") argues that the capital market is efficient if it reflects all relevant information in determining security prices (Fama, 1970). Efficiency, in this context, means that investors cannot earn above-average returns without accepting above-average risks (Malkiel, 2003). Harry Roberts made the initial distinction between weak and strong market efficiency which became the classic taxonomy in Fama's review paper (Fama, 1970).

The weak form of the EMH posits that current security prices reflect only historical information. The semi-strong form of the EMH states that current security prices reflect historical price information as well as publicly available company information. Finally, the strong form of the EMH asserts that current security prices reflect all information – historical prices, public information, and insider information. In the case of pricing of ECs, the relevant information on downside protection is publicly available. Thus, if the market is efficient and the semi-strong hypothesis holds, then downside protection should be reflected in EC pricing.

3.4 Binomial Options Pricing

Option pricing theory can be applied to examine the value of downside protection in ECs. In line with financial theory, equity represents a call option on the firm's assets, with strike price equal to the face value of debt (Jonathan & Peter, 2019). As both ECs and shares are equity instruments, we can utilize the Binomial Options Pricing Model ("BOPM") to quantify the value of reduced risk exposure in ECs.

The BOPM offers a generalizable approach for option valuation and was formalized by Cox et al. (1979). This model traces the payoff evolution of a given instrument, which can be used to price the underlying derivative. The BOPM assumes two possible outcomes in the next period that are each assigned specific probabilities, and the weighted average outcome discounted at the risk-free rate returns the option value.

Consider a bank with shares where the firm value is $6,000 in the up state and $5,000 in the down state, with equal probabilities of 50% for each scenario. The face value of debt is $1,000, and the risk-free rate is 5%. Under these conditions, the equity value is $4,286, as illustrated in the binomial payoff tree on the following page.

T=	0	1	Calculations	
		5,000	(6,000 – 1000)	
Equity Value	4,286		$\frac{(5{,}000 + 4{,}000) \cdot 50\%}{(1 + 5\%)^1}$	(3.1)
		4,000	(5,000 – 1000)	

Now suppose the exact same bank has ECs instead, and that the payoff to equity holders in the down state is increased by $100, as previously illustrated in Figure 3. This is due to the Ownerless Capital covering losses above their proportional share. The up state is unaffected. Thus, the value of the instrument being an EC as opposed to shares, ceteris paribus, is:

$$\text{Value of Downside Protection} = \frac{(0 + 100) \cdot 50\%}{(1 + 5\%)^1} \approx 48 \tag{3.2}$$

Consequently, the price increases by 1.11% (48 / 4,286) due to the unique equity structure of ECs. From the above equations, we see that this value depends on the extent of disproportionate allocation of losses, which is contingent upon the divergence of profit and loss ownership, the likelihood of the down state, and the size of the loss. Moreover, the value also depends on the discount factor and how far into the future it can be realized. As a result, the impact of downside protection should intuitively be more pronounced in volatile and risky banks or during periods of financial instability.

Note that the unique equity structure of ECs having a value is not a violation of the capital structure irrelevance theorem as firm value is unaffected. The value arises from a wealth transfer from the Ownerless Capital to the EC capital.

Another insight is that the change in payoff is equivalent to reducing the face value of debt in the down state. This can be interpreted as the EC capital gaining seniority to Ownerless Capital in adverse outcomes. As a result, the equity structure of EC banks may exhibit similar traits to hybrid capital and debt.

3.5 Price-to-Book Ratio

In our analyses, we utilize the P/B ratio as a dependent variable to examine the pricing dynamics of ECs. The P/B ratio is defined as the ratio of a firm's market value to its book value (Bogdanova et al., 2018). This multiple can be interpreted as the market's willingness to pay a premium or discount to a firm's book value of equity. Assuming that the market is efficient, we can relate such expectations to the reduced downside risk exposure in ECs which theoretically enhances their ability to deliver excess returns. The P/B ratio is computed by dividing price by the book value of the company's equity.

$$P/B = \frac{Instrument\ Price}{Book\ Value\ of\ Equity\ per\ Instrument} \tag{3.3}$$

Note that ECs' book value solely consists of the EC capital. Alternatively, the denominator can be derived by multiplying the total book value of equity with the EC fraction.

Following Gordon & Shapiro (1956), a theoretical approach to determining the correct P/B ratio can be derived. Through their version of the Dividend Discount Model, the P/B ratio may be derived as a function of the Return on Equity ("ROE"), the Payout Ratio ("PR"), the growth rate g, and the cost of equity k. This relationship can be articulated as:

$$P/B = \frac{ROE \cdot PR \cdot (1 + g)}{k_e - g} \tag{3.4}$$

This equation depicts how the P/B ratio is an increasing function of the ROE, the PR, and the growth rate. Conversely, it is a decreasing function of the firm risk as measured by the cost of equity. The formulation can be further simplified by approximating the growth rate as a function of the ROE and the PR as shown in the equation below:

$$g = ROE \cdot (1 - PR) \tag{3.5}$$

This relationship demonstrates how a firm's growth rate can be determined by its retained earnings and ability to generate return on them. We further substitute into Equation 3.4 on the next page:

$$P/B = \frac{ROE - g}{k_e - g} \quad (3.6)$$

An important insight from the above equation is that for a stable firm, when the ROE exceeds the cost of equity, the price will surpass the book value of equity, and vice versa. This theoretical approach to determining the correct P/B ratio emphasizes the importance of growth and riskiness in market pricing.

For banks in particular, the P/B ratio is a key multiple to compare market pricing and perceived value. This significance stems from the distinct, stringent regulatory accounting practices that differ substantially from those of non-financial corporations (Bogdanova et al., 2018). As the primary operations are related to loans and other financial instruments, the book values inherently reflect the real value of their assets and liabilities.

For example, the market value of a floating rate loan should be equal to the principal. This is because the loan's future cash flows are discounted at a rate that matches the interest rate, which includes a fixed credit risk premium. If there are changes in the borrower's credit risk, stringent regulations ensure that the book value is promptly impaired. Consequently, the book value of banks typically mirrors their real value, and this establishes a benchmark P/B ratio of 1.00 for the average bank. This makes the P/B ratio one of the most favored multiples among analysts to gauge pricing and perceived value of banks; deviations from 1.00 indicate market confidence in the bank's ability to deliver future excess returns, possibly due to reduced downside risk exposure, growth opportunities, and profitability.

3.6 Literature Review

Although ECs have been around since 1988 and have played a pivotal role in the Norwegian banking industry, they have been subject to meager academic research. In this final section of the chapter, we will briefly review existing literature relevant to our research question.

Despite being exclusive to Norway, ECs have received scarce academic attention domestically. Kaaby (2010) compared the returns of ECs to DNB and the OSEBX from 1998 to 2009. The paper concludes ECs outperformed these two prior to the Great Financial Crisis (“GFC”), driven by the largest EC banks, measured by market capitalization and Assets under Management (“AuM”). Furthermore, Bøhren & Josefsen (2009) found that Norwegian savings banks exhibited similar economic efficiency regardless of their ownership structure.

Internationally, several studies have been conducted to research pricing differences across banks. As outlined in Section 3.5, the preferred metric for evaluating pricing in the banking industry is the P/B ratio. In this context, Hunter & Wall (1989) discover significant relationships between the P/B ratio and profitability, growth, and loans as a percentage of earnings assets. Net interest margins, non-performing loans, and bank efficiency ratios are also shown to be determinants of the P/B ratio (Liang & Yao, 2005). Furthermore, Bogdanova et al. (2018) find that the P/B ratio is well explained by ROE and non-performing loans across several countries. These empirically backed determinants of the P/B ratio should be considered as control variables in our analyses to effectively isolate ECs’ unique risk profile.

In their study of crisis-related shifts in the market valuation of banks, Calomiris & Nissim (2014) argue that perceptions of risk exposure in terms of leverage are crucial. Prior to the GFC, higher leverage was associated with higher market value, but during and after the crisis the relationship reversed. Therefore, it may be crucial to control for pricing prior to the GFC, for example through control variables.

The international studies cited above are highly relevant to our research question, as they assess the determinants of pricing dynamics within the banking sector. The evidence from prior literature establishes academically recognized models, sufficient to empirically evaluate determinants of pricing differences across banks. Given the scarce research on this topic in Norway, our thesis will draw upon international literature to develop our hypotheses and empirical models.

Our literature review reveals a gap in academic research on the market pricing of ECs. We add to the existing literature by conducting this preliminary study, tailored to the unique Norwegian equity instrument. This research is an initial step toward building a solid foundation rooted in empirical analysis on the subject of EC pricing dynamics.

4 Hypotheses

The examination of Norwegian banks, ECs, financial theories, and literature review in the previous chapters have yielded intriguing insights. This chapter formulates our hypotheses based on these insights and serve as a framework for our empirical research approach.

As discussed in Subsection 2.2.1, ECs should have lower downside risk exposure due to asymmetric participation in gains and losses, as losses are distributed regardless of the share of ownership of total equity. This benefits the EC holders at the expense of Ownerless Capital, as the latter absorbs losses above its proportional share. An increased size of this “airbag” relates to greater absorption of EC holders' losses. Subsequently, this should lead to a reduction in the systematic risk associated with the savings bank. As detailed in Section 3.1, financial theory suggests that investors prefer firms with lower systematic risk, given the same expected return. Thus, investors should prefer ECs with greater potential loss-absorbing capacity, ceteris paribus.

Extending this argument to market pricing, savings banks favored by investors due to their equity structure should command a higher premium than others. This line of reasoning suggests the semi-strong form of EMH holds and that prices reflect all publicly available information. Our literature review demonstrates how risk-exposure metrics are determinants of pricing in the banking industry. We posit that ECs offer an attractive risk-reward relationship and should be priced at a premium. Consequently, our main research question is:

How does the market price Norwegian Equity Certificates?

Several metrics might be employed to analyze the pricing dynamics of banks. The P/B ratio is the preferred multiple for comparing pricing across banks, as the book value of equity closely aligns to the real value. As a result, we hypothesize that ECs with downside protection due to their equity structure should have higher P/B ratios, and test the following hypothesis:

H1: ***“The downside protection of Equity Certificates has a positive effect on the bank’s Price-to-Book ratio.”***

against

H0: ***"The downside protection of Equity Certificates does not have a positive effect on the bank's Price-to-Book ratio."***

The above hypothesis aims to explain differences in pricing between ECs, attributable to their equity structure. Savings banks have a longstanding tradition in Norwegian society, and for nearly half a century ECs have been their preferred way of issuing equity. However, certain savings banks have issued shares instead, and some have even converted their ECs to shares.

If Hypothesis 1 holds and investors prefer ECs for their inherent risk-reducing attributes, then banks with ECs should generally be favored over those with shares. Moreover, the value of downside protection should increase during crises, consistent with the binomial options pricing theory outlined in Section 3.4. Conversely, ECs are also characterized by other distinctive features, such as limited voting rights, that pull investors in the opposite direction, as outlined in Subsection 2.2.2. Investors must relinquish control in exchange for downside protection.

A positive relationship between the risk-reducing capabilities of ECs and market pricing might provide evidence of how much investors emphasize the downside protection of ECs. Identifying a negative relationship between ECs and P/B ratios, relative to shares, implies that investors place greater emphasis on other factors. Such factors could be related to reduced voting rights and instrument complexity. Our insights from interviews also suggest that governance concerns in EC banks could influence market perception of ECs. Consequently, we hypothesize that there is a difference in pricing between ECs and shares, and test the following hypothesis:

H2: ***"Equity Certificates exhibit different Price-to-Book ratios than shares due to their distinctive instrument characteristics."***

against

H0: ***"Equity Certificates does not exhibit different Price-to-Book ratios than shares due to their distinctive instrument characteristics."***

In summary, our hypotheses examine pricing differences both within ECs and in comparison to shares, particularly during crisis periods, to understand how the market prices ECs. These hypotheses will serve as a framework for our data sample and methodology.

5 Data

A prerequisite for empirically testing our hypotheses is obtaining a suitable data sample to utilize in our regression models. Therefore, this chapter offers a detailed overview of the data collection process and the data sample itself. Due to unavailability of existing data, we manually compiled data from multiple sources to construct a novel dataset tailored to our research question. In the following sections, we will briefly detail each step of the process.

5.1 Data Sources

To assess the impact of ECs' unique features on pricing, we need both accounting and market data. All accounting data was manually retrieved from annual and quarterly reports published in stock exchange announcements via NewsWeb. This service is provided by Oslo Stock Exchange ("OSE") and contains all published stock exchange announcements within our study period, for both listed and delisted companies. We further used ISIN numbers and tickers to link these accounting figures with market data from Titlon (former Børsdatabasen) and Eikon. Titlon provides high quality financial data on Norwegian instruments, including historical prices adjusted for both corporate actions and dividends (UiT, 2022), while Eikon is an international financial database with high quality information on trading instruments. To ensure the accuracy of our market data, we cross-checked and compiled data from both databases into a comprehensive dataset, systematically organized into panel data in an Excel sheet. We encourage any inquiries regarding access to our data sample for research purposes.

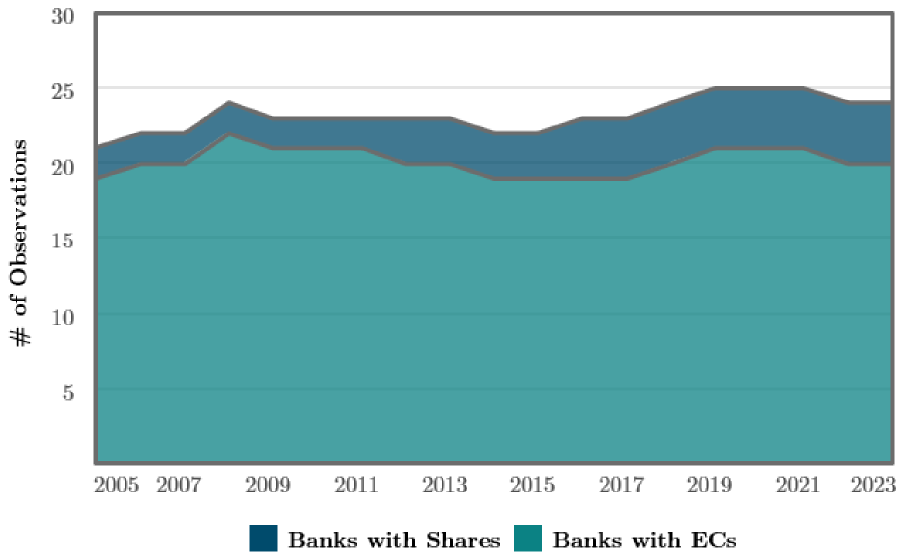
5.2 Data Sampling

The novel dataset consists of all savings banks listed on the Oslo Stock Exchange from 2005-Q1 to 2023-Q4. The Norwegian Banks' Guarantee Fund's ("NBGF") establishment in 2004 marks a natural starting point for our study period, as all Norwegian banks are compulsory members. Consequently, we used NBGF's yearly reports (Bankenes Sikringsfond, 2024) combined with Sparebankforeningen's (2024) overview of mergers between savings banks to map all savings banks from 2005 to 2023 in the following categories: (1) savings banks with ECs listed at OSE, (2) savings banks with ECs not listed on OSE, (3) savings banks with shares listed on OSE, and (4) traditional savings banks with only Ownerless Capital. To build a dataset with comparable accounting and market data across banks we moved forward with savings banks with listed ECs or shares.

Then followed an extensive process manually reviewing all financial reports of all listed savings banks, retrieving 1764 cross-section time series observations with ~ 55,000 unique accounting figures and key indicators of 35 Norwegian banks. The number of annual unique bank observations is provided in Figure 4, while an overview of the sampled banks and retrieved data points with sources is found in Table 7 and Table 8 of Appendix 10.1, respectively.

Figure 4: Annual Observations of Sampled Banks by Instrument Type

This stacked line chart displays the distribution of annual observations of banks in the Full Sample from 2005 to 2023, sorted by instrument type. The total number of observations per annum varies between 21 and 25 (mean of 23.2), the number of ECs fluctuate from 19 to 22 (mean of 20.2), while shares vary from 2 to 4 (mean of 3.0).



To analyze our hypotheses, the dataset is divided into three sub-samples: (1) the EC Sample, (2) the Full Sample, and (3) the DiD Sample. The EC Sample comprises all savings banks with listed ECs throughout the study period and is utilized to analyze the first hypothesis. The Full Sample includes all listed savings banks in the sample, both those with ECs and shares, and is employed to analyze the second hypothesis. The DiD Sample exclusively consists of banks that are included in our quasi-experiment study period.

5.3 Data Selection

We have made several assumptions and somewhat critical choices to arrive at the final data set. In this section, we will elaborate on these choices.

For certain savings banks, financial reports contain information regarding both the group and parent bank. While ECs or shares lie in the parent bank, the market value reflects the entire group. Therefore, we use the consolidated group figures in these cases, and adjust for non-controlling interests ("NCIs") and Additional Tier 1 Capital ("AT1") classified as equity.

In our data sample, we link market and accounting information at quarter-end. Due to low liquidity in some savings banks, the trading date does not always align perfectly with the end-of-quarter date. In these instances, we identify the closest available trading date prior to quarter-end and retrieve market information from that date.

Further complicating the issue, disclosed accounting information is typically not available until a month or two into the following quarter. Thus, the instrument value at quarter-end might not fully reflect the quarter's accounting information. However, this information tends to be well-known in the market before it is published, either through guidance or analyst estimates, and we assume this notion prevails. Our assumption is made with the intention of providing an accurate relationship between market and accounting information.

Lastly, the construction of a novel data set entails certain limitations. While it affords us the opportunity to conduct preliminary research on a fascinating topic, manually retrieving data comes with drawbacks. To mitigate typing errors we implemented several validation routines, for example through flagging and cross-checking significant quarterly changes in key figures utilized in our regression models. Nevertheless, we cannot guarantee the absence of typing errors. We do not believe this to be a potential issue to our analyses due to the number of observations which should limit the influence of a few potential typing errors.

6 Methodology

The previous chapters have established a solid foundation for empirically approaching our research question. Building on this framework, we will develop a suitable methodology for our study, which will be presented in this chapter. First, we introduce the selected variables from our data sample and provide corresponding descriptive statistics. Then, we detail the applied methodology in our research and evaluate the robustness of our approach.

6.1 Variables Selection

We aim to examine the impact of reduced risk exposure in the equity structure of Norwegian savings banks with ECs on the instrument's price. Specifically, we employ the P/B ratio as the dependent variable and various measures to capture the downside protection in ECs as the independent variables in our regression models. Additionally, we incorporate control variables to account for simultaneous effects and to isolate the unique characteristics of ECs. We base the selection of all variables on financial theory and insights from interviews with industry professionals. Each selected variable will be introduced in the following subsections.

6.1.1 Dependent Variable: Price-to-Book Ratio

Consistent with financial theory, the downside protection in ECs warrants compensation in the form of increased pricing. As discussed in Section 3.4, if the market "correctly" prices ECs, we posit that this increase should equal the present value of losses absorbed by the Ownerless Capital beyond its proportional share of total equity. The essence is that the extent of downside protection should positively correlate with the pricing of ECs, ceteris paribus.

We use the P/B ratio as a proxy for instrument pricing in our analyses. As outlined in Section 3.5, the P/B ratio is a widely recognized pricing multiple of banks due to the inherent nature of their book values closely reflecting real values. This multiple effectively quantifies market expectations of excess return, which in theory should be increased by reduced risk exposure. Given that the P/B ratio of savings banks has broad empirical support, we believe this measure is an apt dependent variable for our analyses. Moreover, the P/B ratio is a relative measure that should exhibit statistical properties that remain uniform over time to facilitate stationarity (Stock & Watson, 2020). We define P/B as:

$$P/B_{i,q} = \frac{Instrument\ Price_{i,q}}{(Book\ Value_{i,q} \cdot Applied\ EC\ Fraction_{i,q}) \big/ \#\ Outstanding_{i,q}} \quad (6.1)$$

where $Instrument\ Price_{i,q}$ is the instrument price of instrument i in quarter q, $Book\ Value_{i,q}$ is the book value of equity for instrument i in quarter q, $Applied\ EC\ Fraction_{i,q}$ is the applied EC fraction[2] of instrument i in quarter q, and $\#\ Outstanding_{i,q}$ is the number of ECs/shares outstanding of instrument i in quarter q. Share instruments are assigned with an EC fraction of 100% to ensure comparability. We expect our selected RRPs to be positively correlated with P/B. In line with the recommendations of Wilkins (2018), we include a lagged dependent variable derived by $P/B_{i,q\text{-}1}$ as an independent variable to mitigate autocorrelation.

6.1.2 Independent Variables: Equity Certificate Variables

As outlined in Subsection 2.2.1 and Section 3.4, the theoretical reduction in risk exposure for ECs is linked to asymmetric participation in gains and losses. In the event of a loss, the Ownerless Capital covers losses beyond its proportional share of total equity, effectively acting as an "airbag" for the EC capital. Consequently, our selected variables intended to capture the impact of risk reduction are exclusively based on the ECs' ownership of losses and the extent of divergence with the ownership of profits. Additionally, we include a dummy variable for instrument type in our regression models that compares ECs with shares.

Risk Reduction Proxies: *T3 Fraction, Relative T3 Fraction* & EQRM

We propose three proxies to capture the impact of downside protection in ECs. Each proxy is a slight variation designed to quantify downside risk exposure for EC holders and its

[2] In our study, we distinguish between actual and applied EC fractions, as well as T3 fractions. The applied fractions are calculated at the end of a year or following an equity issuance. These metrics determine how profits and losses will be distributed for each quarter of the following year. Consequently, they exhibit a lag of one to four quarters. On the other hand, actual fractions represent the current EC or T3 fraction at *any* given quarter and do not have such lags. We posit that the actual fractions should be interpreted as an estimate of how *future* profits and losses are distributed.

divergence from upside returns. More intuitively, the RRPs are related to the Ownerless Capital covering a disproportionately large share of losses, effectively transferring wealth to the EC holders in the event of a loss. We design these proxies so that an increase in their values indicates an increase in downside protection. Consequently, we expect a positive correlation between the RRPs and P/B.

To address sample skewness and account for potential non-linear relationships, we add 1 to each proxy and apply a natural logarithmic transformation. Additionally, we multiply the transformed values by -1 where necessary for interpretation purposes. Note that we utilize actual T3 and EC fractions to ensure alignment with the proxies' forward-looking nature and to capture intra-year variations.

Our first proxy is the T3 fraction which is derived by the ratio of the EQR to the T3 capital. This ratio determines the proportion of potential future losses that will be distributed to the EC holders. For instance, if the T3 fraction is 25%, then 25% of any loss incurred by the bank would be absorbed by the EC holders. Intuitively, a decrease in the T3 fraction indicates that the EC capital is exposed to less downside risk. We define this RRP as follows:

$$T3\ Fraction_{i,q} = -\ log\left(1 + \frac{EQR_{i,q}}{Tier\ 3\ Capital_{i,q}}\right) \tag{6.2}$$

A limitation of *T3 Fraction* is that it does not consider the profit distribution provided by the EC fraction; it only reflects how much of potential losses are covered by EC holders. Suppose the T3 fraction is equal to the EC fraction. In that case, there is harmony in profit and loss sharing, and the earnings distribution dynamics are identical to those of shares. Therefore, we posit that the relative levels of the T3 fraction compared to the EC fraction form the basis for the value of downside protection in ECs, as discussed in Subsection 2.2.1. The greater the divergence, the higher the value of downside protection, ceteris paribus.

To address the above limitation, we introduce the relative T3 fraction. We calculate this second RRP by dividing the EC fraction by the T3 fraction. This approach enables a relatively high T3 fraction accompanied by an even higher EC fraction to reflect increased downside protection value, as the Ownerless Capital in such cases absorbs a disproportionate large share of losses. In other words, this RRP provides a tangible measure of the extent of divergence between the participation in gains and losses. We add a very small value to the T3 fraction to ensure that zero values are accounted for, and define the Relative T3 fraction as follows:

$$\textit{Relative T3 Fraction}_{i,q} \quad = \quad -\ log\left(1 + \frac{\textit{Actual EC Fraction}_{i,q}}{\textit{T3 Fraction}_{i,q} + 0.0001}\right) \qquad (6.3)$$

Note that we purposely omit the absolute difference between the T3 fraction and the EC fraction as an RRP. This is because the absolute difference is not a precise estimate of divergence; the key aspect here is the marginal effect. For instance, a variable measuring the absolute difference would consider a 1% increase in the T3 fraction or EC fraction from 1% to 2% as equivalent to an increase from 95% to 96%. However, the impact on the margin is significantly more substantial in the former scenario. This notion can also be applied to *T3 Fraction*, which we have included due to its practical application in loss distribution. Nevertheless, applying a logarithmic transformation to this variable should help mitigate the impact of potential non-linear relationships.

With our third and final RRP, we look beyond the T3 fraction to establish a tangible relationship between downside risk exposure and upside returns. Specifically, we compare the EQR to the absolute annualized net income attributable to EC holders[3], and term this the EQR margin. As outlined in Subsection 2.2.1, the EQR effectively represent the maximum loss that EC holders can incur[4], thus serving as a cap on their downside risk exposure. Conversely, we roughly assume that the absolute net income reflects the expected upside return. As such, the EQR margin provides an indirect estimate of asymmetric participation in gains and losses. In this context, a low level of risk exposure relative to a significant upside

---

[3] Net Income Attributable to EC Holders = (Consolidated Net Income – NCIs – AT1) · EC Fraction

[4] This is a broad assumption since the "airbag" is not infinite. The EQR represents a cap on downside risk exposure until the Ownerless Capital runs out. However, under most circumstances, the Ownerless Capital is sufficient to absorb losses. Thus, in practical terms, the EQR can effectively be considered as a cap on downside risk exposure.

potential suggests an increased value of downside protection. We define the EQR margin as follows:

$$EQRM_{i,q} = -\ log\left(1 + \frac{EQR_{i,q}}{|\ Net\ Income_{i,q}\ |}\right) \tag{6.4}$$

Instrument Type Dummy: *DummyEC*

To examine differences in *P/B* between ECs and shares, we introduce a dummy variable for instrument type in the models that utilizes the Full Sample. The intent is to isolate the unique characteristics of ECs not captured by the control variables. We define *DummyEC* as:

$$DummyEC_{i,q} = \begin{Bmatrix} 1 \ \ if\ i,q = EC \\ 0 \ \ if\ i,q \neq EC \end{Bmatrix} \tag{6.5}$$

where $DummyEC_{i,q}$ is equal to 1 if instrument i is an EC in quarter q, and 0 if not. We expect *DummyEC* to be positively correlated with *P/B* due to the downside protection in ECs.

6.1.3 Control Variables

There are variables beyond the RRPs and *DummyEC* that may influence *P/B*. We aim to control for such factors to isolate the unique risk profile of ECs and to address concerns with sources of endogeneity. Our selected control variables are guided by prior literature and will be presented in the following subsections.

Dummies: *Time Dummies* & *Crisis Dummies*

We implement various dummies to control for effects of interest and other macroeconomic effects in our analyses. First, we include time dummies prior to the GFC. As illustrated in Figure 6, the P/B ratios for banks with both ECs and shares were well above the benchmark of 1.00, in contrast to the more evenly distributed ratios during the post-GFC period. To ensure stationarity, we detrend this former period by incorporating five semi-annual time dummies ("Pre-2008"), starting from 2005-Q1 to 2008-Q3. This pairing approach limits the number of independent variables which we believe should be a careful consideration given the small and unbalanced data sample. To prevent overlap with the GFC, the last two time dummies are omitted in the models utilizing crisis dummies. This will be clearly indicated in the regression model excerpts by Pre-GFC as opposed to Pre-2008.

As discussed in Section 3.4, we theorize that the risk exposure reduction in ECs should have a larger impact on P/B ratios during periods of financial instability. This is due to the increased probability of imminent realization of the downside protection. We aim to test the presence of such effects by including dummies for four identified crises[5]: (1) the GFC (*Dummy08FC*), (2) the 2014 oil crisis (*Dummy14OC*), (3) the 2020 coronavirus pandemic (*DummyCP20*), and (4) the 2022 banking turbulence (*Dummy22BT*). We further include a joint crisis dummy for any of these crises' (*DummyCrisis*). Given the nature of these dummies, we anticipate that they exhibit a negative correlation with *P/B*.

Profitability: *ROE*

Profitability is a key performance measure of firms and tends to indicate competitive advantage, making profitable companies more attractive to investors (Frankel & Lee, 1998) hence affecting *P/B*. Profitability functions as a catch-all proxy for various factors that are of interest to control for in our analyses. Specifically, profitability may capture variations in operational concentration, and revenue and cost composition (e.g. retail vs. corporate lending and lending vs. financial services). Additionally, EC banks with poor performance are more likely to attain protection from the Ownerless Capital. Such factors may influence pricing.

We select ROE as our profitability proxy due to its widespread acceptance as a primary indicator of bank performance and broad empirical support (ECB, 2010). The main advantage of ROE is that this is a direct estimate of the return to equity investors and can be applied

[5] Each crisis dummy has an interval of eight quarters and starts at 2007-Q2, 2014-Q3, 2020-Q1 and 2022-Q1, respectively. Although the GFC "officially" started in 2008-Q3, signs of financial instability had already emerged within the banking sector the prior year. In the summer of 2007, subprime mortgage defaults escalated, issuance of mortgage-backed securities came to a halt, and other financial markets similarly dried up (Frame et al., 2015). This is exemplified by the significant challenges encountered by Fannie Mae and Freddie Mac in this period. Regarding the 2014 oil crisis, the start is aligned to the first quarter with brent crude oil prices below $100. The 2022 banking turbulence includes the start of the substantial interest rate hikes in 2022, and the failure of Silicon Valley Bank and Credit Suisse in 2023, with corresponding increases in credit default swaps prices and risk premiums for financial institutions (Keatinge & Joshua, 2023).

as a proxy for investors' return expectations (Bogdanova et al., 2018). In fact, the P/B ratio and ROE should move in tandem as the P/B ratio can be formulated as a function of ROE, as shown in Section 3.5. Here, the growth rate g can also be approximated by multiplying ROE with the retention rate[6]. We calculate ROE by dividing the net income attributable to equity holders by the average total book value of equity, and define ROE as:

$$ROE_{i,q} = \frac{Net\ Income_{i,q}}{\left(BoP\ Book\ Value_{i,q} + EoP\ Book\ Value_{i,q}\right) \cdot 0.5} \tag{6.6}$$

where $Net\ Income_{i,q}$ is the net income of instrument i in quarter q, BoP and $EoP\ Book\ Value_{i,q}$ is the beginning and end of period book values of equity for instrument i in quarter q. We expect ROE to be positively correlated with P/B.

Leverage: *InvCapRatio*

Leverage is frequently used as a risk proxy in equity instruments (Bowman, 1980). This is particularly relevant for the banking sector, which is characteristically highly leveraged and susceptible to macroeconomic shifts. However, Modigliani & Miller (1958) argue that in a perfect capital market, the cost of equity, which can be proxied by the average ROE, is proportional with leverage as investors are only compensated for systematic risk. Further, leverage can reflect competitive advantages, as the largest banks are able to use IRB reporting (Andersen et al., 2020). Such ambiguous interpretations may limit leverage as a risk proxy.

Nevertheless, we incorporate leverage into our regression models to isolate "real" profitability - a satisfactory ROE depends on leverage as these are proportional. For context, banks actively use leverage to attain a target ROE (Pagratis et al., 2020). Moreover, since deposits are insured, the leverage is to some extent isolated from the bank's risk. This encourages risk-

[6] While empirical studies frequently utilize the retention rate to estimate growth, we omit dividend variables in our analyses due to their ambiguous interpretations in this particular setting. The general perception is that higher dividends limits growth due to reduced reinvestment capacity (Zhou & Ruland, 2006). However, in the context of Norwegian savings banks, high dividends are expected by investors and interpreted as a sign of strength. More importantly, dividends to EC holders directly deplete the EQR, which we hypothesize should positively impact the perceived value. From an ideal EC investor perspective, the EQR should always be fully distributed through dividends, which are then reinvested. The optimal adaptation depends on the dividend tax rate and growth implications of such a dividend policy.

taking. As a result, authorities impose capital requirements to limit leverage, and bank analysts often view high leverage as a favorable factor in pricing dynamics.

Furthermore, incorporating leverage as a control variable in our models helps control for solidity. All the selected RRPs in our study inherently reflect solidity to some extent as they are related to the EQR - a component of the equity buffer. A potential complication is that the RRPs do not solely reflect the intended risk reduction properties of ECs, but also other effects that the control variables are unable to capture, such as solidity. Therefore, we maintain that including leverage as a control variable is essential.

We use the tier 1 capital ratio as a leverage proxy in our analyses due to its tightly regulated reporting and accessibility in financial statements throughout our study period. We invert the metric so that an increase in the variable is equivalent to an increase in leverage and define it as *InvCapRatio*. Given the above discussion, we anticipate *InvCapRatio* to be positively associated with *P/B*. We aim to control for risk exposure by including a separate and unambiguous independent variable.

Risk Exposure: *GLR*

Risk is pivotal to asset prices and perceived value. Moreover, the hypothetical increase in the value of ECs is likely to be more pronounced in risky and volatile banks, as discussed in Section 3.4. In our aim to control for risk exposure, we introduce a performance metric directly related to the loan portfolio of a given bank, as this is their main source of risk exposure. Further, banks are subject to stringent regulations mandating continuous loan portfolio risk assessments which reduces accounting flexibility.

We control for risk exposure by comparing loan impairments to the total gross loan portfolio. This is one of few measures that proved to be consistent and comparable across the entire study period. Moreover, loan impairments provide a direct estimate of expected future performance and volatility due to the uncertainty of loan repayments. For instance, elevated levels of loan impairments may indicate shifts in the risk profile of the loan portfolio, miscalculations in risk assessment, or fluctuations in macroeconomic conditions (Ahmed et al., 1999). We define this control variable for risk exposure on the following page as:

$$GLR_{i,q} = \frac{Loan\ Impairments_{i,q}}{Gross\ Loans_{i,q}} \quad (6.7)$$

where $Loan\ Impairments_{i,q}$ is the impairment on loans, guarantees etc. of instrument i in quarter q, and $Gross\ Loans_{i,q}$ is the total gross loans of instrument i in quarter q. We expect GLR to be negatively correlated with P/B.

Size: *MCAP*

The size of a firm is in itself a variable affecting pricing according to fundamental value theory (Berk, 1995). Size serves as a catch-all proxy for several indicators such as risk, growth potential, economies of scale, and liquidity. For instance, smaller firms typically possess less market power, diversification, and economies of scale, making them more exposed to economic fluctuations, and are inherently riskier than larger counterparts (Calomiris & Nissim, 2014). Diversification is particularly relevant in our study setting, as EC banks tend to be dispersed across Norway but concentrated within small geographic areas. Furthermore, smaller firms tend to be less mature with more growth potential (Lev, 1983). Conversely, larger firms may be able to exploit economies of scale. In the Norwegian banking sector, this advantage can be related to the largest banks being able to adopt IRB reporting, which allows for more flexible loan portfolio credit assessments and adaptable leverage (Stengrimsen & Storsletten, 2023).

We posit that the size, as measured by the market capitalization, reflects some of the above effects. We apply a natural logarithmic transformation and employ $MCAP$ as our firm size proxy, expecting $MCAP$ to be positively correlated with P/B.

Liquidity: *Illiq*

There is broad empirical support that liquidity influences pricing, and thus P/B. Illiquid instruments are less price informative and limit the ability to realize positions at acceptable prices in a timely manner (Kerr et al., 2020). Consequently, investors require compensation in the form of a liquidity premium - illiquid instruments trade at discounts. Although firm size may control for some liquidity variations, we believe that it is essential to incorporate a specific illiquidity variable. This is due to ECs' distinct investor characteristics, as detailed in Subsection 2.2.3, which may impact liquidity more than bank size alone might suggest.

We control for liquidity using the widely recognized illiquidity proxy by Amihud (2002). This measure is derived by the daily ratio of absolute return to NOK trading volume and effectively quantifies the price impact of trading activity in a low-frequency setting (Goyenko et al., 2009). In essence, an illiquid instrument exhibits greater price fluctuation in response to small amounts of trading activity. We define the illiquidity measure as:

$$Illiq_{i,q} = log\left(1 + 10^6 \frac{1}{D_{i,q}} \sum_{d=1}^{D_i} \frac{|\ return_{i,d}\ |}{turnover_{i,d}}\right) \tag{6.8}$$

where $|\ return_{i,d}\ |$ denotes the absolute return of instrument i on day d, $turnover_{i,d}$ is the trading volume of instrument i on day d, and $D_{i,q}$ is the number of daily observations of instrument i in quarter q. Quarterly arithmetic averages are employed and rescaled by 10^6 to get the Amihud illiquidity proxy. Finally, we add 1 and take the natural logarithm to mitigate sample skewness. We expect *Illiq* to be negatively correlated with *P/B*.

Net Income & Book Value Distribution: *EC Fraction*

In Subsection 6.1.1, we propose that the actual EC fraction should be interpreted as an estimate of how future net incomes and book values are distributed. As the time approaches the last quarter of a given year, this fraction converges towards the EC fraction that will be applied in the subsequent year. However, we do not include a control variable for such seasonal variations due to concerns with multicollinearity.

The intuition behind this decision is that the EC fraction directly determines changes in the T3 capital as it is used to distribute profits, which constitute the majority of bank-quarter observations. Consequently, the T3 fraction converges towards the EC fraction over time, ceteris paribus. Our exclusion of the EC fraction as a control variable is supported by separate Variance Inflation Factor ("VIF") diagnostic tests, which yielded VIFs well above the recommended threshold of 5 (James et al., 2013).

We do not believe this exclusion raise concerns with omitted variable bias, as the impact of changes in the EC fraction on price and book value should offset each other. Specifically, the EC fraction is not a determinant of the P/B ratio, especially considering that it does not influence voting power. This further implies that the RRPs using the EC fraction in their calculations are isolated on the downside protection. However, we acknowledge that changes in the EC fraction may have a small disproportionate effect on the book value relative to the price. This discrepancy is attributed to an instant proportional shift in the distribution of the book value, in contrast to the price, which is determined by *discounted* future cash flows. In this context, we posit that the impact of omitting the EC fraction should be insignificant for all practical purposes, as the discount factor should be partially captured by ROE.

6.2 Methodology

In this section, we present the econometric approaches employed to address our hypotheses outlined in Chapter 4. Our models draw upon the framework employed by Bogdanova et al. (2018) and Calomiris & Nissim (2014). We make minor adjustments to their models to align with our hypotheses. The methodology is split into three parts. First, we outline a correlational study employing a Fixed Effects ("FE") panel data regression on the EC Sample to determine the potential impact of downside protection in ECs on P/B ratios, and whether this relationship may be more pronounced in periods of financial instability. Then, we present a similar approach applied on the Full Sample to explore whether ECs exhibit higher P/B ratios than shares due to their distinctive characteristics. Finally, we outline a DiD approach to assess the impact of converting ECs to shares on the P/B ratio.

6.2.1 Correlational Study on Equity Certificates

The first phase of our analysis involves conducting panel data regressions on the EC Sample. These regressions explore the correlation between our selected RRPs and P/B. As outlined in the above section, we investigate the impact of downside protection within the unique equity structure of ECs with these proxies. Our objective is to determine their influence on how the market values ECs, and whether this aligns with the financial theories outlined in Chapter 3.

We start by developing a regression model that will be applied on the entire study period to identify potential general relationships. Subsequently, we utilize a similar approach to examine pricing dynamics during economic downturns, where we expect the unique risk profile in ECs to be more pronounced. In these case studies, we utilize interaction terms between the two most suitable RRPs and the crisis periods defined in Subsection 6.1.3. If the interaction terms are significant, this would imply that the relationship between the RRPs and *P/B* changes in these periods. We choose to utilize *T3 Fraction* and *Relative T3 Fraction* as our two selected RRPs for these interaction terms.

All regression models on the EC Sample utilize bank FE to control for intrinsic differences among banks. For instance, banks with ECs often exhibit geographical dispersion and concentration within small areas across Norway. Additionally, these banks may cater to specific customer segments, leading to variations in operational focus. Such unique time-invariant factors that may influence pricing dynamics are absorbed by each bank's intercept. As a result, controlling for bank-specific FE may mitigate omitted variable bias.

We opted not to include time FE due to the relatively small and unbalanced sample size which could lead to overfitting[7]. Moreover, the adjusted R^2 penalizes the inclusion of many independent variables. For perspective, incorporating quarterly time FE would introduce an additional 72 independent variables. Excluding these effects means that we do not control for certain time-variant factors that uniformly impacts all EC banks, such as the evolving knowledge and understanding of their unique mechanisms.

We address the potential concern mentioned above by incorporating half-yearly time dummies, spanning from 2005-Q1 to 2008-Q3. These dummies effectively serve as quasi-time FE for the specified intervals by assigning each period a unique intercept. We believe this approach sufficiently addresses potential biases in estimating the relationship between our selected independent variables and *P/B*. Moreover, empirical studies present mixed opinions on the utilization of time FE (Bogdanova, Fender, & Takats, 2018). Note that the relationship between certain independent variables and the P/B ratio may be ambiguous during periods

[7] We conducted separate regression model specifications incorporating time FE for both year and year-quarter to ensure robustness and validation. Their results align with the main inferences of our analysis in Chapter 7, and an excerpt is provided in Table 14 of Appendix 10.4.

of financial instability. For instance, leverage amplifies returns which poses a risk during such periods. Similarly, liquidity dynamics are typically distinct and defining for each specific crisis, and no liquidity measure is flawless. This issue extends to our selected RRPs.

All our selected RRPs inherently reflect solidity to some extent as they are related to the EQR - a component of the equity buffer. A potential complication is that the RRPs do not solely reflect the intended downside protection in ECs, but also other effects that the control variables are unable to capture, such as solidity. Consequently, the interpretation of the interaction terms should be approached with caution, as their association with *P/B* may be ambiguous in crises.

To address potential heteroskedasticity and autocorrelation, we employ the Arellano method to apply robust standard errors, along with an HC1 standard error correction which is typically recommended for smaller, unbalanced sample sizes (Hayes & Cai, 2007). In line with the recommendations of Cameron & Miller (2015), we cluster standard errors by entity (bank) since the data sample comprises more time periods (quarters) than the number of banks.

We implement variations of the following model for all regression models isolated on ECs:

$$P/B_{i,q} = \sum_{j=1}^{J} \gamma_j \cdot C_{j,i,q} + \sum_{t=1}^{T} \delta_t \cdot TD_{t,q} + \beta RRP_{i,q} + FE_i + \epsilon_{i,q} \tag{6.9}$$

where $P/B_{i,q}$ is the P/B ratio of instrument i in quarter q, $C_{j,i,q}$ is the control variable j for instrument i in quarter q, $TD_{t,q}$ is the time dummy variable t in quarter q, $RRP_{i,q}$ is the RRP for instrument i in quarter q, and FE_i is the bank FE for instrument i.

For the case studies analysis, we slightly modify the above model to:

$$P/B_{i,q} = \sum_{j=1}^{J} \gamma_j \cdot C_{j,i,q} + \sum_{t=1}^{T} \delta_t \cdot TD_{t,q} + \sum_{t=1}^{T} \theta_t \cdot (RRP_{i,q} \cdot TD_{t,q}) + FE_i + \epsilon_{i,q} \tag{6.10}$$

where $P/B_{i,q}$ is the P/B ratio of instrument i in quarter q, $C_{j,i,q}$ is the control variable j for instrument i in quarter q, $TD_{t,q}$ is the time dummy variable t in quarter q, $RRP_{i,q} \cdot TD_{i,q}$ is the interaction of RRP of instrument i in quarter q with time dummy period t, and FE_i is the bank FE for instrument i. Interactions are exclusive to the crisis time dummies.

6.2.2 Correlational Study on Equity Certificates Versus Shares

The second phase of our analysis builds upon the above framework, with minor adjustments applied on the Full Sample. These regressions explore the impact of banks using ECs as opposed to shares on *P/B*, ceteris paribus. To this end, we aim to isolate the distinct characteristics of ECs in the instrument type dummy through our selected control variables. Note that this isolation includes all factors that differentiate ECs from shares beyond downside protection, such as limited voting rights, instrument complexity, and governance concerns.

There is a lack of variation in the instrument type dummy, as SR-Bank is the only bank during our study period that has transitioned between ECs and shares. As bank FE remove within-entity variations, the independent variable *DummyEC* reflects the impact of using ECs for SR-Bank in isolation. Meanwhile, our goal is to uncover the broader impact of an instrument being an EC on pricing dynamics across all banks.

We adjust the methodological approach to facilitate variation for each bank by introducing interaction terms between *DummyEC* and predefined dummies that vary across time: (1) annual time dummies, (2) a dummy for the period following the 2009 legislative changes, (3) a single dummy for any crisis period, and (4) dummies for each identified crisis period. The model with annual time dummies is equivalent to yearly time FE which should capture time variant effects such as decreased investor skepticism towards ECs. We use this model to examine the general influence of ECs on *P/B*. Conversely, the other models focus on the pricing dynamics during economic downturns, where we expect the unique risk profile in ECs to be more pronounced. The interaction terms can be interpreted as the impact of using ECs as opposed to shares on *P/B* during these periods.

All regression models on the Full Sample are variations of the following model:

$$P/B_{i,q} = \sum_{j=1}^{J} \gamma_j \cdot C_{j,i,q} + \sum_{t=1}^{T} \delta_t \cdot TD_{t,q} + \sum_{t=1}^{T} \theta_t \cdot (DummyEC_{i,q} \cdot TD_{t,q}) + FE_i + \epsilon_{i,q} \quad (6.11)$$

where $P/B_{i,q}$ is the P/B ratio of instrument i in quarter q, $C_{j,i,q}$ is the control variable j for instrument i in quarter q, $TD_{t,q}$ is the time dummy variable t in quarter q, $DummyEC_{i,q} \cdot TD_{i,q}$ is the interaction of instrument i being an EC in quarter q during time dummy period t, and FE_i is the bank FE for instrument i.

6.2.3 Quasi-Experiment on Equity Certificate Conversion

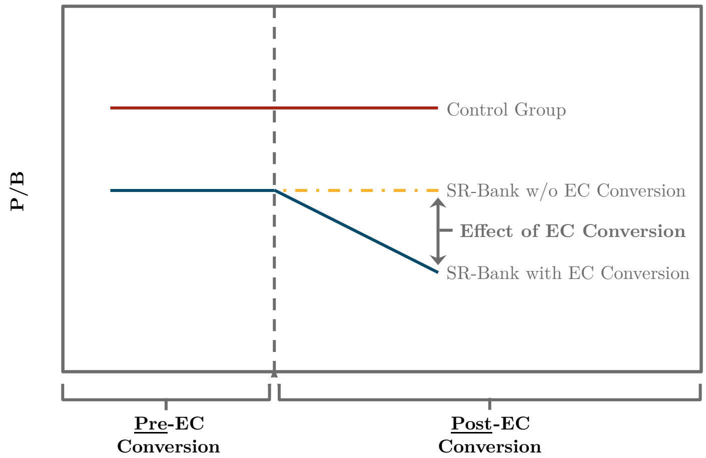
In the final phase of our analysis, we extend on the above examination by exploring the relationship between instrument conversion and *P/B*. Specifically, we aim to do this by applying instrument conversion as a treatment in a DiD statistical technique. We anticipate a negative impact of converting ECs to shares due to the downside protection offered by ECs.

Our study centers on SR-Bank which is the only bank that has converted ECs to shares within our study period. This is the only conversion other than Gjensidige NOR (now merged into DNB) in 2003 that has taken place (Finanskomiteen, 2003). We acknowledge that a single instance of treatment constraints our ability to establish causal inference. However, considering the ongoing uncertainty surrounding ECs, we find this event particularly relevant. This quasi-experiment is rather conducted to enrich our understanding of EC conversion.

DiD analysis presume random assignment of treatment, a condition that is not satisfied in the case of SR-Bank. The primary motivation behind SR-Bank's conversion was to appeal to increase capital access, which suggests that the conversion was strategic rather than random. In such cases, researchers often conduct quasi-experiments by comparing the treatment group to a control group that did not receive treatment (Stock & Watson, 2020). To isolate the effect of the conversion, we determine a control group comprising banks that did not convert their ECs throughout the study period. The intuition is that in the absence of conversion, SR-Bank would have followed the same trend as the control group, as illustrated in Figure 5 on the next page. This is known as the parallel trends assumption.

Figure 5: The Parallel Trends Assumption

This line chart illustrates the intuition behind the parallel trends assumption in the DiD approach. In the pre-treatment period, SR-Bank and the control group follows the same trend which should continue in the post-treatment period in the absence of treatment. Thus, the difference in differences of the P/B ratio between the pre- and post-treatment period reflects the effect of converting ECs to shares.



We construct the control group through Propensity Score Matching ("PSM") based on ECs publicly traded in the eight quarters pre- and post-treatment. PSM is a logit-regression model that estimates the probability of conversion based on predefined key characteristics (Heinrich et al., 2010). We employ our defined variables for profitability, size, illiquidity, and EC fraction as the characteristics, and perform nearest neighbor matching to identify the five EC banks most likely to convert. This ensures that their inclusion is as if it was subject to random assignment. An overview of the control group is provided in Table 7 of Appendix 10.1.

Although SR-Bank officially converted in 2012-Q1, the conversion date might not perfectly reflect when the market priced the effect of conversion. Assuming the semi-strong form of EMH holds and the market instantly prices new information, a determining factor is the market's interpretation of the conversion probability prior to the conversion date. Further, this relied on the terms of the conversion and final approval. Thus, several dates prior to the conversion could be of interest, like the announcement date or approval date. After careful consideration, we posit that the formal approval of conversion best reflects when the full effect was priced by the market. The Finance Department of Norway gave its final approval on the 21st of June 2011 (Oslo Børs, 2011), confirming the terms of the conversion. The market should then have swiftly adjusted to price in the expectation of an imminent EC conversion. Consequently, we designate 2011-Q2 as the first quarter with treatment.

All DiD regression models on the DiD Sample are variations of the following model:

$$P/B_{i,q} = \alpha + \beta_1 Treated_i + \beta_2 PostTreatment_{i,q} + \beta_3 (Treated_i \cdot PostTreatment_{i,q}) + \epsilon_{i,q} \quad (6.12)$$

where $P/B_{i,q}$ is the P/B ratio of instrument i in quarter q, $Treated_i$ is a dummy variable indicating whether or not instrument i was converted to shares, and $PostTreatment_{i,q}$ is a dummy variable indicating whether an observation of instrument i in quarter q was after SR-Bank's conversion. Hence, $Treated_i$ captures the difference in $P/B_{i,q}$ between SR-Bank and the control group, while $PostTreatment_{i,q}$ captures the difference in $P/B_{i,q}$ after conversion. The $Treated_i \cdot PostTreatment_{i,q}$ interaction term measures SR-Bank's effect of converting to shares. Furthermore, we include other specifications of the original model, using the same control variables ($C_{j,i,q}$) as the previous analyses and with bank FE (FE_i).

6.3 Descriptive Statistics

To effectively analyze the regression results, we aim to enhance understanding of key metrics and provide deeper insights. In this section, we present descriptive statistics of the data used in our analyses. Initially, we provide basic statistics for the dependent and independent variables. We then briefly review the trends of *P/B* in the Full Sample and the DiD Sample.

Table 1 provides information on the data employed in the regressions. Figure 6 and Figure 7 illustrates the development of *P/B* throughout the study period of the correlational studies and quasi-experiment, respectively. Corresponding tables for the EC Sample and the DiD Sample are provided in Table 10 and Table 11 of Appendix 10.2. We do not winsorize any of the continuous variables, positing that the natural logarithm transformation sufficiently mitigates the impact of statistical outliers. Additionally, excessive adjustment could counteract its intended purpose and potentially introduce more skewness than it eliminates (Foster, 1980). There are missing values for the first observation of ROE for each bank as the denominator is based on an average value. This does not impact the number of observations utilized in our regressions as the lagged *P/B* is included as an independent variable. Thus, the first bank-quarter observation of each variable is omitted in the regression models. Finally, the EC fraction is included for illustrative purposes due to its impact on multiple variables.

Table 1: Descriptive Statistics for the Full Sample

This table provides the number of observations, means, standard deviations and distributions for the Full Sample. The sample contains pooled cross-sections of banks with ECs or shares from 2005-Q1 to 2023-Q4. *P/B* is the price divided by book value per instrument, *Lagged P/B* is *P/B* lagged by one quarter. *ROE* is the net income divided by average book value of equity. *InvCapRatio* is the inverted tier 1 capital ratio. *GLR* is loan impairments divided by total gross loans. *Log MCAP* is the natural logarithm of market capitalization. *Log Illiq* is the natural logarithm of the quarterly arithmetic mean of daily absolute returns divided by turnover rescaled by 10^6 plus 1. *DummyCrisis* is a dummy variable indicating periods with financial instability. *DummyEC* is a dummy variable indicating banks with ECs. *EC Fraction* is the EC capital divided by the sum of EC capital and Ownerless Capital, while the *T3 Fraction* is the ratio of the EQR to the T3 capital. The *Relative T3 Fraction* is the EC fraction divided by the T3 fraction. *EQRM* is the EQR divided by absolute net income attributable to EC holders. The variables with "(%)" are expressed in percentage points for interpretation purposes. Note that the RRPs are not transformed with a natural logarithm and multiplied with -1 like they have been defined in Section 6.1.2.

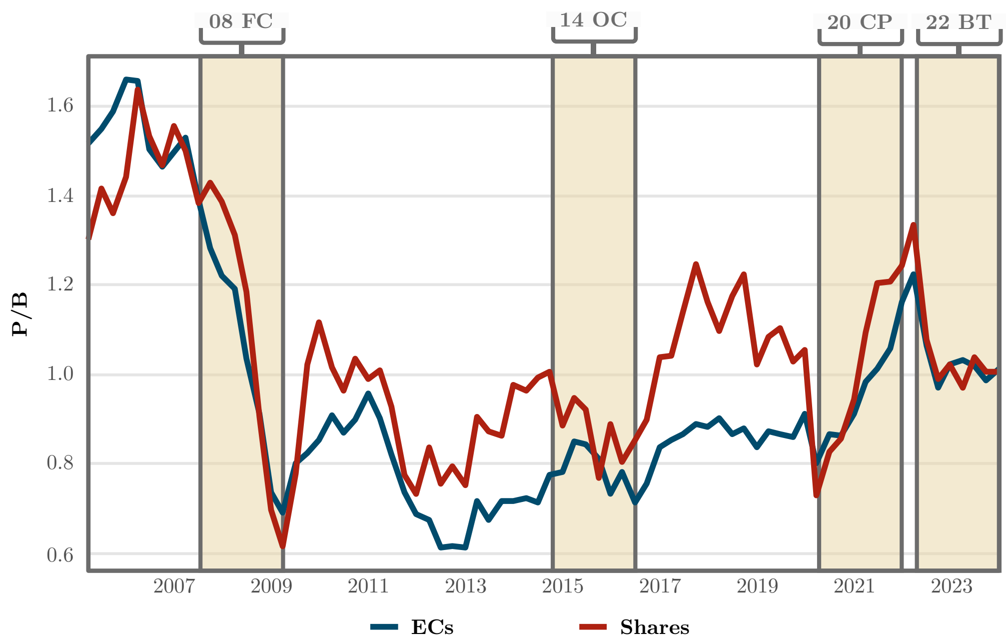
	N	Mean	St. Dev.	Min	p25	Median	p75	Max
Dependent Variable								
P/B	1,764	0.97	0.34	0.23	0.74	0.91	1.15	2.40
Control Variables								
Lagged P/B	1,730	0.97	0.34	0.23	0.74	0.91	1.15	2.40
ROE (%)	1,730	10.23	4.81	-35.93	7.92	10.03	12.23	60.07
InvCapRatio (%)	1,764	84.69	3.57	70.80	81.90	84.18	87.13	93.70
GLR (%)	1,764	0.13	0.18	-0.61	0.02	0.09	0.19	1.49
Log MCAP (kNOK)	1,764	13.62	1.97	10.13	12.14	13.44	14.82	19.62
Log Illiq	1,764	0.56	0.75	0.00	0.04	0.30	0.82	6.95
DummyCrisis	1,764	0.44	0.50	0	0	0	1	1
DummyEC	1,764	0.87	0.34	0	1	1	1	1
EC Specific Variables								
EC Fraction (%)	1,533	43.14	22.41	2.57	25.76	39.66	57.16	97.35
T3 Fraction (%)	1,533	18.94	22.72	0.00	2.46	10.24	27.35	95.00
Relative T3 Fraction	1,533	116.93	590.67	1.02	1.93	3.35	10.32	6,253.51
EQRM (%)	1,533	224.23	404.26	0.00	69.08	168.61	290.46	11,789.43

Dependent Variable & Key Independent Variables

The average P/B in the Full Sample is 0.97, with a median of 0.91. The distribution exhibits a relatively tight spread around the mean as reflected by the evenly distributed 25th and 75th percentiles. This clustering around 1.00 aligns with what we would expect - the book value for banks should closely reflect the real value due to the inherent nature of their operations. The standard deviation of 0.34 indicates moderate variability. Deviations from the benchmark value of 1.00 likely reflect market expectations about the banks' potential to deliver return above or below their book values, for example through growth possibilities or limited downside risk exposure in ECs. The notably low minimum value of 0.23 likely reflects a bank experiencing financial distress since this was Sandnes Sparebank in 2009-Q1. Conversely, the maximum value of 2.4 belongs to SR-Bank and is likely attributed to growth expectations. As illustrated in Figure 6, P/B for both ECs and shares were abnormally high prior to the GFC. Post-GFC, P/B exhibit a mean reversal towards the benchmark value of 1.00 and shows signs of stationarity as discussed in Section 3.5.

Figure 6: P/B Ratio of Sampled ECs & Shares

This line chart depicts the quarterly equal-weighted average P/B ratio of the ECs and shares included in the Full Sample, from 2005-Q1 to 2023-Q4. The predefined crisis periods are highlighted in the beige rectangles. 08 FC represents the GFC in 2008, while 14 OC reflects the oil crisis in 2014. The two last crises, 20 CP and 22 BT, represents the coronavirus pandemic in 2020 and the banking turbulence of 2022, respectively.



The EC specific variables include our selected RRPs, along with the EC fraction. These variables have less observations as there are no equivalent metrics for shares and will be utilized exclusively in the regression analyses concerning ECs. The average EC fraction is 43.14%. The relatively large standard deviation of 22.41% may be attributed to the diverse target EC fractions adopted by each bank as reflected by the minimum value of 2.57% (SpareBank 1 BV) and a maximum value of 97.35% (SpareBank 1 Ringerike-Hadeland). Moreover, banks frequently adjust their target EC fractions following the issuance of ECs, which are common in the sector. In contrast to our initial expectations, the distribution seems to be slightly skewed towards the right tail. This is likely explained by frequent EC issuances and mergers, increasing the EC holders share of total equity over time. Consequently, this finding should not be confused with investor concerns of EC dilution over time, as discussed in Subsection 2.2.1. We reiterate that the EC fraction itself should not directly influence the risk-reduction properties of ECs but should be considered in conjunction with the T3 fraction.

Our selected RRPs exhibit considerable variations which is likely influenced by outliers. Particularly, *Relative T3 Fraction* and *EQRM* are sensitive metrics due to the EQR being very small, or even zero, in some banks. This may result in substantial values and variations as these proxies are calculated with the EQR in either the numerator or denominator. To address the statistical impact of such outliers, we apply a natural logarithmic transformation to these proxies for use in the regression models, as defined in Section 6.1.2. Due to the skewness of these proxies, the median value, as opposed to the mean, should more accurately represent the typical value of a given bank.

The median value of *T3 Fraction* is 10.24%. This indicates that the "airbag" is generally significantly larger than the EQR and may absorb a disproportionate share of losses. Consequently, this supports our implicit assumption that the Ownerless Capital can effectively cover any potential losses incurred so that the EQR may represent a cap on downside risk exposure. Furthermore, the median *Relative T3 Fraction* value of 3.35 suggests that the EC fraction is generally three times greater than the T3 fraction, highlighting a considerable disparity in the distribution of profits and losses. This asymmetric distribution exclusively favors EC holders, as evidenced by the minimum value of *Relative T3 Fraction* exceeding 1. That is, for every single bank-quarter observation in our data sample, the EC fraction surpasses the T3 fraction. Finally, the median *EQRM* value of 168.61% implies that the maximum downside risk exposure for EC holders corresponds to only ~1.69 years of profits. This further underscores the contrasts in upside potential relative to downside risk. As a result, the dynamics of all our RRPs suggests that ECs offer a favorable risk-reward profile that should be priced at a premium.

Control Variables

The control variables exhibit statistical properties that are consistent with the theoretically predicted signs. At first, a tight spread around a high average *ROE* of 10.23% in a traditionally safe sector might be unintuitive. However, this is expected due to high leverage in the banking sector, as reflected by *InvCapRatio*. As discussed in Section 6.1.3, the cost of equity can be approximated by the average *ROE* and is proportional to leverage. Thus, with an average *InvCapRatio* of 84.69%, relatively high *ROE* values are expected. This further suggests that the *ROE* of IRB banks with flexible leverage are more volatile, and underscores the purpose of controlling for leverage despite potential ambiguous correlations with *P/B*.

As expected, the gross loss ratio (*GLR*) and the illiquidity proxy (*Log Illiq*) display substantial variability. *GLR* is inherently susceptible to variations as it reflects the loan portfolio quality. As banks are unable to reliably predict economic downturns and recoveries, *GLR* can either increase substantially during periods of uncertainty, or turn negative when loan impairments are reversed following an improvement in economic conditions. Likewise, instrument liquidity can fluctuate significantly from one quarter to another based on market conditions and bank size, or between instrument type due to general skepticism towards ECs. For instance, certain ECs have one day of trading activity over an entire quarter. Similarly, firm size as reflected by *Log MCAP* exhibits substantial differences between major share banks such as DNB at one end, and smaller EC banks such as Aurskog Sparebank and SpareBank 1 Helgeland at the other end. The natural logarithmic transformation should mitigate some of this skewness.

The mean of *DummyCrisis* at 0.44 shows that approximately half of the observations occur in a crisis. Given that the crisis periods amount to a total of eight years which constitutes

44% of the total study period, such a finding was expected. This further implies that the number of observations is not skewed in crises, for example due to bankruptcy.

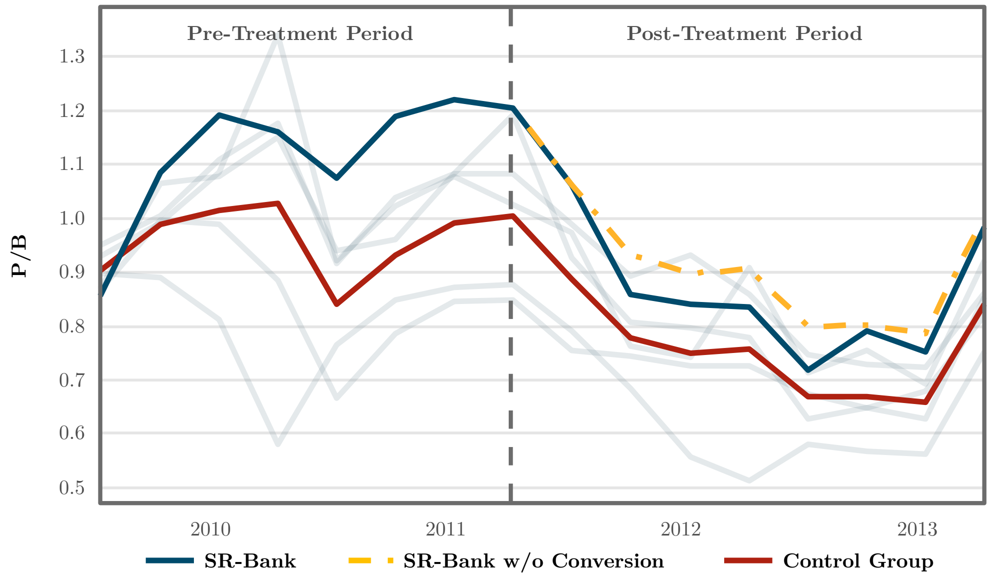
The mean of *DummyEC* highlights the skewness of our sample, where 87% of observations in the Full Sample are EC banks. Examining Figure 6, the average P/B ratio of banks with shares are generally higher than those with ECs. Interestingly, this trend seems to diminish during our identified crisis periods as shares tend to experience more pronounced declines.

DiD Sample

Concerning the DiD Sample, our main interest is to assess the plausibility of the parallel trends assumption – one of the most critical components of the DiD approach. We aim to do this by examining Figure 7. Additionally, we briefly discuss trends in *P/B*. A table detailing the variables in the DiD Sample is available in Table 11 of Appendix 10.2.

Figure 7: P/B Ratio of SR-Bank & Control Group

This line chart depicts the quarterly equal-weighted average P/B ratio of the control group, in addition to SR-Bank and each of the banks in the control group separately (indicated by the grey lines), from 2009-Q2 to 2014-Q1. SR-Bank's conversion from ECs to shares was approved in 2011-Q2. This corresponds to the treatment date indicated by the dashed vertical line. The yellow dashed line is SR-Bank's P/B ratio following the treatment date assuming that it would have followed the same trend as the control group.



Upon reviewing Figure 7, the parallel trends assumption seems to hold. The difference in *P/B* between SR-Bank and the equal-weighted mean of the control group during the pre-treatment period appears to remain consistent, apart from the first observation in 2009-Q2. Given the financial instability at that time, it seems plausible to disregard this as a singular anomaly.

Interestingly, the difference in *P/B* narrows in the quarters leading up to the official conversion in 2012-Q1 as the P/B ratio of SR-Bank decreases more sharply. This may support our decision to alter the treatment starting quarter to 2011-Q2 at the time of the conversion approval. More importantly, there appears to be a clear shift in the difference in differences pre- and post-treatment, where the P/B ratio of SR-Bank has decreased more relative to the control group. If so, this supports our hypothesis that the conversion resulted in a lower *P/B*.

6.4 Pearson's Correlations & Robustness

In this concluding section of the chapter, we briefly review the robustness of our approach. First, we examine Pearson's correlations among key variables and assess concerns of multicollinearity. Subsequently, we address potential autocorrelation and heteroskedasticity issues. Correlation coefficients for the Full Sample are provided in Table 2 on a separate page following this section. Additionally, p-values for autocorrelation tests and VIFs for assessing multicollinearity are presented in Table 12 and Table 13 of Appendix 10.3, respectively.

The Pearson's correlations are generally low, with a few exceptions. As anticipated, *Lagged P/B,* which is included to address potential autocorrelation, is significantly correlated with *P/B* at 0.94. *Lagged P/B* could introduce issues with multicollinearity if the other variables are able to reliably predict the P/B ratio of the previous quarter. As the P/B ratio is forward looking, we believe this to be unlikely. This notion is supported by the most correlated independent variable being *ROE* at 0.34.

While there exists no consensus on the exact threshold at which multicollinearity becomes concerning, coefficients below 0.7 are typically deemed acceptable (Booth et al., 1994). In this regard, aside from the RRPs, correlation coefficients do not exceed 0.7, indicating less potential multicollinearity issues as these coefficients are not included in the same models. This notion is supported by diagnostic tests yielding VIF values well below the commonly accepted threshold of 5 (Sheather, 2009). The VIFs are detailed in Table 13 of Appendix 10.3.

Consistent with expectations, the RRPs exhibit high positive correlations with each other. These proxies are all constructed to capture the same effect, and their high correlations support that they are indeed effectively variations of the same variable. Notably, *Log Relative T3 Fraction* and *Log EQRM* exhibit a high correlation of 0.72, which is intuitive. Both these proxies relate ownership of profits to ownership of losses but vary slightly in their approach. As both proxies incorporate the EC fraction in their calculations, this further emphasizes the multicollinearity challenges could arise if the EC fraction were included as a control variable.

The proxies' relationships with the control variables suggest they are suitable for capturing their intended purpose. Leverage and risk exposure increase asymmetric participation in gains and losses, while profitability and size decrease this divergence. Moreover, other than the positive correlation between *ROE* and *Log EQRM*, the RRPs have correlations pointing in the same direction. This abnormal correlation can possibly be explained by net income attributable to EC holders being a determinant for both ROE and changes in the EQR. This may affect the effectiveness of this variable as a proxy for downside protection; thus, we exclude it from our models examining the effect of downside protection in crises. Further, we also want to highlight the positive correlations between each RRP and both leverage and risk exposure. As discussed in Subsection 6.1.3, our selected RRPs might have ambiguous interpretations during crisis periods due to their link to solidity and their dynamics when a savings bank incurs losses. These correlations support this ambiguity, which may limit the ability of our regression models to deliver conclusive results in periods of financial instability.

Considering the relationships between our RRPs and *P/B*, the correlations align with our hypotheses, albeit they are weak to varying degrees. These findings are not unexpected, since the value of downside protection is small as it can only materialize when net losses occur, which is rare in such a stable sector. Furthermore, the proxies should theoretically increase when losses occur, as detailed in Subsection 2.2.1, which may partly counteract the expected positive correlation. This highlights the importance of including control variables to isolate the downside protection from such dynamics and to avoid interpreting Pearson's correlations too rigidly, especially when the expected relationship is small. Without including control variables, correlational analysis is likely to yield results with simultaneous biases.

The correlations between *P/B* and the control variables generally meet our expectations outlined in Subsection 6.1.3, except for *DummyCrisis*. Observations in crises exhibits a slightly positive correlation with *P/B* of 0.01. This relationship may be attributed to overly positive future outlooks during the recovery phases of crises, coupled with delayed reversals of impairments of the book value. In the banks' financial reporting, impairments are swiftly recognized, whereas reversing them typically requires more substantial evidence. Nonetheless, our primary interest lies in the effects during periods of volatility and uncertainty, rather than negative changes in *P/B* itself. Another observation is that the positive correlation with *InvCapRatio* supports our decision to include a separate risk exposure proxy in *GLR*.

Regarding autocorrelation and heteroskedasticity, there is rarely reason to assume homoskedasticity of the error terms in economic models (Stock & Watson, 2020). The sticky nature of many of our variables raises these concerns. We address them through various methods, such as including pre-GFC time dummies to mitigate non-stationarity and *Lagged P/B*. As detailed in Table 12 of Appendix 10.3, this appears to be adequate for most of the regression models. However, we are not able to reject the null hypothesis of autocorrelation in every model. To mitigate such concerns, we utilize robust standard errors clustered by bank which accommodate variations in error terms across banks.

Table 2: Pearson's Correlations for Full Sample

This table provides Pearson's correlations for the Full Sample. The sample contains pooled cross-sections of banks with ECs or shares from 2005-Q1 to 2023-Q4. *P/B* is the price divided by book value per instrument. *ROE* is the net income divided by average book value of equity. *InvCapRatio* is the inverted tier 1 capital ratio. *GLR* is loan impairments divided by total gross loans. *Log MCAP* is the natural logarithm of market capitalization. *Log Illiq* is the natural logarithm of the quarterly arithmetic mean of daily absolute returns divided by turnover rescaled by 10^6 plus 1. *DummyCrisis* is a dummy variable indicating periods with financial unrest. *DummyEC* is a dummy variable indicating banks with ECs. *EC Fraction* is the EC capital divided by the sum of EC capital and Ownerless Capital. *Log T3 Fraction* is the natural logarithm of EQR divided by T3 Ownerless Capital. *Log Relative T3 Fraction* is the natural logarithm of the EC fraction divided by the T3 fraction. *Log EQRM* is the natural logarithm of the EQR divided by net income attributable to EC holders. *Log T3 Fraction* and *Log EQRM* are multiplied with -1 for interpretation purposes.

	P/B	Lagged P/B	ROE	InvCapRatio	GLR	Log MCAP	Log Illiq	DummyCrisis	Log T3 Fraction	Log Relative T3 Fraction	Log EQRM
P/B	1.00										
Lagged P/B	0.94	1.00									
ROE	0.37	0.34	1.00								
InvCapRatio	0.22	0.26	0.16	1.00							
GLR	-0.26	-0.24	-0.33	0.11	1.00						
Log MCAP	0.25	0.22	0.31	-0.17	-0.18	1.00					
Log Illiq	-0.23	-0.21	-0.19	0.02	0.16	-0.47	1.00				
DummyCrisis	0.01	0.06	-0.11	-0.25	-0.03	0.16	-0.00	1.00			
Log T3 Fraction	0.06	0.08	-0.11	0.33	0.10	-0.66	0.22	-0.13	1.00		
Log Relative T3 Fraction	0.13	0.16	-0.16	0.35	0.17	-0.56	0.19	-0.10	0.58	1.00	
Log EQRM	0.26	0.28	0.20	0.54	0.03	-0.40	0.12	-0.25	0.51	0.72	1.00

7 Main Results & Analysis

In this chapter, we empirically test and analyze our hypotheses using the methodological framework detailed in the previous chapter. We organize the analysis into four subsections. First, we explore the potential correlation between downside protection in ECs and P/B ratios, and whether this relationship intensifies during periods of financial instability. Subsequently, we examine differences in P/B ratios between ECs and shares attributable to ECs' unique characteristics and the impact of converting ECs to shares. Finally, we consider the broader potential implications of our findings and assess the limitations of our study.

7.1 H1: Pricing of Downside Protection in Equity Certificates

7.1.1 Main Findings

In Hypothesis 1, we posit that the downside protection of ECs has a positive effect on the P/B ratio. As discussed in Subsection 2.2.1, this protection arises from the Ownerless Capital absorbing losses above its proportional share of equity, effectively serving as an "airbag" for the EC capital. To examine Hypothesis 1, we have developed several proxies based on the ECs' ownership of losses and the extent of divergence with the ownership of profits, as detailed in Subsection 6.1.2. In this regard, greater loss absorption from the Ownerless Capital relates to reduced systematic risk. Consequently, we expect to find that an increase in downside protection leads to higher P/B ratios amongst ECs, ceteris paribus. The results of our regression models, which are presented in Table 3 on the next page, support Hypothesis 1.

Table 3: Impact of Downside Protection in ECs on P/B ratio

The regressions in this table depict the relationship between the P/B ratio and our selected RRPs in banks with ECs using the EC Sample. The sample consists of 30 banks and 1,503 bank-quarter observations in the period from 2005-Q2 to 2023-Q4. Model (1), (2), and (3) evaluate each RRP separately while controlling for bank-specific FE and predefined control variables. Across all models, the R^2 is approximately 0.85, indicating that the models explain 85% of the variation in *P/B*. All models include time FE denoted by Pre-2008, as defined in Subsection 6.1.3. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses.

	Dependent Variable:		
		P/B	
	(1)	(2)	(3)
Lagged P/B	0.777^{***}	0.786^{***}	0.799^{***}
	(0.028)	(0.026)	(0.026)
ROE	0.204^{***}	0.237^{***}	0.161^{***}
	(0.072)	(0.064)	(0.060)
InvCapRatio	0.165	0.017	-0.019
	(0.162)	(0.283)	(0.285)
GLR	-6.411^{***}	-7.096^{***}	-6.269^{***}
	(2.113)	(2.453)	(2.207)
Log MCAP	0.066^{***}	0.035^{**}	0.031^{*}
	(0.015)	(0.017)	(0.016)
Log Illiq	-0.007^{**}	-0.007^{**}	-0.007^{**}
	(0.003)	(0.003)	(0.003)
Log T3 Fraction	0.332^{***}		
	(0.070)		
Log Relative T3 Fraction		0.012^{***}	
		(0.002)	
Log EQRM			0.018^{**}
			(0.008)
Bank FE	Yes	Yes	Yes
Time FE	Pre-2008	Pre-2008	Pre-2008
Observations	1,503	1,503	1,503
R^2	0.850	0.848	0.846
Adjusted R^2	0.846	0.844	0.842
F Statistic (df = 12; 1461)	690.251^{***}	678.947^{***}	670.343^{***}
Note:			$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

In the above regression models, we evaluate three independent variables as proxies for downside protection: (1) *Log T3 Fraction*, (2) *Log Relative T3 Fraction*, and (3) *Log EQRM*. Each proxy is developed so that an increase in its value relates to increased downside protection. All RRPs exhibit their intended effect, as detailed in Subsection 6.1.2. Moreover, most of the control variables remain significant across all models with some slight variation in significance level, except for *InvCapRatio*. As discussed in Subsection 6.1.3, this control variable is included to isolate solidity effects from the RRPs and "real" profitability in *ROE*.

In model (1), an increase in downside protection, as proxied by *Log T3 Fraction*, is positively associated with higher values of *P/B*. Intuitively, a reduction in downside risk exposure, as proxied by the proportion of future losses that will be incurred by EC holders, seems to be valued by investors. This is supported by the coefficient being significant at the 1% level. The interpretation of the coefficient suggests that a 1% decrease in the T3 fraction, is on average associated with a 0.0032 higher *P/B*. More specifically, the greater the divergence between the EQR and T3 Ownerless Capital, the greater the loss absorption, which may in turn increase the P/B ratio. Additionally, an increase in the coefficient can be interpreted as indicating an enlargement of the loss-absorbing "airbag"'. Conversely, it might also suggest that the cap on downside risk exposure, as represented by the EQR, is reduced. Our findings in model (1) suggest that these two latter points tend to correlate with a higher P/B ratio.

In model (2), the *Relative T3 Fraction* exhibits a positive relationship with higher values of *P/B* and is significant at the 1% level. The intuition behind this RRP is that the greater the relative divergence between the EC fraction and the T3 fraction, the higher the value of downside protection, ceteris paribus. This is due to the Ownerless Capital covering a disproportionate large share of losses relative to its ownership of profits. Considering the significance of *Log Relative T3 Fraction*, such dynamics appear to be valued at a premium by the market. Specifically, the extent of relative divergence between participation in gains and losses is, on average, associated with higher *P/B* values.

Furthermore, the EC fraction exceeds the T3 fraction in every single bank-quarter observation. Since the majority of EC capital is positioned at the top of the loss hierarchy, the EC fraction tends to increase when losses occur because the Ownerless Capital decreases more than EC capital. Meanwhile, the T3 fraction remains unaffected. Consequently, the marginal effect of risk reduction grows as losses occur, thereby enhancing the downside protection in consecutive periods with losses. This suggests that the impact of downside protection should intensify during crisis periods, as we will later examine in Subsection 7.1.2.

Interestingly, changes in *Relative T3 Fraction* could be related to frequent EC issues in the industry. When a savings bank issues ECs, the EC fraction increases relative to the T3 fraction, particularly when combined with dividends to EC holders. This practice has become common among savings banks, drawing criticism by the Financial Supervisory Authority in Norway (2022). The core issue stems from newly raised equity being added to the top of the hierarchy, as illustrated in Figure 2. Simultaneously, dividends at the bottom tier deplete the EQR, with the T3 Ownerless Capital remaining unchanged. As a result, EC holders may increase their ownership and share of profits in the bank, while shifting downside risk exposure to the Ownerless Capital. This dynamic could partly compensate for any dilution that existing EC holders might experience, thereby making them more open to issue equity. Moreover, new investors are able to fully benefit from these equity issuance dynamics.

Continuing the above premise, EC banks might have been able to issue equity under more favorable terms than share banks, ceteris paribus. Such conditions could partly explain why Norwegian savings banks frequently issue ECs, possibly challenging the pecking-order theory of Myers & Majluf's (1984). However, if the future outlook is pessimistic, the preference for equity issuance could increase, thereby revealing information about the “true” state of the firm. This could effectively reduce the information asymmetry between inside and outside investors. As such, the outlined dynamics might not contradict the pecking-order theory. Nonetheless, exploring a new game equilibrium could be a topic for future research.

In model (3), we introduce our third and final RRP, *Log EQRM*, which relates the size of the EQR to the annualized net income. Since the EQR may effectively function as a cap on downside risk exposure and the net income to EC holders represents the upside return, this proxy indirectly estimates asymmetric participation in gains and losses. The *Log EQRM* coefficient is correlated with higher *P/B* values, significant at the 5% level. Intuitively, this implies that lower downside risk exposure combined with larger upside potential is associated with increased P/B ratios. Notably, *Log EQRM* is less significant than the other two proxies. A possible explanation for this could be its positive correlation with *ROE*, which might explain why we observe a decrease in the *ROE* coefficient in model (3) compared to the other models. When excluding ROE from model (3) the coefficient exhibits a greater effect and is significant at the 1% level. This supports our notion that multicollinearity with *ROE* reduces the significance of *Log EQRM* relative to the other proxies.

To summarize, we find evidence supporting Hypothesis 1; downside protection in ECs has a significant positive effect on the P/B ratio. This relationship is robust across all three selected RRPs. When the downside protection of ECs is more prominent, investors seem to be willing to pay a premium for reduced downside risk, thus reflecting a higher perceived value. This suggests that investors comprehend the complex equity structure and price savings banks with ECs accordingly. Thus, the downside protection in ECs seems to influence their pricing.

7.1.2 Case Studies

Considering that our results suggest a positive relationship between the degree of downside protection in ECs and P/B ratios over the entire sample period, it is interesting to examine this relationship more closely during periods of financial instability. As discussed in Section 3.4, the RRPs' impact should be more pronounced during such periods. Consequently, we introduce interactions between the RRPs and dummies for the crisis periods defined in Section 5.3. The results of these regression models are presented in Table 4 on the following page.

Table 4: Impact of Downside Protection in ECs on P/B ratio in Crises

The regressions in this table depict the relationship between *P/B* and our selected RRPs in banks with ECs during our predefined crisis periods using the EC Sample. The sample consists of 1503 bank-quarter observation in the period from 2005-Q2 to 2023-Q4. The models include a joint crisis dummy and a separate dummy for each crisis, as defined in Subsection 6.1.3. Model (1) assess the effect of the *Log T3 Fraction* variable on *P/B* during crises through an interaction with the joint crisis dummy. Model (2) consider the effect of the same RRP in each crisis separately. Models (3) and (4) assess the effect of the *Log Relative T3 Fraction* variable through identical interaction terms. All models include control variables, as defined in Subsection 6.1.3, and bank-specific FE. Time FE is included for the period leading up to the GFC and each crisis dummy utilized in the interaction terms. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses.

	Dependent Variable:			
	P/B			
	Log T3 Fraction		Log Relative T3 Fraction	
	(1)	(2)	(3)	(4)
RRP	0.369***	0.367***	0.013***	0.010***
	(0.077)	(0.072)	(0.003)	(0.003)
DummyCrisis*RRP	-0.084**		-0.005	
	(0.034)		(0.005)	
Dummy08FC*RRP		0.531***		0.009
		(0.116)		(0.007)
Dummy14OC*RRP		0.012		0.010***
		(0.046)		(0.004)
Dummy20CP*RRP		-0.110**		-0.040*
		(0.048)		(0.022)
Dummy22BT*RRP		-0.119**		-0.069**
		(0.053)		(0.029)
Control Variables	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Time FE	Pre-GFC & Crisis	Pre-GFC & Crises	Pre-GFC & Crisis	Pre-GFC & Crises
Observations	1,503	1,503	1,503	1,503
R^2	0.849	0.846	0.855	0.851
Adjusted R^2	0.844	0.842	0.850	0.846
F Statistic	683.100***	668.267***	475.252***	461.232***
Note:				*p<0.1; **p<0.05; ***p<0.01

In Chapter 4, we contend that the downside protection of ECs should exert a greater influence on the P/B ratio during periods of financial unrest. Intuitively, the downside protection should be more valuable when losses are likely to occur, particularly considering the stability in the banking sector. However, the results from our regressions are ambiguous, providing no definitive evidence that the value of the risk-reducing capabilities intensifies during crises. As outlined in Subsection 6.2.1, this is likely related to our selected RRPs inherently reflecting solidity to some extent. This notion is further supported by the positive correlations of leverage and risk exposure with the RRPs, as detailed in Section 6.4. The potential complication is that the RRPs may also capture other effects that the control variables cannot fully account for during unstable periods with changing pricing dynamics, such as solidity.

Further, each crisis period also presents unique, defining characteristics that vary in severity. For example, the GFC was a critical systemic event that directly targeted banks, the 2014 oil crisis primarily affected banks with oil exposure, the 2020 coronavirus pandemic led to historically low interest rates, and the 2022 banking crisis was characterized by significant rises in interest rates and exposure to bond duration. In other words, the pricing dynamics of RRPs may be highly situational. Therefore, the findings of our case studies should be approached with caution, as the RRPs' association with *P/B* may be ambiguous.

In model (1), the interaction term between *Log T3 Fraction* and *DummyCrisis* exhibit a negative effect, significant at the 5% level. The RRP still exhibits a general significant positive effect on *P/B*. This suggests that the value of downside protection has less effect on *P/B* during crisis periods. This finding appears to contradict financial theory, but it underscores the potentially ambiguous interpretations of the RRPs' impact during financial turbulence.

A possible explanation for the counterintuitive findings could be related to ECs becoming more similar to shares across our study period. Historically, ECs have been fairly illiquid and would thus exhibit less volatility during crises. In conjunction with increasing similarity, growth, and transparency over the years, ECs have also become more liquid. The increase in liquidity might have caused savings banks with ECs to experience greater pricing volatility in crises as we proceed further into our sample period. These liquidity dynamics are unlikely to be perfectly captured by the illiquidity proxy, especially given that certain EC banks traded very infrequently in earlier years. Conversely, the T3 fraction decreases over time, and its difference from the EC fraction also decreases. These opposing trends are reflected by the Pearson's correlations in Section 6.4, where the RRPs are positively correlated with illiquidity.

Building on the above argumentation, *Log T3 Fraction* exhibits a positive relationship with *P/B* during the GFC in model (2), when ECs were more illiquid and likely experienced less volatility. The coefficient indicates a stronger effect than over the full sample period and is significant at the 1% level. Meanwhile, the effect of the variable disappears during the 2014 oil crisis and is significantly negative during the last two crises. Notably, all three crises with unintuitive results occurred after the legislative change of 2009, when ECs became more similar to shares and were traded more regularly When combining this insight with the element of all crises having their own separate characteristics, one might rationalize the ambiguous findings of *Log T3 Fraction* during crises.

In model (3), the interaction term between *Log Relative T3 Fraction* and *DummyCrisis* is not significant. Since the *Log Relative T3 Fraction* is still significant by itself, the interpretation is that there is no additional effect of downside protection during crises in general. A plausible explanation for the lack of significance could be that banks which incurred the most substantial losses also saw the largest increases in the EC fraction. As previously discussed in Subsection 7.1.1, the EC fraction tends to increase when losses occur. Consequently, banks experiencing the largest losses would also experience a rise in the *Log Relative T3 Fraction*. If the control variables fail to separate the RRP from these dynamics, this might explain why no additional effects were observed during crises.

In model (4), the interaction term between *Log Relative T3 Fraction* and the GFC is insignificant, while the interaction with the 2014 oil crisis is positively significant at the 1% level. This indicates that the downside protection in ECs had a stronger positive effect on the P/B ratio during the 2014 oil crisis than over the full period, when proxied by *Log Relative T3 Fraction*. However, this finding should be interpreted with caution as savings banks with larger exposure to the oil industry in their loan portfolio might have experienced a larger decrease in their P/B ratio, regardless of their risk-reducing features. Nonetheless, *Log Relative T3 Fraction* exhibit an additional positive effect on *P/B* during the 2014 oil crisis.

The interaction terms with *Dummy20CP* and *Dummy22BT* are both significantly negative in model (4), corresponding with the observations of the same crises in model (2). As previously discussed, the counterintuitive results may be attributed to increased liquidity in later years, thus increasing volatility. Further, these two crises combined account for all the bank-quarter observations in the last four years. The last four years have not necessarily been troublesome for ECs, and most of them have achieved solid returns despite financial unrest. Also, the crises mostly contemplated a risk of system failure and distrust globally. Investors may have exhibited more of a distrust towards the banking sector in general, rather than emphasizing the downside protection of savings banks with EC. These factors collectively might help explain the weaker effect of risk reduction on *P/B* in the last two crises.

To summarize, our regression models provide some evidence consistent with an increased value of downside protection in crisis periods; however, the results are inconclusive. The effect is strongest in the GFC, although *Log T3 Fraction* and *Log Relative T3 Fraction* never exhibit a greater effect in the same crisis. The inability of our models to yield conclusive results may be attributed to the varied characteristics of each crisis and ambiguous interpretations of our selected RRPs during such periods.

7.2 H2: Pricing of Equity Certificates Versus Shares

7.2.1 Main Findings

In the analysis of Hypothesis 1, our findings suggest that investors value the downside protection in ECs, implying that they should be priced at a premium compared to shares. However, whether ECs exhibit higher P/B ratios may depend on how investors balance the risk-reduction features of ECs against other characteristics. Consequently, in Hypothesis 2, we propose that there should be a difference in P/B ratios - either higher or lower, depending on investor preferences. We approach the hypothesis by incorporating interactions between instrument type and time dummies. The results are reported in Table 5 on the next page.

Table 5: ECs Versus Shares - Impact of Instrument Type on P/B ratio

The regression models in this table depict the effect of instrument type on the P/B ratio using the Full Sample. The sample consists of 35 banks and 1730 bank-quarter observations in the period from 2005-Q2 to 2023-Q4. All four regression models include our selected control variables defined in Subsection 6.1.3, a dummy for instrument type, and bank-specific FE. Model (1) includes year FE and interacts each year with *DummyEC*. Model (2) extends the first model by incorporating a dummy variable that indicates whether a date falls before or after the 2009 legislative changes, along with an interaction term between this dummy and *DummyEC*. Model (3) utilizes a joint crisis dummy for all crises combined, while model (4) includes a separate dummy for each crisis, as defined in Subsection 6.1.3. Time FE in model (3) and (4) are included for the pre-GFC period and each crisis. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses. Note that the displayed coefficient and standard deviation for model (1) are the *average* values for the interaction terms between each year and *DummyEC*. A full excerpt of each model is provided in Table 15 of Appendix 10.4.

	Dependent Variable:			
	P/B			
	(1)	(2)	(3)	(4)
Average Year*DummyEC	-0.073			
	(0.034)			
Post2009Q2*DummyEC		-0.175^{***}		
		(0.043)		
DummyCrisis*DummyEC			0.017	
			(0.016)	
Dummy08FC*DummyEC				0.030
				(0.058)
Dummy14OC*DummyEC				0.034^{*}
				(0.019)
Dummy20CP*DummyEC				0.020
				(0.017)
Dummy22BT*DummyEC				-0.003
				(0.016)
Control Variables	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Time FE	Year	Year	Pre-GFC & Crisis	Pre-GFC & Crises
Observations	1,730	1,730	1,730	1,730
R^2	0.864	0.865	0.841	0.844
Adjusted R^2	0.857	0.859	0.837	0.839
F Statistic	243.324^{***}	235.948***	743.686^{***}	505.116^{***}

Note: *p<0.1; **p<0.05; ***p<0.01

In model (1), the interaction between year and EC dummy, on average, exhibits a negative relationship with *P/B*. The presented coefficient is the mean of all 18 interaction variables between year and *DummyEC*, and all interaction variables exhibit a negative relationship as shown in the extended regression excerpt in Table 15 of Appendix 10.4. Further, 13 out of 18 coefficients are significant at either the 5% or 1% level. Consequently, the interpretation is that ECs have significantly lower P/B ratios than shares in these years, possibly due to their distinct characteristics. For example, being an EC bank in 2017 indicates a 0.125 lower P/B ratio compared to a share bank.

These findings corroborate Hypothesis 2, indicating a pricing disparity between ECs and shares, characterized by a negative impact from being an EC bank. Considering the results of Hypothesis 1, which demonstrated that downside protection in ECs positively correlates with the P/B ratio, it appears that other unique attributes of ECs dominated this effect. Such dominating characteristics could be related to reduced voting rights, instrument complexity, governance concerns, and other factors negatively impacting the P/B ratio.

Surprisingly, when running the same regression model and differentiating between the pre- and post-2009 legislative changes, we observe that the ECs' discount in *P/B* seems to increase. This is indicated by the interaction term in model (2), which implies a difference in differences. Consequently, the negative effect of being an EC on *P/B* has seemingly exacerbated, contrary to our initial expectations of a narrowed difference following the legislative changes intended to align ECs more closely with shares. This finding suggests that the legislative efforts may not have fully achieved their intended effects. However, the increased *P/B* disparity might also be partially attributed to shifts in liquidity dynamics, as outlined in Subsection 7.1.2. This highlights that the impact of being an EC bank is subject to fluctuations over time depending on regulatory changes, market dynamics, and general understanding of the instrument. As a result, these findings emphasize the necessity for improved understanding of ECs and clarity in their regulations to properly evaluate their pricing dynamics - an insight that could prove important for future policymakers.

In model (3) all crises are combined into a joint crisis dummy. While the crises dummy exhibits a significantly negative influence on the P/B ratio it does not exhibit any significance when interacted with the EC dummy. Thus, there is no significant difference in the pricing of ECs and shares during crisis. In light of the findings in model (1), this suggests that although ECs in general are priced with a lower P/B ratio than shares, the difference in pricing between ECs and shares does not change in crises periods. This suggests that even in periods of financial instability, the risk-reduction features of ECs are unable to make up for the other negative characteristics.

Model (4) aims at capturing the differences in the P/B ratio during the four predefined crises. There is no evidence of significant differences in *P/B* between ECs or shares in the 2008 financial crisis. It is important to note that during the financial crisis, our share bank sample comprised only DNB and Vekselbanken ("VVL"). Since DNB was at that time, and still is, a system-critical bank in Norway, one could argue it was perceived as less risky due to it being "too big to fail". VVL on the other hand, is a low-liquidity share bank. Consequently, the decrease in the P/B ratio of share banks during the financial crises might not be a fair representation of differences in pricing dynamics.

The interaction term between the 2014 oil crisis and the dummy EC variable can be weakly interpreted as ECs having a 0.034 higher P/B ratio compared to shares during this crisis. The coefficient is significant at the 10% level. In the 2014 oil crisis, SR bank is included in the share bank sample. Since the bank had substantial loan exposure in the Rogaland area, it faced greater exposure to the oil industry than other banks. DNB also had considerable exposure to the oil industry at that time, being the main access point to international capital for Norwegian industry. In contrast, the typical EC bank is typically locally exposed to other parts of the country with less reliance on the oil sector. As a result, the sampled share banks might have been priced with a lower P/B ratio due to their specific risk exposure to oil. Consequently, this might explain why ECs maintain their P/B ratio better than shares during the oil crisis, in addition to their downside protection.

Meanwhile, there is no evidence of significant differences in the P/B ratio between ECs and share banks during the 2020 pandemic or the 2022 banking turbulence. Overall, the results of model (3) and (4) do not yield conclusive results. A plausible explanation for this could be the changing liquidity dynamics previously discussed, which may negate the potential advantages of ECs' downside protection during crises, particularly in recent years like the 2020 pandemic and the 2022 banking turbulence.

The primary finding of this subsection is that ECs exhibits significantly lower P/B ratios than share banks in 13 of the past 18 years, supporting Hypothesis 2. Considering that the downside protection in ECs appears to be valued by investors, these findings suggest that other unique instrument characteristics may outweigh this feature. Such characteristics may include instrument complexity, limited voting rights, and governance concerns.

7.2.2 Quasi-Experiment on Equity Certificate Conversion

As outlined in the above subsection, our findings suggest that ECs are systematically priced lower than shares, and even more so post the 2009 legislative changes. This is possibly due to negative characteristics overshadowing the downside protection. Consequently, it would be interesting to assess pricing differences in Norwegian savings banks before and after converting ECs to shares. Therefore, in this subsection, we present the analysis of our quasi-experiment, the DiD models. The results are reported in Table 6 on the following page.

Table 6: Impact of EC Conversion on the P/B Ratio

The regressions in this table depict the effect of converting from ECs to shares on the P/B ratio using the DiD Sample. The sample consists of six banks and 96 bank-quarter observations in the period from 2009-Q2 to 2013-Q1. The dependent variable is *P/B,* and the independent variables are a dummy indicating banks converting to shares (*Treated*), and a dummy indicating the post-conversion time period (*PostTreatment*). The interaction term between these dummies aims to isolate the effect of conversion. The conversion group only consists of one bank, SR-Bank, since this is the only bank which have converted in recent years. The control group consists of five savings banks, selected through PSM. Model (1) and (2) does not include bank-specific FE, as opposed to model (3) and (4). Furthermore, model (2) and (4) includes the control variables defined in Subsection 6.1.3, while model (1) and (3) do not. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses. Note that *Treated* disappears in the FE models due to no variation in this variable. A full excerpt of each model is provided in Table 16 of Appendix 10.4.

	Dependent Variable:			
	P/B			
	(1)	(2)	(3)	(4)
Treated	0.160***	0.011		
	(0.047)	(0.029)		
PostTreatment	-0.212***	-0.171***	-0.212***	-0.174***
	(0.022)	(0.020)	(0.022)	(0.016)
Treated*PostTreatment	-0.056**	-0.066***	-0.056**	-0.047
	(0.022)	(0.017)	(0.022)	(0.030)
Intercept	0.963***	0.300		
	(0.047)	(0.407)		
Control Variables	No	Yes	No	Yes
Bank FE	No	No	Yes	Yes
Observations	96	96	96	96
R^2	0.473	0.747	0.545	0.723
Adjusted R^2	0.456	0.720	0.509	0.679
F Statistic	27.519***	28.144***	52.726***	26.759***
Note:				*p<0.1; **p<0.05; ***p<0.01

The interaction term in model (1) indicates a lower P/B ratio due to the EC conversion, in line with our expectations of ECs achieving higher pricing due to downside protection. Despite not controlling for bank-specific FE, the coefficient is significant at the 5% level. When introducing the predefined control variables in model (2), the lower P/B ratio after conversion is significant at the 1% level.

Note that *Treated* is equivalent to a SR-Bank dummy, as the treatment group consists solely of this bank. Therefore, the treated dummy in model (1) and (2) is akin to including bank-specific FE for SR-Bank, but not for the banks in the control group. Considering this limitation, the findings in model (3) and (4) should provide the most relevant insights.

In model (3), the DiD estimator exhibits a negative relationship between converting ECs to shares, suggesting that conversion lowers the P/B ratio. The coefficient is statistically significant at the 5% level and is consistent with the findings from the previous two models.

Even though the coefficients of the DiD estimator in the first three models are significant, one should be careful with interpreting the result as the causal effect of converting. SR-Bank is the only bank which have converted in recent times and other banks considering an EC conversion might not experience the same effect. The bank's main motivation for converting was improved access to both equity and debt after several years of strong growth (Oslo Børs, 2010). The bank had grown from 18 billion NOK in AuM in 1991 to 140 billion NOK in AuM in 2010, while also being among the most profitable savings banks. A considerable portion of SR-Bank's success can likely be attributed to the development of the oil industry in the Rogaland area and is not necessarily transferable to other banks, or even future time periods.

When introducing the predefined control variables and bank-specific FE in model (4), the conversion shows no significant effect on *P/B*. This result may be due to controlling for too many factors, which can lead to overspecification and leave too little variation for the DiD estimator to capture. Nevertheless, the absence of a significant conversion effect emphasizes that the findings from the previous models should be interpreted with caution.

The inconclusive findings and inherent limitations of our regression models can be attributed to the small size of the control group. Ideally, the control group should include more than only five banks. However, the main requirement for including a bank in the control group is that it must be highly similar to SR-Bank in the pre-conversion period. This is essential for satisfying the parallel trends assumption. Further expanding the control group would necessitate including banks less similar to SR-Bank, as identified by the PSM, thus weakening the parallel trends assumption. We believe that our chosen control group size balances sample size limitations with the parallel trends assumption to the best of our ability.

Another factor potentially influencing our results is the decision to analyze pricing performance over a two-year period before and after the conversion. During this four-year window, there was significant activity in the savings banks sector, including several equity issuances by both SR-Bank and the banks in the control group. This likely influenced pricing dynamics. Insights from interviews with industry professionals suggest that the equity issuances during this period impacted pricing for some time even after the issuance, thus reducing the robustness of our findings. This is compounded by the fact that there is only one treated bank and five banks in the control group, meaning that individual outlier effects could disproportionately influence our results.

Additionally, the selection of the treatment date poses further complications, as discussed in Subsection 6.2.3. Further, one might argue that some unique characteristics of EC banks, such as governance concerns, persisted until the actual conversion date. Such dynamics further weaken the robustness of this quasi-experiment.

An alternative approach to investigating the impact of converting ECs to shares could involve a comparative analysis of SR-Bank against SpareBank 1 SMN (“MING”). Insights from our interviews with industry experts suggest that MING was next in line to convert after SR-Bank due to certain comparable attributes. Therefore, comparing their P/B ratios over an extended period while controlling for corporate actions might yield intriguing results, although these would only apply at the firm level.

To summarize, our quasi-experiment indicates a significant negative effect of converting from ECs to shares in three out of four models. However, DiD estimator in model (4) does not exhibit a significant effect when accounting for both bank-specific FE and control variables. These results align with Hypothesis 2 but contradicts our previous findings regarding the pricing differences between ECs and shares. While the results are intriguing, they remain inconclusive and should not be interpreted as describing a causal effect of conversion.

7.3 Implications

The findings from our analyses can be further decomposed to explore their potential implications. First, we will briefly summarize the key results of our study. Subsequently, we break down these findings and discuss their potential implications.

In Section 7.1, we find evidence supporting our first hypothesis; downside protection in ECs has a positive effect on the P/B ratio. In Section 7.2, we find evidence supporting our second hypothesis; ECs exhibit different P/B ratios than shares, and the effect of being an EC bank is negative. These results indicate that although investors seem to understand and value the downside protection offered by ECs, this factor alone does not sufficiently compensate for the other attributes that are lost in comparison to shares.

Further decomposing our novel insights: the downside protection offered by ECs is indeed valued by investors. The findings corroborate the risk-reward theory and the semi-strong strong form of the EMH, detailed in Section 3.1 and 3.3, respectively. This suggests that available information on reduced risk exposure is understood and priced by the market. Consequently, from an EC bank perspective, it seems beneficial to maintain a favorable downside protection to attract investors, at least if the current governance structure survives.

To maintain, or enhance the downside protection to investors, the savings banks may pay out larger dividends to EC holders than gifts to society from the Ownerless Capital. As described in Section 2.2, this would result in the Ownerless Capital accumulating more than the EQR, thereby increasing the relative size of the “airbag” and exacerbating disparities in profit and loss sharing. This could help explain why the unequal distribution of dividends between the two equity forms persists, even after it was addressed in 2009 (Banklovkommisjonen, 2009). Consequently, our insights suggest that, in a way, savings banks are structurally incentivized to give less back to society than to EC holders in order to appeal to investors.

The Banking Law Commission (2009) presented customer dividends, inspired by Gjensidige, as a means of mitigating the unequal distribution. Customer dividends are a substitute to gifts from the Ownerless Capital. Net income allocated to the Ownerless Capital is distributed as dividends to the bank's customers based on the size of their loans and deposits. Interestingly, distributing net income through customer dividends is tax-deductible and gives the bank a tax benefit, boosting its returns. This is an incentive for savings banks to introduce customer dividends. However, as of 2023, only five EC banks have incorporated customer dividends into their dividend policy (Pedersen, 2024). This reluctance may stem from the misaligned incentives faced by management in savings banks, as customer dividends could limit downside protection for EC investors. However, we do not discover any noticeable deviating trends in RRPs across banks with customer dividends.

As outlined above, our discussion casts doubt on the integrity of incentive mechanisms within the equity structure of ECs. For share banks, management is expected to act in the best interests of equity holders. The question for EC banks is - *which* equity holders?

We contend that balancing the interests of both EC holders and Ownerless Capital, as management is legally obliged to (Finanstilsynet, 2022), may inherently pose challenges due to misaligned incentives. EC holders may benefit from increased risk and volatility as they do not bear the full cost of adverse outcomes at the expense of the Ownerless Capital. Such an incentive structure mimics the dynamics between equity and debt, introducing multiple implications when drawing parallels to empirical research on capital structure.

Suppose management prioritizes the interests of EC holders, possibly due to the fact that new equity can only be raised from EC investors. If so, management may be incentivized to take on excessive risk, shifting it to the Ownerless Capital, thereby creating a moral hazard in response to the incentive structure. This situation is analogous to the asset-substitution problem described by Jensen & Meckling (1976). Here, the equity holders (EC holders) can transfer wealth from debt holders (Ownerless Capital) by engaging in risky projects, as illustrated in Section 3.4. In fact, poor performance may even benefit EC holders by increasing their share of future profits, while their downside protection remains unchanged, as detailed in Subsection 2.2.1. This may further exacerbate the incentive to shift risk onto the Ownerless Capital. A possible implication of such dynamics is that management may opt for lower-quality projects at the expense of maximizing firm value. Risk may also be shifted to the Ownerless Capital through excessive dividends to EC holders.

Conversely, management may take on lower-risk projects that do not maximize firm value if they prioritize the interests of the Ownerless Capital. Such agency costs may also manifest in Mergers & Acquisitions ("M&A") depending on cross-collateralization of returns and assets. In this context, the dynamics are further complicated by the Ownerless Capital in the target bank being converted to ECs in the new firm entity. Such incentives in both the acquiring and target bank may lead to inefficient M&A activities.

Beyond the direct loss of value creation from failing to maximize firm value (known as the residual loss) and the risk shifting to Ownerless Capital (which is owned by society), these dynamics could further entail additional societal costs. As Jensen & Meckling (1976) theorized, significant monitoring costs and bonding expenditures may be incurred. For example, both EC holders and Ownerless Capital might need to intensively monitor management actions, enforce stringent and excessive corporate chapters, and allocate considerable resources to align incentives. Such frictions can reduce efficiency within the savings bank sector and exacerbate corporate governance challenges.

Jensen (2001) highlighted that too many stakeholders can erode managerial accountability, particularly if the stakeholders' interests are conflicting. Suboptimal actions by management may be justified by a variety of reasons due to ambiguous interpretations of what actions are actually optimal in balancing the interests of both equity groups. A potential implication is that this can enable management to serve their own personal interests instead. Such dynamics may amplify corporate governance concerns that have seemingly become defining of the Norwegian savings banks industry over the years.

Given the magnitude of complex mechanisms behind the equity structure in EC banks, we find the results from our second hypothesis intuitive. Although the downside protection seems to be priced in, the combination of other adverse factors likely overshadows this feature. As a result, investors may regard shares as the most attractive equity instrument due to characteristics such as instrument complexity, limited voting rights, uncertain incentive structures, and governance concerns.

Our findings imply that converting from EC to shares may crystalize value in savings banks, thereby enhancing the banks' perceived value. DNB and SR-Bank have done this and converted all Ownerless Capital to a trust with ownership in the bank. Notably, a comparable transformation occurs when savings banks merge. Then the target bank's Ownerless Capital is converted to a trust that receives ECs in the acquiring bank. For example, this has resulted in the top five EC holders of Sparebanken Sør-Øst Norge being trusts made up of Ownerless Capital from target banks (Sparebanken Sør-Øst Norge, 2024). Isolating the Ownerless Capital in a trust might enhance transparency and more effectively preserve the long-standing tradition of giving back to society. Deviating from the savings banks' preferred equity instrument of the last 45 years might also be a way to ensure the continued survival of savings banks in times of increased compliance and reporting obligations.

Given the preceding discussion, ECs may not be the optimal equity instrument for savings banks if the goal is to ensure the long-lasting tradition of giving back to society. Moreover, the intricate mechanisms and incentive structures may raise questions about whether EC's capital structure serves its intended purpose. Facilitating dynamics that could potentially incentivize savings banks to shift risk to society if future outlooks are pessimistic was probably not the original intent behind the implementation of ECs. This underscores the significance of the forthcoming evaluation of the capital structure in Norwegian savings banks and highlights the existing gaps in literature and need for further research on the subject.

7.4 Limitations

The interpretation of our findings and implications should be considered within the context of certain methodological constraints. In this section, we will briefly address these structural challenges to provide a clearer understanding of our study's limitations.

First, our choice of variables and regression model structure does not build on a strong academical foundation. While this limits the empirical strength of our findings, we argue our contribution to existing literature is considerable, given that we are conducting a preliminary study into a scarcely researched topic. To be able to conduct this research, we had to make choices without necessarily having the academic literature to justify all of them. Nevertheless, our methodology is built upon the fundamental principles of financial theory.

Second, the previously mentioned limitations in our data set influence our analysis. Ideally the sample of banks should be larger, particularly the sample of share banks. In earlier years of our study period, the only share banks are DNB and VVL. While DNB might be considered large enough to be a diversified proxy of Norwegian banking industry, a larger sample would have strengthened the credibility of our findings.

Lastly, survivorship bias might influence our results. Survivorship bias is a form of selection bias that may lead to overly optimistic beliefs because failures are overlooked. In our case, overlooking banks failing to survive. To mitigate survivorship bias we have included banks which have only been listed for parts of our study period. However, our sample does not include savings banks with ECs that are not listed on the Oslo Stock Exchange. There are six banks listed on Euronext growth, and several other banks with ECs which are not publicly traded. Including them in our study would increase the credibility of our results but collecting reporting and trading data proved to be infeasible.

8 Conclusions

In this final chapter, we conclude and emphasize the main findings of our study and their potential implications. Finally, we connect these insights to offer suggestions for future research on ECs and Norwegian savings banks to expand understanding of the topic.

8.1 Conclusions

Norwegian savings banks have long been integral to the development of Norwegian society, but this role could shift following recent criticisms regarding their unique equity instruments. Specifically, the EBA has criticized the asymmetric participation in gains and losses, prompting the Norwegian Ministry of Finance to initiate a public investigation into their capital structure. The impact of ECs' distinctive features is a predominantly unexplored field of research. Therefore, this thesis has investigated the impact of EC savings banks' unique features on pricing over the past two decades, using a novel dataset that includes all listed savings banks during the study period.

We posit that ECs should have lower systematic risk as the Ownerless Capital may function as an "airbag" in adverse outcomes, thus mitigating the downside risk exposure for EC investors. An increase in downside protection should lead to higher pricing, ceteris paribus. As a result, we hypothesized that:

H1*: "The downside protection of Equity Certificates has a positive effect on the bank's Price-to-Book ratio.*"

Our analysis reveals a significant positive relationship between downside protection in EC banks and higher P/B ratios. Thus, we can reject the null hypothesis of no significant effect of downside protection in favor of H1. The relationship remains robust across all three of our selected downside protection proxies. A potential implication of discovering such a pricing relationship is recognizing that the market understands the complex equity structure of EC banks and prices them accordingly. Yet, it remains uncertain as to whether the pricing fully captures the reduced risk exposure. This might explain why the risk-reducing capabilities do not exhibit a greater effect during crisis periods. However, this is more likely attributed to inherent limitations of our selected RRPs during such periods.

Furthermore, we build on the findings above and assert that the distinct characteristics of ECs, such as downside protection, complexity and reduced voting rights should result in a difference in pricing between ECs and shares. As a result, we also hypothesized that:

H2: ***"Equity Certificates exhibit different Price-to-Book ratios than shares due to their distinctive instrument characteristics."***

In our analysis, we uncover results supporting our second hypothesis, and thus we reject the null hypothesis of no difference in P/B ratios between ECs and shares in favor of H2. Surprisingly, the results indicate that, despite their downside protection, ECs are priced with significantly lower P/B ratios than shares. We argue that this is because a combination of other factors overshadows their risk reduction capabilities. This assertion is supported by the findings of our first hypothesis, which suggests that the market acknowledges and incorporates the downside protection in the pricing of ECs. Price-constraining factors might include instrument complexity, reduced voting rights, and governance concerns.

Furthermore, one might argue converting from ECs to shares could crystalize value in savings banks and increase perceived value. However, the quasi-experiment does not yield conclusive results on the effect of converting ECs to shares and should not be interpreted with causality due to several limiting factors. Nevertheless, transparent legislation and addressing complexity seem essential to secure the best interests of local communities and draw attention from international investors. Isolating the Ownerless Capital in a trust might enhance transparency and more effectively preserve the long-standing tradition of giving back to society.

We posit that our study offers meaningful insights to savings banks, investors, regulators, and commentators. Our introductory study on ECs provides empirical evidence that the market values the unique risk-reduction attributes of ECs. However, this relationship does not seem to outweigh other unique characteristics, such as the complex mechanisms and incentive structures in EC banks, raising questions about whether their capital structure serves its intended purpose. Such findings underscore the importance of the forthcoming evaluation of the capital structure in Norwegian savings banks and highlights the existing gaps in literature and need for further research on the subject. This is crucial to facilitate transparency and future access to capital in the Norwegian savings bank sector, while ensuring that the long-lasting tradition of giving back to society is preserved. One might wonder – could such a development close what Eie (2024) describes as the last mispriced pocket globally?

8.2 Proposals for Future Research

The findings from our study represent an initial step toward building a solid foundation rooted in empirical analysis on the topic of EC pricing dynamics. Thus, our preliminary study, along with our novel dataset, may pave the way for future research to further enhance understanding of the complex nature of ECs.

For upcoming research studies, it could be intriguing to further examine dynamics driving price differentials between ECs and shares. To this end, one might further investigate the impact of possibly dysfunctional incentive structures in EC banks, governance concerns, or market sensitivity as represented by beta. Furthermore, conducting a DiD study with the implementation of dilution protection measures in EC banks as the treatment could provide insights into how this relates to pricing dynamics. This is particularly relevant given the increasing prevalence of such measures in recent years. Examining differences in pricing dynamics between listed and unlisted ECs could also yield valuable insights.

Finally, we encourage any inquiries regarding access to our data sample for academic research purposes to further stimulate understanding of Norwegian savings banks. The sample is suitable for researching various topics of interest, such as determinants of profitability, growth, and mergers among savings banks, for both banks with ECs and those with shares.

9 References

Ahmed, A. S., Takeda, C., & Thomas, S. (1999). Bank loan loss provisions: a reexamination of capital management, earnings management and signaling effects. *Journal of Accounting and Economics*, 28(1):1-25.

Amihud, Y. (2002). Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets*, 5(1):31–56.

Andersen, H., Juelsrud, R. E., & Kostøl, A. (2020). *Effects of the IRB approach on bank.* Norges Bank.

Bachmann, H. S., & Hanstad, T. B. (2013). *Lønnsomhet i norske sparebanker : en studie av forklaringer til lønnsomhetsvariasjon.* Bergen: SNF.

Bankenes Sikringsfond. (2024). *Analyse og nøkkeltall norske banker*. Retrieved from Bankenes Sikringsfond: https://www.bankenessikringsfond.no/for-foretakene/analyse-og-nokkeltall/

Banklovkommisjonen. (2009). *NOU: Kapital- og organisasjonsformer i sparebanksektoren mv.* Finansdepartementet.

Berk, J. B. (1995). A Critique of Size-Related Anomalies. *The Review of Financial Studies*, 8(2):275-286.

Bogdanova, B., Fender, I., & Takats, E. (2018). The ABCs of bank PBRs: What drives bank price-to-book ratios? *Bank of International Settlements, Quarterly Review.* Retrieved from Bank of International: https://www.bis.org/publ/qtrpdf/r_qt1803h.htm

Bøhren, Ø., & Josefsen, M. (2009). Ownerless Firms. *SSRN Electronic Journal.*

Booth, G. D., Niccolucci, M. J., & Schuster, E. G. (1994). *Identifying Proxy Sets in Multiple Linear Regression: An Aid to Better Coefficient Interpretation.* Unpublished.

Bowman, R. G. (1980). The Importance of a Market-Value Measurement of Debt in Assessing Leverage. *Journal of Accounting Research*, 18(1):242-254.

Calomiris, C. W., & Nissim, D. (2014). Crisis-related shifts in the market valuation of banking activities. *Journal of Financial Intermidiation*, 23(3):400-435.

Cameron, A. C., & Miller, D. L. (2015). A Practitioner's Guide to Cluster-Robust Inference. *The Journal of Human Resources*, 50(2):317-372.

Chen, J. (2024, May 15). *Risk-Return Tradeoff: How the Investment Principle Works.* Retrieved from Investopedia: https://www.investopedia.com/terms/r/riskreturntradeoff.asp

Cox, J. C., Ross, S. A., & Rubinstein, M. (1979). Option pricing: A simplified approach. *Journal of Financial Economics*, 7(3):229.

Donaldson, G. (1961). *Corporate debt capacity.* Boston: Harvard University.

ECB. (2010). *BEYOND ROE – HOW TO MEASURE BANK PERFORMANCE.* European Central Bank.

Eie, G. (2024, February 2). Interview with Finansavisen. (E. Kjernli, Interviewer)

European Banking Authority. (2022, June 22). *Nyhetsarkiv.* Retrieved from Finanstilsynet: https://www.finanstilsynet.no/contentassets/395ca9f5434c49b9b818dae177f49677/letter-on-cet1-eligibility--instruments-issued-by-norwegian-institutions.pdf

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, 25(2):383-417.

Finanskomiteen. (2003). *Innstilling frå finanskomiteen om Kredittmeldinga.*

Finanstilsynet. (2022, March 3). *Likelydende brev til sparebanker med egenkapitalbevis .* Retrieved from Finanstilsynet: https://www.finanstilsynet.no/contentassets/be6cdbc3c75542f29a2acf7d461883d5/utbytte-og-emisjoner.pdf

Finanstilsynet. (2022, December 19). *Nyhetsarkiv.* Retrieved from Finanstilsynet: https://www.finanstilsynet.no/nyhetsarkiv/nyheter/2022/den-europeiske-banktilsynsmyndigheten-eba-har-vurdert-norske-kapitalinstrumenter/

Foster, G. (1980). Accounting policy decisions and capital market research. *Journal of Accounting and Economics*, 2(1):29-62.

Fox, J., & Monette, G. (1992). Generalized Collinearity Diagnostics. *Journal of the American Statistical Association*, 87(417):178-183.

Frame, W. S., Fuster, A., Tracy, J., & Vickery, J. (2015). *The Rescue of Fannie Mae and Freddie Mac.* Federal Reserve Bank of New York.

Frankel, R., & Lee, C. M. (1998). Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics*, 25(3):283-319.

French, S., Leyshon, A., & Thrift, N. (2009). A Very Geographical Crisis: The Making and Breaking of the 2007–2008 Financial Crisis. *Cambridge Journal of Regions Economy and Society*, 2(2):287-302.

Gordon, M. J., & Shapiro, E. (1956). Capital Equipment Analysis: The Required Rate of Profit. *Management Science*, 3(1):102-110.

Goyenko, R. Y., Holden, C. W., & Trzcinka, C. A. (2009). Do liquidity measures measure liquidity? *Journal of Financial Economics*, 92(2):153–181.

Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*, 39(4):709-722.

Heinrich, C., Maffioli, A., & Vázquez, G. (2010). *A Primer for Applying Propensity-Score Matching.* Inter-American Development Bank.

Hunter, W. C., & Larry, W. (1989). Bank merger motivations: a review of the evidence and an examination of key target bank characteristics. *Economic Review*, 74(5):2-19.

IBF. (2024, May 8). *Systematic and Unsystematic Risk*. Retrieved from Institute of Business & Finance: https://icfs.com/financial-knowledge-center/systematic-and-unsystematic-risk

James, G., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An Introduction to Statistical Learning with Applications in R.* Springer.

Jensen, M. C. (2001). Value Maximisation, Stakeholder Theory, and the Corporate Objective Function. *Journal of Applied Corporate Finance*, 14(3):8-21.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4):305-360.

Jonathan, B., & Peter, D. (2019). *Corporate Finance.* Pearson.

Kaaby, E. A. (2010, May 18). *Egenkapitalbevis i sparebanker : en analyse av perioden 1998-2009.* Retrieved from UiT Munin: https://munin.uit.no/handle/10037/2653

Keatinge, C., & Joshua, J. (2023, March 10). *Credit Investors See Potential Risk in Bank Bonds After SVB Collapse.* Retrieved from BNN Bloomberg:

https://www.bnnbloomberg.ca/credit-investors-see-potential-risk-in-bank-bonds-after-svb-collapse-1.1893955

Kerr, J. N., Sadka, G., & Sadka, R. (2020). Illiquidity and Price Informativeness. *Management Sciences*, 66(1):334-351.

Lev, B. (1983). Some economic determinants of time-series properties of earnings. *Journal of Accounting and Economics*, 5:31-48.

Liang, C.-J., & Yao, M.-L. (2005). An Investigation Into the Differences Between the Book Value and Market Value of Commercial Banks: An Empirical Study. *International Journal of Management*, 22(1):89-100.

Malkiel, B. G. (2003). The Efficient Market Hypothesis and Its Critics. *The Journal of Economic Perspectives*, 17(1):59-82.

Markowitz, H. (1952). Portfolio Selection. *Journal of Finance*, 7(1):77-91.

Meinich, P. (2023, December 7). *Sparebank*. Retrieved from Store Norske Leksikon: https://snl.no/sparebank

Menon Economics. (2023). *Kartlegging av norsk banksektor - en internasjonal sammenligning.* Finans Norge.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, 48(3):261-297.

Modigliano, F., & Miller, M. H. (1961). Dividend Policy, Growth, and the Valuation of Shares. *The journal of Business*, 34(4):411-433.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2):187-221.

Oslo Børs. (2010, June 29). *SpareBank 1 SR-Bank utreder eventuell omdanning til aksjesparebank.* Retrieved from NewsWeb: https://newsweb.oslobors.no/message/263563

Oslo Børs. (2011, June 21). *The Ministry of Finance has given its permission for conversion.* Retrieved from Oslo Børs NewsWeb: https://newsweb.oslobors.no/message/285231

Pagratis, S., Karakatsani, E., & Louri, H. (2020). Are banks using leverage to target return on equity? Evidence from the US and the EU. *Oxford Economic Papers*, 72(3):863–892.

Pedersen, J. G. (2009, December 2). Superaksje med airbag. (C. L. Becker, Interviewer)

Pedersen, R. (2024, April 12). *Kundeutbytte i Banker*. Retrieved from Smarte Penger: https://www.smartepenger.no/skadeforsikring/3469-kundeutbytte-i-banker

Sheather, S. J. (2009). *A Modern Approach to Regression with R.* Springer.

Shieh, G. (2010). On the Misconception of Multicollinearity in Detection of Moderating Effects: Multicollinearity Is Not Always Detrimental. *Multivariate Behavioral*, 45(3):483-507.

Slyngstadli, P. (2022, March 21). *Hva er egenkapitalbevis?* Retrieved from Norne Securities: https://norne.no/blogg/nyheter/hva-er-egenkapitalbevis/

Sparebanken Sør-Øst Norge. (2024, May 10). *Våre største eiere*. Retrieved from Sparebanken Sør-Øst Norge: https://www.sparebank1.no/nb/sorost/om-oss/investor/egenkapitalbevis/vare-storste-eiere.html

Sparebankforeningen. (2021). *Sparebankstiftelsene – Hvem er de og hva gjør de?* Retrieved from Sparebankforeningen: https://www.sparebankforeningen.no/artikler/2021/sparebankstiftelsene--hvem-er-de-og-hva-gjor-de/

Sparebankforeningen. (2023, March 21). *Sparebankene styrker samfunnet.* Retrieved from Sparebankforeninen: https://www.sparebankforeningen.no/om-oss/sparebankene-styrker-samfunnet/

Sparebankforeningen. (2024). *Fusjoner og endringer hos sparebankene.* Retrieved from Sparebankforeningen: https://www.sparebankforeningen.no/om-oss/fusjoner-og-endringer/

Sparebankforeningen. (2024). *Strukturutvikling i sparebankene*. Retrieved from Sparebankforeningen: https://www.sparebankforeningen.no/om-oss/strukturutvikling-i-sparebankene/

Stengrimsen, H., & Storsletten, C. (2023). *Skaper forskjeller i bankregulering ulike konkurransevilkår?*

Stock, J. H., & Watson, M. W. (2020). *Introduction to Econometrics.* Pearson Education.

UiT. (2022). *TITLON – Financial data for Norwegian academic institutions*. Retrieved from UiT Norges arktiske universitet: https://uit.no/forskning/forskningsgrupper/sub?p_document_id=352767&sub_id=417205

Wilkins, A. S. (2018). To Lag or Not to Lag?: Re-Evaluating the Use of Lagged Dependent Variables in Regression Analysis. *Political Science Research and Methods*, 6(2):393-411.

Zhou, P., & Ruland, W. (2006). Dividend Payout and Future Earnings Growth. *Financial Analysts Journal*, 62(3):58-69.

Declaration on the Use of Artificial Intelligence

During our thesis work, we utilized ChatGPT 4.0 to assist with coding in R and to proofread excerpts from the thesis.

We are aware of our responsibility for all content in this thesis, including parts where artificial intelligence tools have been employed. We are responsible for ensuring that the thesis follows ethical guidelines for privacy and publication.

10 Appendices

10.1 Data Sample & Interview Participants

Table 7: Entity Overview of Full Sample

This table provides an overview of all the sampled entities in the Full Sample with their respective study periods, along with the number of observations. The last column indicates the banks that are included in the control group for the quasi-experiment. Note that RVSB is a made-up ticker for identification purposes.

#	Firm Name	Ticker	First Quarter	Last Quarter	# of Obs.	Control Group
	Banks with ECs					
1	Aurskog Sparebank	AURG	2005-Q1	2023-Q4	76	No
2	Hol Sparebank	HOLG	2005-Q1	2013-Q2	34	No
3	Høland Og Setskog Sparebank	HSPG	2005-Q1	2023-Q4	76	No
4	Jæren Sparebank	JAREN	2007-Q2	2023-Q4	67	No
5	Melhus Sparebank	MELG	2005-Q1	2023-Q4	76	No
6	Nes Prestegjelds Sparebank	NESG	2005-Q1	2013-Q2	34	No
7	Rygge-Vaaler Sparebank	RVSB	2005-Q4	2011-Q3	24	No
8	Sandnes Sparebank	SADG	2005-Q1	2023-Q4	76	No
9	Sandsvær Sparebank	SANG	2005-Q1	2008-Q3	15	No
10	Skue Sparebank	SKUE	2013-Q3	2023-Q4	42	No
11	Sogn Sparebank	SOGN	2005-Q1	2023-Q4	76	No
12	SpareBank 1 BV	SBVG	2008-Q4	2021-Q1	50	No
13	SpareBank 1 Helgeland	HELG	2005-Q1	2023-Q4	76	No
14	SpareBank 1 Nord-Norge	NONG	2005-Q1	2023-Q4	76	Yes
15	SpareBank 1 Nordmøre	SNOR	2017-Q4	2023-Q4	25	No
16	SpareBank 1 Nøtterøy-Tønsberg	NTSG	2007-Q4	2016-Q4	37	No
17	SpareBank 1 Østfold Akershus	SOAG	2011-Q4	2023-Q4	49	No
18	SpareBank 1 Østlandet	SPOL	2017-Q1	2023-Q4	28	No
19	SpareBank 1 Ringerike-Hadeland	RING	2005-Q1	2023-Q4	76	No
20	SpareBank 1 SMN	MING	2005-Q1	2023-Q4	76	Yes
21	SpareBank 1 Sørøst-Norge	SOON	2021-Q2	2023-Q4	11	No
22	SpareBank 1 Telemark	SBTE	2018-Q4	2021-Q1	10	No
23	SpareBank 1 Vestfold	VSBG	2005-Q1	2008-Q3	15	No
24	Sparebanken Møre	MORG	2005-Q1	2023-Q4	76	Yes
25	Sparebanken Øst	SPOG	2005-Q1	2023-Q4	76	Yes
26	Sparebanken Pluss	PLUG	2005-Q1	2013-Q4	36	No
27	Sparebanken Sør	SOR	2014-Q1	2023-Q4	40	No
28	Sparebanken Vest	SVEG	2005-Q1	2023-Q4	76	Yes
29	SR-Bank	ROGG	2005-Q1	2011-Q4	28	No
30	Totens Sparebank	TOTG	2005-Q1	2023-Q4	76	No

Banks with Shares					
31 Bien Sparebank	BIEN	2022-Q4	2023-Q4	5	No
32 DNB Bank	DNB	2005-Q1	2023-Q4	76	No
33 Sbanken	SBANK	2015-Q4	2022-Q1	26	No
34 SR-Bank	SRBNK	2012-Q1	2023-Q4	48	No
35 Vekselbanken	VVL	2005-Q1	2023-Q4	76	No

Table 8: Data Points & Sources

This table provides the retrieved data points for each bank in the Full Sample, sorted by their respective sources.

ISINs were manually added through online research and cross-checked with corresponding bank names.

#	Data Point	Source
	Quarterly Accounting Figures	Quarterly Reports
1	Interest Income	
2	Interest Expenses	
3	Net Interest Income	
4	Loan Impairments	
5	Pre-Tax Operating Profit	
6	Net Income	
7	Portion Attributable to NCIs	
8	Portion Attributable to AT1	
9	Portion Attributable to Equity Holders	
10	Cash	
11	Total Assets	
12	Total Liabilities	
13	Total Equity	
14	NCIs	
15	AT1	
16	Equity Certificates	
17	Premium Reserve	
18	Equalization Reserve	
19	Total Equity Certificate Capital	
20	Primary Capital Fund	
21	Compensation Fund	
22	Gift Fund	
23	Total Ownerless Capital	
24	Tier 1 Cap Ratio	
25	Gross Loans	
26	Average AuM	
27	Applied EC Fraction	

Trading Data	Titlon & Eikon
28 Trading Date	
29 Actual Price	
30 Adjusted Price	
31 # Outstanding	
32 Quarterly Trading Days	
33 Daily Trading Volume	
34 Daily Closing Price	

Table 9: Interview Participant Overview

This table provides an overview of each interviewee and their professional background. To gain insight into the Norwegian savings banks industry, we conducted several interviews. The interviews followed a semi-structural framework. This means the interviewer leans on an interview guide to broadly structure the interview but allows the interview to be shaped by the conversation. An interview guide is a manuscript structuring the course of the interview, and we tailored a broad interview guide for each interview.

#	Name	Professional Background
1	Håkon Astrup	Equity Analyst at DNB Markets, covering Norwegian financial institutions. Ranked as Norway's best banking analyst for the last three years by Finansavisen.
2	Fridtjof Berents	CEO of Toluma, former Deputy CEO of Finance Norway. Previously held various positions at Arctic Securities. Member of Sparebankutvalget.
3	Joar Johnsen	Senior Client at Export Finance Norway, former Chief Analyst at Finance Norway. Member of Sparebankutvalget.
4	Marina Tarakanova	Former Senior Equity Analyst at Norne Securities, covering the banking sector.

10.2 Descriptive Statistics

Table 10: Descriptive Statistics for EC Sample

This table provides the number of observations, means, standard deviations and distributions for the EC Sample. The sample contains pooled cross-sections of banks with ECs from 2005-Q1 to 2023-Q4. *P/B* is the price divided by book value per instrument, *Lagged P/B* is *P/B* lagged by one quarter. *ROE* is the net income divided by average book value of equity. *InvCapRatio* is the inverted tier 1 capital ratio. *GLR* is loan impairments divided by total gross loans. *Log MCAP* is the natural logarithm of market capitalization. *Log Illiq* is the natural logarithm of the quarterly arithmetic mean of daily absolute returns divided by turnover rescaled by 10^6 plus 1. *EC Fraction* is the EC capital divided by the sum of EC capital and Ownerless Capital, while the *T3 Fraction* is the ratio of the EQR to the T3 capital. The *Relative T3 Fraction* is the EC fraction divided by the T3 fraction. *EQRM* is the EQR divided by absolute net income attributable to EC holders. The variables with "(%)" are expressed in percentage points for interpretation purposes. Note that the RRPs are not transformed with a natural logarithm and multiplied with -1 like they have been defined in Section 6.1.2.

	N	Mean	St. Dev.	Min	p25	Median	p75	Max
Dependent Variable								
P/B	1,533	0.96	0.34	0.23	0.73	0.90	1.12	2.40
Control Variables								
Lagged P/B	1,503	0.96	0.34	0.23	0.73	0.90	1.12	2.40
ROE (%)	1,503	10.14	4.96	-35.93	7.88	9.94	12.13	60.07
InvCapRatio (%)	1,533	84.72	3.51	70.80	81.98	84.27	87.20	93.56
GLM (%)	1,533	0.13	0.18	-0.61	0.02	0.09	0.19	1.49
Log MCAP (kNOK)	1,533	13.28	1.58	10.13	11.95	13.34	14.49	16.83
Log Illiq	1,533	0.59	0.77	0.00	0.07	0.33	0.83	6.95
EC Specific Variables								
EC Fraction (%)	1,533	43.14	22.41	2.57	25.76	39.66	57.16	97.35
T3 Fraction (%)	1,533	18.94	22.72	0.00	2.46	10.24	27.35	95.00
Relative T3 Fraction	1,533	116.93	590.67	1.02	1.93	3.35	10.32	6,253.51
EQRM (%)	1,533	224.23	404.26	0.00	69.08	168.61	290.46	11,789.43

Table 11: Descriptive Statistics for DiD Sample

This table provides the number of observations, means, standard deviations and distributions for the DiD Sample. The sample contains pooled cross-sections of SR-Bank that converted their ECs to shares in 2012-Q1, and banks in the control group that received no treatment, from 2009-Q2 to 2013-Q1. The treatment date is set to the approval of SR-Bank's conversion in 2011-Q2. *P/B* is the price divided by book value per instrument. *Treated* indicates banks that received treatment. *PostTreatment* indicates observations after the treatment. *Treated*PostTreatment* is the interaction term between *Treated* and *PostTreatment*. *EC Fraction* is the EC capital divided by the sum of EC capital and Ownerless Capital. *ROE* is the net income divided by average book value of equity. *Log MCAP* is the natural logarithm of market capitalization. *Log Illiq* is the natural logarithm of the quarterly arithmetic mean of daily absolute returns divided by turnover rescaled by 10^6 plus 1. The variables with "(%)" are expressed in percentage points for interpretation purposes.

	N	Mean	St. Dev.	Min	p25	Median	p75	Max
Dependent Variable								
P/B	96	0.88	0.18	0.51	0.75	0.86	1.00	1.34
Independent Variables								
Treated	96	0.17	0.37	0	0	0	0	1
PostTreatment	96	0.50	0.50	0	0	0.5	1	1
Treated*PostTreatment	96	0.08	0.28	0	0	0	0	1
Characteristics Used in PSM								
EC Fraction (%)	91	44.49	15.54	6.81	34.97	46.09	56.49	72.15
ROE (%)	96	12.89	3.48	5.87	10.99	12.35	14.62	26.93
Log MCAP (kNOK)	96	14.40	0.91	12.51	13.68	14.28	15.20	16.36
Log Illiq	96	0.30	0.42	0.001	0.01	0.09	0.48	2.00

10.3 Robustness Analyses

Table 12: Breusch-Godfrey Tests for Autocorrelation

This table presents the p-values of the Breusch-Godfrey test for each model in this thesis. The null hypothesis is that there is no first-order autocorrelation in the residuals.

Model	EC Sample	EC Case Studies	Full Sample	DiD Sample
(1)	0.31	0.34	0.04^{**}	0.00^{***}
(2)	0.01^{**}	0.09^{*}	0.01^{***}	0.00^{***}
(3)	0.01^{***}	0.06^{*}	0.792	0.02^{***}
(4)		0.01^{**}	0.136	0.01^{***}

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 13: VIFs

This table presents the Generalized Variance Inflation Factor ("GVIF") for each independent variable used in the regression models provided in this paper. The GVIF is a linear measure that is proportional to the inflated coefficient confidence intervals due to multicollinearity (Fox & Monette, 1992). Consequently, the commonly accepted threshold of <5 for critical VIF levels can be applied. Note that in most instances, high VIFs may not necessarily indicate multicollinearity issues if they arise due to the inclusion of interaction terms and/or dummy variables representing more than two categories (Shieh, 2010). This notion applies to the abnormally high value of 7.1 for *DummyEC* in model (1) that utilizes the Full Sample.

	EC Sample			EC Case Studies				Full Sample			DiD Sample	
	(1)	(2)	(3)	(1)	(2)	(3)	(4)	(1)	(3)	(4)	(2)	(4)
Lagged P/B	1.8	1.8	1.7	1.6	1.6	1.6	1.6	2.4	1.7	1.8	1.3	1.4
ROE	1.2	1.2	1.3	1.2	1.2	1.3	1.3	1.3	1.2	1.3	1.3	1.5
InvCapRatio	1.7	1.7	1.8	1.7	1.7	1.9	1.9	2.4	1.6	1.9	1.5	2.1
GLR	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.2	1.2	1.4	1.6
Log MCAP	4.5	3.2	3.1	4.5	3.2	4.7	3.3	5.0	4.0	4.2	1.8	4.4
Log Illiq	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.3	1.3	1.3	1.4
Log T3 Fraction	3.2			3.4		3.5						
Log Rel. T3 Fraction		1.5			1.8		1.8					
Log EQRM			1.7									
DummyCrisis				1.6	1.7				2.8			
DummyCrisis*RRP				1.9	2.0							
Crisis Dummies						1.8	2.9			2.9		
Crisis Dummies *RRP						1.7	2.9					
DummyEC								7.1	3.7	3.7		
Year Dummies *DummyEC								3.0				
DummyCrisis* DummyEC									3.0			
Crisis Dummies *DummyEC										2.9		
Treated											1.3	
PostTreatment											1.3	1.7
PostTreatment* Treated												1.6
Bank Dummies	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1		1.6
Pre-2008 Dummies	1.1	1.1	1.1									
Pre-GFC Dummies				1.1	1.1	1.2	1.2		1.1	1.1		
Year Dummies								2.9				

10.4 Excerpts of Selected Regression Models

Table 14: Impact of Downside Protection in ECs on P/B ratio with Time FE

The regressions in this table depict the relationship between the P/B ratio and our selected RRPs in banks with ECs using the EC Sample. The sample consists of 30 banks and 1,503 bank-quarter observations in the period from 2005-Q2 to 2023-Q4. Models (1), (3) and (5) evaluate each RRP separately while controlling for bank-specific FE, predefined control variables and yearly time FE. For these models, R^2 is approximately 0.87, indicating that the models explain 87% of the variation in *P/B*. In models (2), (4), and (6) we control for year-quarter FE instead. For these models, R^2 is approximately 0.57, indicating that the models explain 57% of the variation in *P/B*. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses.

	Dependent Variable:					
	P/B					
	(1)	(2)	(3)	(4)	(5)	(6)
Log T3 Fraction	0.227^{***}	0.188^{***}				
	(0.065)	(0.057)				
Log Relative T3 Fraction			0.007^{**}	0.008^{**}		
			(0.003)	(0.003)		
Log EQRM					0.007	0.019^{**}
					(0.010)	(0.009)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Year	Year-Quarter	Year	Year-Quarter	Year	Year-Quarter
Observations	1,503	1,503	1,503	1,503	1,503	1,503
R^2	0.866	0.571	0.865	0.570	0.864	0.568
Adjusted R^2	0.861	0.538	0.860	0.536	0.859	0.534
F Statistic	374.268^{***}	265.108^{***}	370.158^{***}	263.299^{***}	368.464^{***}	261.556^{***}

Note: $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table 15: Impact of Instrument Type on P/B Ratio (Full Excerpt)

The regression models in this table depict the effect of instrument type on the P/B ratio using the Full Sample. The sample consists of 35 banks and 1730 bank-quarter observations in the period from 2005-Q2 to 2023-Q4. All four regression models include our selected control variables defined in Subsection 6.1.3, a dummy for instrument type, and bank-specific FE. Model (1) includes year FE and interacts each year with *DummyEC*. All yearly interaction terms in this model exhibit a negative effect on *P/B*, and in 13 of 18 of them the effect is significant at either the 5% or 1% level. Model (2) extends the first model by incorporating a dummy variable that indicates whether a date falls before or after the 2009 legislative changes, along with an interaction term between this dummy and *DummyEC*. Model (3) utilizes a joint crisis dummy for all crises combined, while model (4) includes a separate dummy for each crisis, as defined in Subsection 6.1.3. Time FE in model (3) and (4) are included for the pre-GFC period and each crisis. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses.

	Dependent Variable:			
	P/B			
	(1)	(2)	(3)	(4)
Lagged P/B	0.675***	0.674***	0.798***	0.805***
	(0.029)	(0.029)	(0.024)	(0.026)
ROE	0.132*	0.110	0.245***	0.246***
	(0.072)	(0.070)	(0.067)	(0.072)
InvCapRatio	-0.343	-0.312	0.040	0.317
	(0.212)	(0.214)	(0.291)	(0.283)
GLR	-8.779***	-9.047***	-4.994**	-6.283***
	(2.658)	(2.630)	(2.005)	(2.034)
Log MCAP	0.055**	0.053**	0.036*	0.031
	(0.022)	(0.021)	(0.019)	(0.020)
Log Illiq	0.003	0.004	-0.006*	-0.007*
	(0.005)	(0.005)	(0.004)	(0.004)
DummyEC	0.144***	0.144***	0.042**	0.027
	(0.029)	(0.028)	(0.016)	(0.017)
Dummy2006*DummyEC	-0.108***	-0.109***		
	(0.029)	(0.029)		
Dummy2007*DummyEC	-0.090**	-0.092**		
	(0.037)	(0.036)		
Dummy2008*DummyEC	-0.015	-0.016		
	(0.093)	(0.094)		
Dummy2009*DummyEC	-0.113***	0.017		
	(0.026)	(0.036)		
Dummy2010*DummyEC	-0.027	0.146**		

	(0.036)	(0.071)		
Dummy2011*DummyEC	-0.069	0.105		
	(0.045)	(0.082)		
Dummy2012*DummyEC	-0.089***	0.086		
	(0.025)	(0.058)		
Dummy2013*DummyEC	-0.116***	0.059		
	(0.029)	(0.051)		
Dummy2014*DummyEC	-0.068***	0.106*		
	(0.025)	(0.059)		
Dummy2015*DummyEC	-0.036	0.138**		
	(0.030)	(0.063)		
Dummy2016*DummyEC	-0.067**	0.107*		
	(0.030)	(0.062)		
Dummy2017*DummyEC	-0.125***	0.050		
	(0.033)	(0.057)		
Dummy2018*DummyEC	-0.078**	0.096		
	(0.031)	(0.061)		
Dummy2019*DummyEC	-0.069**	0.105*		
	(0.029)	(0.058)		
Dummy2020*DummyEC	-0.021	0.153**		
	(0.043)	(0.073)		
Dummy2021*DummyEC	-0.072**	0.102*		
	(0.031)	(0.060)		
Dummy2022*DummyEC	-0.084***	0.090		
	(0.027)	(0.064)		
Dummy2023*DummyEC	-0.075***	0.100*		
	(0.020)	(0.053)		
Post2009Q2		0.267***		
		(0.035)		
Post2009Q2*DummyEC		-0.175***		
		(0.043)		
DummyCrisis			-0.032**	
			(0.014)	
DummyCrisis*DummyEC			0.017	
			(0.016)	
2008				-0.074
				(0.055)
2014				-0.055***
				(0.018)
2020				0.012

				(0.014)
2022				-0.006
				(0.013)
Dummy08FC*DummyEC				0.030
				(0.058)
Dummy14OC*DummyEC				0.034*
				(0.019)
Dummy20CP*DummyEC				0.020
				(0.017)
Dummy22BT*DummyEC				-0.003
				(0.016)
Bank FE	Yes	Yes	Yes	Yes
Time FE	Year	Year	Pre-GFC	Pre-GFC
Observations	1,730	1,730	1,730	1,730
R^2	0.864	0.865	0.841	0.844
Adjusted R^2	0.857	0.859	0.837	0.839
F Statistic	243.324***	235.948***	743.686***	505.116***
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 16: Impact of EC Conversion on the P/B Ratio (Full Excerpt)

The regressions in the table on the following page table depict the effect of converting from ECs to shares on the P/B ratio using the DiD Sample. The sample consists of six banks and 96 bank-quarter observations in the period from 2009-Q2 to 2013-Q1. The dependent variable is *P/B*. The independent variables include a dummy variable indicating banks converting to shares (*Treated*), and another dummy variable indicating the post-conversion time period (*PostTreatment*). Their interaction term, *Treated*PostTreatment*, aims to isolate the effect of conversion. The conversion group only consists of one bank, SR-Bank, since this is the only bank which have converted in recent years. The control group consists of five savings banks, selected through PSM. Model (1) and (2) does not include bank-specific FE, as opposed to model (3) and (4). Furthermore, model (2) and (4) includes the control variables defined in Subsection 6.1.3, while model (1) and (3) do not. Standard errors clustered by bank and robust to heteroskedasticity are displayed in parentheses. Note that *Treated* disappears in the FE models due to no variation in this variable.

	Dependent Variable:			
	P/B			
	(1)	(2)	(3)	(4)
Treated	0.160***	0.011		
	(0.047)	(0.029)		
PostTreatment	-0.212***	-0.171***	-0.212***	-0.174***
	(0.022)	(0.020)	(0.022)	(0.016)
Treated*PostTreatment	-0.056**	-0.066***	-0.056**	-0.047
	(0.022)	(0.017)	(0.022)	(0.030)
Intercept	0.963***	0.300		
	(0.047)	(0.407)		
Lagged P/B		0.369***		0.364***
		(0.075)		(0.060)
ROE		-0.033		-0.606
		(0.374)		(0.560)
InvCapRatio		-0.906*		2.041**
		(0.542)		(1.041)
GLR		8.882		16.630***
		(6.732)		(4.020)
Log MCAP		0.079***		0.191***
		(0.011)		(0.050)
Log Illiq		0.011		0.006
		(0.029)		(0.010)
Bank FE	No	No	Yes	Yes
Observations	96	96	96	96
R^2	0.473	0.747	0.545	0.723
Adjusted R^2	0.456	0.720	0.509	0.679
F Statistic	27.519***	28.144***	52.726***	26.759***

Note: *p<0.1; **p<0.05; ***p<0.01