

The economic performance of ownerless firms

Abstract

This paper explores whether ownership matters in a fundamental sense by comparing the performance of stockholder-owned firms to the much less analyzed ownerless firms, where no stakeholder has residual cash flow rights and control rights are shared by customers, employees, and the community. Controlling for differences in size and risk and only comparing firms within the same industry, we find that stockholder-owned firms do not outperform ownerless firms. This finding is consistent with the notion that owners can be replaced by other governance mechanisms. We find indicative evidence that by disciplining every firm regardless of its stakeholder structure, product market competition plays this role as a substitute for owner monitoring.

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1. Introduction

The objective of the firm and the distribution of ownership rights among its stakeholders are two related issues that attract considerable public attention. (Macey and O'Hara (2003), Allen et al. (2009)). Our paper addresses this issue empirically by asking whether the stakeholder structure matters for the firm's performance. In particular, we analyze whether agency theory is right in predicting that in ownerless firms, where no stakeholder has residual cash flow rights, returns to capital invested will be lower than in firms owned by stockholders (Jensen and Meckling (1976)).¹

The existing literature has not addressed this question.² Rather, it has analyzed extensively whether changes in ownership structure correlate with changes in performance (see Becht et al. (2003) for a survey). However, by only comparing firms that all have owners, this approach leaves unanswered the more fundamental question of whether firms need owners for governance reasons in the first place. That question cannot be answered unless firms with owners are compared to firms without owners. Another rationale for making such a study is the fact that firms without owners play a significant role in the economy. For instance, ownerless firms in the US account for 64% of hospital care, 56% of day care for children, 20% of college and university education, and 10% of primary and secondary training (Hansmann (1996), p. 227). Thus, understanding the governance of ownerless firms is useful per se.

We use firm-level data from the population of Norwegian banks, which differ widely in how cash flow rights and control rights are distributed among the stakeholders. One firm type is the standard stock company. These are commercial banks, where profit maximization is the goal, stockholders have all cash flow rights, and stockholders control the board. In contrast, no stakeholder has cash flow rights in the ownerless banks, which have multiple objectives and voting rights shared by the employees, customers, and the community citizens. There is also a third type which is a mixture of the two pure types. All three firm types have equal access to the same, unsegmented product market and operate under the same regulatory regime.

The power of our tests is increased by this combination of high heterogeneity in stakeholder structure and low heterogeneity in market opportunities and regulation. If a key to economic success involves profit maximization as the goal and owner control as a governance mechanism, this should at least show up as performance differences between firms that operate in the same environment, but represent the largest possible difference in their objectives and owner control.

¹ Hansmann (1996, p. 228) uses the term non-profit for firms that are "barred from distributing any profits to its members, officers, directors or trustees". Since these firms are not barred from earning profits, however, and since we study the relationship between stakeholder structure and profits, we prefer the term ownerless to non-profit.

² Empirical tests of the relationship between stakeholder structure and organizational design have not focused on performance, but on behavior, such as productive efficiency (Mester (1991)), pricing strategy (Ashton and Letza (2003), Cummins et al. (2004)), risk taking (Esty (1997a, 1997b)), cost minimization (Mester (1989)), transition between organizational forms (Ostergaard et al. (2009)), and governance activity (Crespi et al. (2004)). Moreover, the stakeholder structures are quite homogenous across sample firms in these studies. With very few exceptions (Crespi et al. (2004), Ostergaard et al. (2009)), all the analyzed firms have at least one stakeholder with both cash flow rights and voting rights, such as equity investors in regular stock companies, depositors in S&Ls, policyholders in insurance mutuals, and producers in cooperatives. None of these firm types are ownerless.

Specifically, the agency logic predicts that compared to profit-maximizing firms controlled by stockholders, ownerless firms with multiple objectives have a double handicap in their ability to produce high returns to capital. Therefore, commercial banks should produce more value than other banks because their owners monitor the management team and because concern for non-owner stakeholders in a firm's objective function is costly for the owners. The performance of the hybrid banks should be somewhere in between the two pure types.

Our major finding is that owned banks do not outperform ownerless banks. This result does not imply that owners produce no value beyond providing capital. However, it does suggest that other governance mechanisms can successfully replace the owners' governance function. That is, managers of ownerless firms may be efficiently disciplined by substitutes for ownership.

The three owner substitutes we consider are regulation, capital constraints, and product market competition. First, it may be argued that the public banking supervisor has a monitoring function because it supervises all firms in our sample. However, supervisors do not mimic the governance role of stockholders, as the supervisors' job is to limit the downside risk and ensure firm survival rather than to encourage the highest possible return to capital invested. Second, one may argue that because ownerless banks cannot raise equity, this lack of access to such funding makes ownerless banks less prone to agency-induced overinvestment. We find no empirical support for this explanation.

The third potential substitute for owner monitoring is the need to perform under competitive pressure. It has been argued repeatedly that only efficient firms survive when competition is strong (Machlup (1967), Schmidt (1997)). Giroud and Mueller (2009) have recently given empirical support to this idea for stockholder-owned firms. They show that monitoring by owners and product market competition are substitute governance mechanisms in their sample of owned firms. In our setting, which is more general by also involving ownerless firms, the argument is that competition disciplines a firm regardless of its stakeholder structure. Therefore, ownerless firms will only persist in competitive markets if they perform as well as owned firms. By disciplining all firms, competition mitigates the governance handicap of ownerless firms. We find support for this interpretation of our major finding, using firm-level data on the relationship between firm performance and competitive pressure.³

We conclude that the observed relationship between stakeholder structure and economic performance is inconsistent with classic agency theory. This suggests there is a serious challenger to the classic organizational form of enterprise that assigns full control rights and cash flow rights to

³ This does not imply there is one superior organizational form. The history of our sample firms supports this view, as ownerless banks have coexisted with stockholder-owned banks for 160 years. This suggests that the value of ownership relative to other ways of organizing enterprise depends on a wider set of stakeholder, firm, and market characteristics than what we are able to explore in this paper. For instance, the theoretical literature surveyed by Hansmann (1996) shows that an ownerless firm may be the optimal organizational form, and also that owned firms may not be most efficiently owned by their capital providers, but by other stakeholders, such as customers and employees. This organizational design for owned firms is more efficient the stronger the firm's market power over these stakeholders, the more firm-specific their human capital, and the less symmetric the information between the parties at the contracting stage.

stockholders in profit-maximizing firms. Neither the one-dimensional objective of profit-maximization nor the stockholders' monitoring function may be critical for high returns to capital invested. In either case, competitive markets may be the underlying mechanism that does the job in the absence of owners.

Section 2 in the following describes the governance structure of the three firm types, and section 3 presents the data set and describes key industry characteristics. We analyze the economic performance of the three firm types in section 4. Conclusions follow in section 5.

2. Firm types and governance structure

The ownerless firms in our sample are savings banks (*sparebank*) that are controlled by its depositors, employees, and the local government.⁴ These firms should not be confused with mutuals, which are not ownerless, but collectively owned by its customers or suppliers. The key difference is that unlike in a mutual, no stakeholder has cash flow rights in an ownerless bank.

Commercial banks (*forretningsbank*) are listed companies that are owned and controlled by stockholders. The third type, which we call a PCC bank (*grunnfondsbank*) has voluntarily transformed itself from an ownerless savings bank into a hybrid form by issuing Primary Capital Certificates (hence PCC). These are regular equity securities held by the general public and are most often publicly listed. Thus, a PCC bank is partly an ownerless company, partly a stock company.

Given these differences in stakeholder structure, it is no surprise that the objective function varies across the three organizational forms. Commercial banks have profit maximization as their goal, whereas ownerless savings banks (hereafter non-PCC banks) have multiple goals.⁵ The hybrid PCC banks also have multiple goals, but their objective function also reflects that stockholders own part of the equity.

Table 1 shows how control (voting) rights and cash flow rights are distributed among the four stakeholders in the three firm types. The ownerless non-PCC bank has a committee of representatives with members appointed by the employees (25% of the votes), depositors (37.5%), and community citizens (37.5%). This committee elects the board, and the two bodies jointly hire and fire the CEO. Per definition, no stakeholder has cash flow rights.

Commercial banks have stockholders who write the corporate charter and hold 73% of the votes for appointing directors. They also have all the claims on the residual cash flow.⁶ The holders of PCC securities are owners with a fractional claim on the residual cash flow. This fraction corresponds

⁴ The ownerless savings bank is similar to so-called mutual savings banks in the US, which were established for the first time in 1816. Despite its name, these mutual savings banks are in fact ownerless firms. Thus, they are fundamentally different from S&Ls, which are consumer cooperatives mutually owned by their depositors (Hansmann (1996), pp. 246-252).

⁵ Other goals include promoting saving in society and offering bank services to a wide range of citizens. Savings banks also distribute part of their earnings for social purposes. Non-PCCs (PCCs) allocated 4% (1%) of earnings to gifts over the sample period. Corresponding figures for commercial banks are not available.

⁶ Commercial banks with more than 200 employees are required by law to have one third of their directors elected by and among the employees. All commercial banks in our sample have more than 200 employees.

to their share of the equity, which varies between 5% and 92% across the sample. The remaining fraction is the ownerless equity. The owners' voting right is 25% by law.⁷

3. Industry characteristics

All banks in our sample have access to the same, unsegmented product markets throughout the sample period. There are no major regulatory barriers preventing banks from entering each others' product markets and geographical regions. The three bank types are subject to the same regulatory capital coverage constraints and reporting requirements. All banks are monitored by the same public banking inspector according to the same set of monitoring principles.

The first Norwegian savings bank was established in 1822, followed by the first commercial bank in 1848. New regulation allowed for the first conversion by a pure savings bank (non-PCC) to a PCC bank in 1988.⁸ Our data set includes every Norwegian savings bank (non-PCC and PCC) and all listed Norwegian commercial banks from 1985 to 2002. There are 2668 firm years, of which non-PCC banks, PCC banks, and commercial banks account for 2288, 214, and 166, respectively. As shown by panel (a) of table 2, the number of non-PCC banks and commercial banks drops over time from 191 to 103 and from 15 to 2, respectively. The number of PCC banks grows from 3 to 24.

Norwegian banks went through a systemic crisis in 1988-1992 (Moe et al. (2004)). The first bank failure occurred in the fall of 1988, 13 small and medium sized banks failed in 1988-1990, and large commercial banks started failing towards the end of 1990. As government support of distressed banks sometimes required the write-off of existing equity, the three largest commercial banks came under full state ownership in 1992. The industry regained profitability in 1993, and the state gradually reduced its ownership thereafter. By the end of our sample period, the state held a 47.8% stake in the largest commercial bank and had sold all their shares in the two others.

Panel (b) of table 2 shows total bank assets across bank types. Savings banks as a group (i.e., PCCs and non-PCCs) gain market share over the sample period, but non-PCCs gradually lose market share to PCCs, primarily because large non-PCCs convert to PCCs. Whereas aggregate PCC assets are just half of non-PCC assets in 1988, they are almost three times bigger in 2002. Descriptive statistics for size per bank is reported in panel (c). Every distribution reflects that each type includes a few unusually large banks. The median commercial bank is about five times larger than a PCC bank, which

⁷ All three bank types have a two-tiered board structure. Except for charter amendments, which require a two thirds majority, all decisions in both tiers are made by simple majority.

⁸ Germany (Krahn and Schmidt (2004)), Norway, and Spain (Crespi et al. (2004)) are the three European countries in which savings banks have a prevalent position by accounting for roughly half the banking assets. Only Norway and Spain have ownerless banks (German savings banks are owned by local governments), and only Norway has PCC banks. Unlike in Norway, the founders of Spanish ownerless banks are on the board. Moreover, no existing study of Spanish banks relates the stakeholder structure to value creation. Some do not distinguish between owned banks and ownerless banks (Fuentelsaz et al. (2002), Maudos (1998), Prior (2003)). Those who do focus on differences in governance activity (Crespi et al. (2004)), cost efficiency (Grifell-Tatjé and Lovell (1997), Tortosa-Ausina (2002a, 2002b), Maudos and Pastor (2003)), and credit risk (Salas and Saurina (2002)).

is twelve times the size of a non-PCC. This suggests that controlling for differences in firm size is potentially important in empirical tests.

Table 3 shows that interest rates on deposits do not differ systematically between bank types. However, the average lending rate on home mortgages, which is the largest asset in every bank type, is higher in savings banks in every year except the first. Thus, the average interest margin is higher in stakeholder-oriented firms, reflecting a less aggressive pricing policy.

Since non-PCC banks are not listed, we cannot use market returns to estimate risk measures like stock beta or the volatility of stock returns. Instead, we use accounting figures for all three bank types. Following Esty (1997a, 1997b), our basic risk measures are estimated from the balance sheet, using the composition of the assets and liabilities to proxy for asset risk and liability risk, respectively. As a robustness check, we measure risk by the volatility of asset returns in section 4.2.

Panel (a) of table 4 describes the asset structure across bank types. We divide the assets into seven categories and construct averages by value-weighting across firms per year and equally-weighting across years. The risk of the assets is generally increasing from left to right in the table. The figures show that ownerless banks hold less risky assets than other banks. Amortizable loans, which is the largest asset component in all bank types, is much higher in savings banks than commercial banks (75% vs. 49%). Short-term assets, which are the second largest asset component for every bank type, are slightly more common in commercial banks (21% vs. 17%).

We classify the liabilities into four categories. Liability risk is higher the more the bank is financed with debt, and the more risky the components of the debt.⁹ This means that in panel (b) of table 4, liability risk increases from left to right. The table shows that ownerless banks have more equity than other banks.¹⁰ Also, the composition of the debt reflects a lower tendency by ownerless banks to take on risk. They rely much more on deposits (75% vs. 47%), use less subordinated debt, borrow less in the interbank market, and finance less from other debt sources. Thus, non-PCC banks fund their assets more by deposits and less by market borrowing than commercial banks. PCC banks are roughly midway between the two.¹¹

⁹ Because deposits are insured by a fund collectively financed by the banks, and because the government is a lender of last resort, there is no deposit risk for customers. As Due to banks and Other liabilities is market funding, these liabilities are sensitive to interest rate movements and may also be more costly to roll over under adverse market conditions. Thus, banks relying more on market funding are generally more risky.

¹⁰ Equity was about 7% for non-PCCs and 3% for the other two types when the banking crisis ended. All bank types and particularly non-PCCs become permanently less leveraged afterwards. Regulation says total liable capital must be at least 8% of total risk-weighted assets. This ratio may differ considerably from the corresponding ratio based on unweighted assets.

¹¹ To check these relationships more formally, we estimate a multinomial logit model that predicts bank type from the bank's size, growth, and balance sheet structure in any given year. The model is estimated separately for the whole period (1985-2002), the crisis years (1988-1992), and the post-crisis period (1993-2002). The results, which are available upon request, support the impression from table 4. For instance, over the period as a whole and also during the crisis, the probability that a randomly selected bank is a commercial bank rather than a non-PCC is significantly higher the larger the bank and the more risky its liabilities.

This observed relationship between stakeholder structure and bank behavior is generally consistent with the existing theory and empirics. For instance, Allen et al. (2009) show theoretically that if a firm starts internalizing their employees' private layoff costs under financial distress, it will take less risk, reduce size, and price its products less aggressively. Esty (1997b) finds that when depositor-owned S&Ls in the US convert to stockholder-owned commercial banks, they take on more risk.¹²

In summary, the aggregate size of commercial banks relative to savings banks (PCCs and non-PCCs) decreases over the sample period, whereas PCCs as a group become increasingly larger than the ownerless non-PCCs. The median commercial bank is five times the size of a PCC bank, which is twelve times larger than a non-PCC bank. The decreasing number of non-PCC banks is partially driven by non-PCCs transforming to PCCs. The non-PCC banks carry less risk on both sides of their balance sheet than stockholder-owned banks.¹³ The three bank types operate in unsegmented product markets with no major barriers to entry. They are subject to the same regulatory constraints.

4. Stakeholders and performance

Since there are no observable market values for non-PCC banks, we choose book return on assets (ROA) as our basic performance measure. ROA is operationalized as net income divided by the book value of assets. We use net income in the numerator of ROA because net income reflects funding costs, i.e., interest paid on the bank's liabilities. Funding costs are typically 75% of a bank's total costs in our sample. Thus, gross ROA (i.e., ROA based on income before funding costs) would ignore the major driver of a bank's competitive cost advantage. Also, income before funding costs is completely dominated by the bank's interest income. This implies that gross ROA moves in tandem with interest rates, independently of the bank's ability to create returns on capital invested. Both distortions are

¹² The banking literature generally shows that customers and owners may disagree on what constitutes the bank's optimal size and risk-taking. First, banking relationships are valuable for the customers and particularly for start-up firms with limited access to alternative debt financing. This has been shown both theoretically (Campbell (1979), Fama (1985), Diamond (1991), Rajan (1992), Boot and Thakor (1994), von Thadden (1995), Bhattacharya and Chiesa (1995), Yosha (1995)) and empirically (Slovin et al. (1993), Hubbard et al. (1999), Ongena et al. (2003)). Second, Karceski et al. (2005) document that customers may be adversely affected when a bank is insolvent or merge. Third, Berger and Udell (1995) and Peek and Rosengren (1996) show that as banks grow, they reduce the supply of loans to small businesses. Fourth, Stein (2002) provides a theoretical explanation for a size effect in lending, where large banks lend to large firms and small banks lend to small firms in equilibrium. Finally, the risk effect also follows from the options pricing model (Black and Scholes (1973)), which implies that because equity is a call option on the underlying assets, higher asset volatility increases the value of equity at the expense of other claimholders. Therefore, unlike non-PCC banks, a commercial bank may act in its owners' best interest by increasing cash flow volatility without rewriting the contract with its non-owner stakeholders.

¹³ Stakeholder differences may not be the only reason why balance sheets differ. First, because commercial banks are much larger than savings banks, they may be tempted to take excessive risk. However, this moral hazard problem of feeling too big to fail is not due to the stakeholder structure, but to the regulator's concern for credit contagion. Second, non-PCCs may have low risk because they cannot raise new equity. Unlike the two other types, they may have to keep higher equity buffers and hence lower liability risk to protect themselves from adverse effects of market downturns. Finally, non-PCCs that want to grow and take more risk may decide to become PCCs. These two last explanations may bias our results towards finding larger size and risk differences between bank types than what is justified by their stakeholder structures. We cannot address the potential moral hazard problem, but section 4.3 shows that lacking access to new equity is not a binding constraint in non-PCCs. Neither do we find that endogeneity in terms of self-selection explains why non-PCC and PCC banks differ.

absent in our (net) ROA measure. Not surprisingly, this is also a common performance measure in the banking literature (e.g., Esty (1997a, 1997b), Berger et al. (2000), Crespi et al. (2004)). We will still analyze alternative performance measures in section 4.2, including gross ROA and return on equity.¹⁴ Notice that because our ROA is net income divided by total assets, it will produce lower return figures than gross ROA. For the same reason, it cannot be meaningfully compared to standard benchmarks like the riskless rate or the market risk premium.

Panel (a) of table 5 shows the average ROA across bank types and years. Ownerless banks have the highest performance over the period as a whole, being 0.88% in non-PCC banks, 0.41% in PCCs, and 0.32% in commercial banks, respectively. Non-PCCs have higher average ROA than commercial banks in 15 of the 18 sample years, and PCC banks are considerably closer to commercial banks than to non-PCCs.¹⁵ However, panel (b) shows that the statistical significance of these performance differences is much weaker after the banking crisis (which occurred in 1988-1992) than before and during the crisis. Thus, the average performance does not differ systematically across the three groups outside the crisis period, and commercial banks were most negatively hit by the crisis. The latter is not surprising, given our earlier finding that commercial banks pursue more risky investment and financing strategies. This makes their ROA move more strongly with overall market movements.

Thus, as expected, ownerless banks do better relative to other banks the weaker the market conditions. The surprising feature in table 5 is that at least according to the raw ROA figures, ownerless banks are on average not outperformed by partially or fully owned banks in more normal times.

4.1 The base case

Since we have repeated observations for the same firm over time, we use a random effects model to account for unobserved firm effects in the panel. We use year dummies to capture unobserved industry effects on the banking sector as a whole (Hsiao (2003)). The robustness tests in section 4.2 will explore what happens when we ignore these unobservable firm and industry effects. We estimate the model separately for the full sample period (1985-2002), the banking crisis years (1988-1992), and for the post-crisis period (1993-2002).

The base case model is estimated in table 6. PCC and Com are dummy variables that equal one if the bank is of the said type and zero otherwise. Thus, both dummies are zero for a non-PCC bank. The agency logic predicts that the two dummy variables have positive coefficients, and that the commercial bank coefficient will be the more positive of the two. We proxy for asset risk by the ratio $1 - ((\text{cash} + \text{amortizable loans} + \text{fixed assets}) / \text{total assets})$ and for liability risk by $1 - (\text{due to customers} / \text{total$

¹⁴ Although return on equity is a more direct performance measure from the stockholders' perspective, it is unsuitable in our context because its denominator is periodically very low and even negative in the crisis years, producing very volatile and sometimes meaningless figures. For instance, average return on equity in commercial banks is -152% in 1991 and 18% in 1997, and one commercial bank had equity of -11.5 bill. NOK in 1989.

¹⁵ A study of governance activity in Spanish banks over a similar period finds higher average ROA in ownerless savings banks (1.28%) than in stockholder-owned commercial banks (1.13%) (Crespi et al. (2004, table 2)).

assets). Although we have to deal with accounting returns from operations rather than market returns on traded securities, we still expect that unless the banking industry is grossly out of equilibrium over extended periods, risk and return are positively related also in an accounting sense. Thus, we predict positive coefficients for the two risk proxies. Since the evidence on scale economies in banking is ambiguous (Berger and Humphrey (1994), Hughes et al. (2001)), we do not predict the sign for the size coefficient. Notice, however, that the size proxy may account for the alternative explanation that although ownerless banks have a governance handicap, this is mitigated by the benefit of being small in an industry with diseconomies of scale. This logic predicts a negative coefficient for the size proxy and positive coefficients for the two bank dummies.

According to the first column of results, which shows the estimates for the full period, the model explains 31% of the variation in ROA, and the model as a whole is highly significant. After having controlled for risk and size differences, the estimates show that a non-PCC bank is expected to outperform a PCC bank by 0.18 ROA units and a commercial bank by 0.77. The riskiness of the assets and the liabilities are both positively related to returns, and there are diseconomies of scale. All these findings are statistically significant by wide margins. The second column of results estimates the basic model over the crisis years. Every sign is maintained, and both the economic and statistical significance increase considerably except for asset risk. Thus, what holds for the full sample period is even more pronounced in the systemic crisis. This supports the notion that the lower risk of non-PCC banks makes them do better than other banks in downturns.

The right column shows that the result for the full period is driven by the exceptional crisis years. Although the coefficients of the bank type dummies keep their negative sign, they are much smaller, the commercial bank dummy is no longer significant, and the PCC dummy is only significant at 9%. Thus, there is no systematic performance difference between bank types after the crisis.

The remarkable result is that owned banks do not outperform ownerless banks in normal times. This suggests the governance of ownerless firms is not inferior to that of owned firms. In the following, we first analyze the robustness of the base-case result. Next, we explore substitutes for the governance role of the missing owners in ownerless firms.

4.2 Robustness

We analyze the robustness of the base-case by (i) applying alternative methods for utilizing the panel structure, (ii) using sized-matched samples, (iii) proxying for risk by ROA volatility, and by (iv) measuring performance in alternative ways.

Table 7 documents that the econometric technique used to handle the panel structure influences the estimates. Model (a) is the base-case from table 6, (b) ignores random effects at the firm level by only considering fixed industry effects, and model (c) ignores both. The estimates show that if we just run OLS on the pooled sample in model (c), the adjusted R^2 drops by almost 90% for the full period and by roughly two thirds in the two sub-periods. Notice also from models (a) and (b) that what matters for

overall model fit is industry effects rather than firm effects. Thus, the key unobservable characteristic is the time-varying determinants of performance which influence all three firm types in the same way.

The base-case results may be influenced by the fact most non-PCCs are small compared to PCCs and commercial banks. For instance, table 2 shows that the median commercial bank is sixty times larger than the median non-PCC bank. Although our base-case model does control for size, the fact that size is so consistently different across bank types may create a sample heterogeneity that is not properly picked up by our size proxy. For instance, the technology used by small banks may deviate so much from that of large banks that just a proportional control for size does not capture this difference. To handle size heterogeneity better, we construct a matching sample where size is much more homogeneous across bank types. The matched sample only contains non-PCC banks that are larger than the smallest commercial bank. Moreover, we keep at least as many non-PCC banks as commercial banks in the sample. These restrictions reduce sample size by roughly 80% to 473 firm years, of which 185, 127, and 161 are for non-PCCs, PCCs, and commercial banks, respectively. The median size of a commercial bank in this sample is 3.4 times the median non-PCC, compared to 60 in the base-case.

Panel (a) of table 8 shows that when we re-estimate the base-case model in the matched sample, the main results persist, although the bank type dummies have weaker statistical significance due to much smaller samples. This result also suggests that the possibly higher margins in product markets chosen by the smaller, ownerless banks is not driving our result.

To address this question directly, we account for differences in market-driven profit opportunities by adding the interest margin as a new independent variable in the base-case model. In unreported regressions that are available upon request, we find that the interest margin does have a positive impact on the bank's performance. However, accounting for the margin does nothing substantial to any other relationship, including the role of bank type. Thus, the performance effect of being ownerless, which often involves being small, is not driven by higher margins in these firms' product markets. Notice also that the base-case model in table 6 shows economies of scale in the post-crisis period. Still, there is no significant performance effect of being owned vs. ownerless once size is controlled for.

In panel (b), we measure risk by ROA volatility rather than by the risk proxies from the balance sheet that we used in the base-case model. We estimate ROA volatility in year t as the standard deviation of the bank's ROA from $t-1$ to $t+1$.¹⁶ The table shows that the relationship between bank type and performance from table 6 is generally upheld. However, the economic and statistical significance drops, and non-PCCs differ less from PCCs. Also, the relationship between risk and return becomes negative and is stronger in the full period than in the two sub-periods. We suspect this result is due to two fundamental data problems in our estimates of ROA volatility. First, we only have annual data and a maximum of 18 observations per firm. Second, the structural relationship between ROA and ROA

¹⁶ Just like we found using risk measures from the balance sheet in table 4, ROA volatility is highest in commercial banks and lowest in non-PCCs. ROA volatility for all bank types peaks around the banking crisis.

volatility is unstable over time. In particular, volatility is very high and performance is very low in the crisis. Thus, even if we had a longer time series, we may not have been able to improve the precision of the risk estimates by extending the estimation window beyond the three years used in table 8. For these reasons, we put more trust in the risk measures from the balance sheet as used in the base-case model.

The fourth robustness test replaces ROA by alternatively the gross ROA (i.e., returns to assets before funding costs), ROE (return on equity), profit margin (net income over revenues), or the interest margin (net interest income over assets). Table 9 shows the findings, which are more consistent with those under ROA from table 6 if we measure performance by the gross ROA, the ROE, or the profit margin than by the interest rate margin. For instance, ROA, gross ROA, ROE, and the profit margin all produce a negative, significant coefficient for the PCC and Commercial dummies in the full period and the crisis period. Also, they produce a positive, significant sign for asset risk in ten of twelve cases. The only difference is that unlike the ROA, the ROE, and the profit margin, the gross ROA indicates that commercial banks do significantly better than the two other types after the crisis. As discussed earlier, however, (net) ROA is a more suitable performance measure for banks. Unlike gross ROA, it reflects the ability to manage the most important cost component (funding costs), and it does not move in tandem with market interest rates. It is reassuring that our major finding is quite insensitive to how performance is measured.

So far, we have ignored any endogeneity caused by the possibility that poorly performing non-PCCs may have converted to PCCs in order to raise new equity. In fact, Ostergaard et al. (2009) find that low equity is the strongest predictor of conversion from non-PCC to PCC. Ignoring this possibility may bias our results towards overestimating the relative performance of non-PCCs. Hence, we have re-estimated the base-case model by first pooling non-PCCs and PCCs into one group. Subsequently, we exclude all PCCs and also the non-PCCs that later convert to the PCC form. These two robustness tests, which are available upon request, produce no material changes to the base-case results in table 6.

4.3 Two alternative explanations

The major finding so far is that after controlling for differences in size and risk, performance is not higher in owned firms than in ownerless firms. This is a puzzling result in an agency perspective. Certainly, the controlling stakeholders in ownerless firms have incentives to make the firm survive in order to provide them with future control benefits, such as below-market product prices paid by customers, inflated wages paid to employees, and sponsoring of community projects. However, and as a direct consequence of such private benefits of control, the stakeholders of ownerless firms lack the incentive to maximize returns to capital invested.

We will analyze two reasons why our finding may still be plausible from an economic point of view. First, suppose the owners of owned firms are forced to be passive for exogenous reasons, such as regulation. If that happens, the key governance mechanism in agency theory will not be allowed to

operate in the owned firms. Hence, owned firms would have the same governance handicap as ownerless firms according to the agency logic, and we would expect no performance differences.

Second, any firm with any stakeholder structure may be disciplined by other and even more powerful governance mechanisms than owners' monitoring of management. One example is product market competition. In such a case, residual claimants may not be critical for making the firm perform well. We will analyze the governance role of several potential owner substitutes in our sample.

4.3.1 Restrictions on ownership

Are the owners of commercial banks and PCC banks unable to forcefully execute their control rights? Governance research has found that the firm's performance tends to improve when ownership rights are held directly by persons rather than indirectly through intermediaries and when some owners have sufficiently strong incentives and power to monitor management (Becht et al. (2003)). Applying this logic to our sample, table 10 reports the aggregate equity fraction per owner type in panel (a) and the fraction held by the largest owner and the five largest owners in panel (b). Panel (a) shows that the average direct (personal) ownership is about 50% in a PCC bank and 20% in a commercial bank. The corresponding figure in other Norwegian listed firms is 18% over a similar period (Bøhren and Ødegaard (2006)). This high incidence of direct ownership in our sample suggests that being ownerless is more of a problem in banking than in other industries. This feature increases the power of our test.

The opposite impression follows from panel (b), which shows that ownership concentration in banks is considerably below the typical level in Norwegian industry, which is about 30% for the largest owner and 55% for the five largest (Bøhren and Ødegaard (2006)). The low concentration in banking is due to regulation, which mandates permission from the Ministry of Finance to own more than 10% for any stockholder or alliance of stockholders.¹⁷ This cap is binding for the median commercial bank in our sample, and it reduces the power of our test.

Nevertheless, 10% represents no trivial amount in terms of inherent monitoring incentives. For instance, 10% of the equity in the largest and smallest commercial bank in 2002 is NOK 2.5 billion and 0.2 billion, respectively. Thus, although regulation forces ownership concentration below its optimum, it does not destroy the incentives for active monitoring by the owners of PCCs and commercial banks.

4.3.2 Substitutes for the governance role of ownership

Pressure from owners is not critical for performance if other governance mechanisms can do the job at comparable costs. We consider three such substitutes for the monitoring function of owners: (i) capital constraints in ownerless firms (ii) regulators in all firms, and (iii) competition in all firms.

The first owner substitute is based on the fact that by construction, non-PCC banks cannot raise new equity. Thus, whereas owned banks can equity-finance overinvestment with both earnings

¹⁷ The mean exceeds this median because the state held very large stakes in a few banks around the banking crisis and held 47.8% of the equity in the largest commercial bank at the end of the sample period.

and stock issue proceeds, ownerless banks can only use earnings. This financial constraint may discipline managers of ownerless banks in similar ways that active owners can discipline managers of owned banks. Because this forces overinvesting ownerless banks to finance growth more heavily with debt than other banks, the agency logic predicts that ownerless banks have higher leverage and are closer to the regulatory minimum for equity. This tendency would be particularly strong when the industry is growing fast. The start of our sample period coincides with the beginning of a deregulation regime which gave banks more flexibility, including the ability to compete on interest rates (Moe et al. (2004)). We would therefore expect overinvesting non-PCC banks to be more equity constrained than other banks under such market conditions.

Table 11 does not support this hypothesis. The average equity capitalization ratio is 9.8% in non-PCCs and 7.1% in commercial banks. The former is significantly larger in 15 of the 18 sample years, and the maximum ratio in any year is normally more than twice as large in non-PCCs.¹⁸ Consequently, ownerless banks are further away from minimum equity requirements than owned banks. This suggests that the inability to raise new equity does not discipline ownerless banks in ways that substitute well for owner monitoring.¹⁹

What about the public banking supervisor? Because this monitoring activity occurs according to the same, detailed rules in every bank, it may be argued that high-quality banking supervision plays the role of owners. However, the banking supervisor's job is not to maximize the value of the bank, but to limit downside risk.²⁰ Therefore, the existence of a public supervisor may explain why depositors are willing to leave their money with banks whose owners benefit from risk-taking. It may also explain why most banks survive. But it cannot explain why a given bank or bank type is more profitable than others. This is supported by a study of 244 banks in 44 countries, which finds no clear relationship between the value of a bank and the way it is controlled by banking supervisors (Caprio et al. (2003)).

Competition is our third substitute for the governance role of owners. The general idea is that more competition reduces admissible inefficiency in any enterprise, regardless of its organizational form. This means that when competition is soft, it takes actively monitoring owners to ensure high managerial effort, but the firm may still survive if such owner qualities are missing. In contrast, firms

¹⁸ The legal minimum ratio uses a weighting system across the asset classes. As we cannot reconstruct this weighting exactly, we use unweighted assets, defining the capital coverage ratio as equity plus subordinated debt divided by assets. However, as non-PCCs have less risky assets than PCCs and commercials, they would have had even higher relative capitalization ratios if we could use the correct weighting formula. The upward shift in capitalization in 1992 and 1993 coincides with the end of the banking crisis and the implementation of the Basel accord. Equity capitalization is highest in all three bank types around 1995, moving slowly downwards thereafter.

¹⁹ Notice also that although the free cash flow of a non-PCC bank is automatically suppressed by the inability to raise equity, the opposite effect comes from the fact that all earnings are retained. Easterbrook (1984) argues that dividend payout and the resulting need to issue stock for investments purposes is a powerful governance mechanism. Hence, the non-PCC bank is neither disciplined by the cash drain from dividend payments nor by the scrutiny of the capital market in equity issues. It does not seem that this lack of discipline induces overinvestment.

²⁰ The Norwegian Financial Services Authority states that its main purpose is 'to ensure that financial enterprises and markets function securely and efficiently in the best interest of society and users of financial services...' (Kredittilsynet, 2002).

facing strong competition will fail under low managerial effort, regardless of whether the owners are strong, weak, or nonexistent. Thus, market pressure and the agents' incentives to maintain their human capital jointly create the urge to expend effort. This makes performance independent of monitoring quality under strong competition, whereas the two are positively related when competition is soft.

The very limited empirical literature supports the basic intuition. Palmer (1973) finds that ownership structure and performance correlate more strongly the higher the firm's market power. Giroud and Mueller (2009) study what happens to firms when takeover threats fall through the passage of statewide antitakeover law. They find that in industries with strong product market competition, neither the firm's market value nor its operating performance changes as the takeover threat falls. In contrast, firms in non-competitive industries experience abnormally low stock returns and operating performance.

The potential sources of competitive pressure are the product market, the labor market, and the market for corporate control. The latter source cannot explain our findings, since ownerless firms cannot be traded. Labor market competition is probably quite weak, since overall unemployment was only 4.2% on average and never exceeded 6.0% in the sample period.²¹ However, the demand for managerial talent may be more modest in smaller communities. Thus, savings bank managers in particular may be disciplined by potential loss of human capital when the bank is underperforming.

Product market competition is the stronger candidate for rationalizing our results. We have already pointed out that all banks in the sample have access to the same product market, and that there are no major economic or regulatory barriers to entry. Moreover, the Norwegian banking market is reasonably competitive by international standards.²² However, this is at best only indirect evidence. To fully test the competition hypothesis, one would need two industries with both owned firms and ownerless firms, and where competition is strong in one industry and weak in the other. According to the theory, owned firms would only outperform ownerless firms in the non-competitive industry.

Our setting does not allow for such an ideal test. We choose a related approach by analyzing whether an individual bank's local, competitive environment influences its performance relative to that of other banks. The base-case model is augmented by a firm-specific competition proxy and also by interacting this competition proxy with the bank type. We alternatively measure competition by the number of branches and by the number of unique banks present in the same municipalities as the bank in question. Both measures account for the fraction of the bank's total assets that is exposed to competition in the different municipalities.²³

²¹ Source: Statistics Norway.

²² Data for the period 1990-2002 shows that market concentration in Norwegian banking is medium among 16 European countries and consistently lower than elsewhere in Scandinavia. The average concentration in Europe stays quite constant over time, but drops in Norway over the early part of the period and stays close to the average European level thereafter. Source: Central Bank of Norway.

²³ We are grateful to Charlotte Ostergaard, Ibolya Schindele and Bent Vale, who generously made their hand-collected data set on bank industry competition available to us. Among the six competition measures used in their

The findings are reported in table 11, where Branch comp and Bank comp are the branch-based and the bank-based competition measures, respectively. For the sample period as a whole, three features emerge which are consistent with the competition logic. First, the bank type dummies are no longer significant determinants of performance. Thus, the type of stakeholder control is irrelevant for performance differences once competitive pressure is taken into account. This supports the idea that competition is a stronger disciplining device than owner monitoring. Second, competition per se does nothing to performance levels. This is consistent with the theoretical result that the net effect of competition on performance is ambiguous.²⁴ Third, the interaction terms are always negative and always significant for commercial banks in both models. Hence, more competition reduces the importance of stakeholder structures for cross-sectional performance differences.

During the banking crisis, the relationship between competition and performance differences is stronger statistically and economically than in the full period. Finally, like in the full period, the stakeholder structure is irrelevant in the post-crisis period. The interaction terms are not significant.

These findings suggest that product market competition is an important determinant of the relationship between the firm's stakeholder structure and its performance. The evidence is in line with recent findings from a setting which does not involve ownerless firms, but where monitoring quality provided by stockholders varies cross-sectionally (Giroud and Mueller (2009)). We conclude that among the alternative economic reasons why ownerless firms are not underperforming relative to owned firms, product market competition is the only one that is consistent with the evidence.²⁵

5. Conclusions

Economists tend to take for granted that when ownership is separated from control, closer monitoring by those who provide the capital will improve the firm's performance. Similarly, we seldom question the conventional wisdom that stockholders will lose if they internalize welfare effects of their actions on other stakeholders. Our paper challenges these two ideas by analyzing whether the existence of owners matters for the firm's economic performance. We do this by comparing returns to capital invested in ownerless firms with multiple objectives to the return in profit-maximizing firms owned by

paper (Ostergaard et al. (2009)), we report our findings for the two measures that produce the cleanest results. The findings for the four other measures are available upon request.

²⁴ More competition produces stronger incentives for agents to work harder. This is because more competition reduces profits, which increases liquidation risk and reduces the value of firm-specific investment. But more competition reduces product prices and thereby erodes the value of cost-reducing effort. This effect may make it optimal for the principal to induce less effort (Schmidt (1997)).

²⁵ One may wonder what remains of the classic arguments for ownerless banks. Unlike in earlier periods, it does not seem true anymore that their customers (i.e., lenders and borrowers) would face excessive contracting costs in commercial banks, that they have particularly homogenous preferences as a group, that they would lack regulatory protection against moral hazard by commercial bank owners, or that ownerless banks are so small that agency costs are negligible. Nevertheless, our findings are inconsistent with the argument that because ownerless firms retain all their earnings and are immune to the market for corporate control, they represent the only firm type in our sample that can survive long after having lost their competitive advantage as an organizational form (Hansmann (1996, p. 262)). If this were a valid explanation, ownerless banks would have had the weakest performance. This is not what we find.

stockholders. This setting allows us to analyze whether firms can be successful without owners rather than the more limited question of whether the ownership structure matters for firms that organized as owned enterprises.

Our results do not support the agency conjecture that returns to capital invested is higher the stronger the control rights of the capital providers and the more profit-oriented the firm's objectives. After having accounted for differences in risk, size, and unobservable firm and industry effects, we conclude that ownerless firms are not outperformed by owned firms.

Economic theory would argue that regardless of the firm's stakeholder structure, managers of firms with potential agency problems can be disciplined by other governance mechanisms than owner monitoring. For the ownerless firms in our sample, this substitute role does not seem to be played by the regulator or by capital constraints. Rather, our results are consistent with the notion that product market competition disciplines both owned firms and ownerless firms in the same way. Our finding also supports the idea that owners may not suffer if they internalize certain externalities on non-owner stakeholders. For both reasons, we think corporate governance research may benefit from reconsidering conventional wisdom on the role of stakeholders in general and of stockholders in particular.

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Table 1: The distribution of control rights and cash flow rights across stakeholders

Bank type	Control rights, %				Cash flow rights, %
	Stockholders	Employees	Depositors	Community	
Non-PCC	0	25	37.5	37.5	Nobody
PCC	25	25	25	25	Stockholders: 5-92
Commercial	73	27	0	0	Stockholders: 100

The table shows the distribution of control rights and cash flow rights across four stakeholder groups in non-PCC banks, PCC banks, and commercial banks during the sample period 1985-2002. Non-PCC banks have no owners. PCC banks have issued equity securities to the general public in terms of Primary Capital Certificates (PCC). The remaining equity in PCC banks is ownerless.

Table 2: Industry characteristics**(a): Number of banks**

Year	All banks	Commercial banks	Savings banks			Listed PCC
			All	Non-PCC	PCC	
1985	206	15	191	191		
1986	206	16	190	190		
1987	172	13	159	159		
1988	173	14	159	156	3	0
1989	158	14	144	137	7	4
1990	154	10	144	137	7	3
1991	147	11	136	128	8	4
1992	145	11	134	125	9	4
1993	142	10	132	124	8	4
1994	141	9	132	122	10	8
1995	140	8	132	118	14	12
1996	141	8	133	117	16	13
1997	137	7	130	114	16	14
1998	137	7	130	109	21	19
1999	134	4	130	107	23	20
2000	135	4	131	107	24	22
2001	132	3	129	105	24	22
2002	129	2	127	103	24	22

(b): Aggregate size per bank type

Year	All banks	Commercial banks	Savings banks		
			All	Non-PCC	PCC
1985	653	376	276	276	
1986	782	471	311	311	
1987	951	542	409	409	
1988	925	537	388	259	129
1989	928	579	348	199	149
1990	925	589	336	197	139
1991	858	551	307	143	164
1992	816	517	299	134	165
1993	775	469	307	138	169
1994	776	456	320	121	199
1995	792	456	336	118	219
1996	921	549	372	124	248
1997	996	585	411	133	278
1998	1051	603	448	131	317
1999	1147	619	528	138	389
2000	1258	665	593	159	434
2001	1083	440	642	169	473
2002	1113	432	680	182	499
Total assets	931	524	406	186	265

(c): Size per bank

	All banks	Commercial banks	Savings banks		
			All	Non-PCC	PCC
Mean	5.4	78.3	2.5	1.4	20.2
Std	22.6	98.0	9.9	3.2	33.9
Median	0.7	43.5	0.7	0.7	7.9
Min	0.03	10.2	0.03	0.03	0.50
Max	238.7	238.7	125.7	28.6	134.6

Panel (a) shows the total number of Norwegian banks (All banks), the number of listed commercial banks, savings banks (non-PCC banks and PCC banks), and listed PCC banks. Panel (b) shows aggregate total assets per bank type. Panel (c) shows the mean total assets for an individual bank, its standard deviation, the median, minimum, and maximum. Non-PCC banks are ownerless savings banks, and PCC banks used to be ownerless savings banks that transformed themselves into PCC savings banks by issuing equity securities to the general public in terms of Primary Capital Certificates (PCC). The figures in panels (b) and (c) are in billion NOK as of year 2002. The sample is all non-PCC banks, PCC banks, and listed commercial banks over the period 1985-2002.

Table 3: Interest rates

Year	<u>Home mortgages</u>		<u>Ordinary deposits</u>		<u>Margin</u>	
	Savings banks	Commercial banks	Savings banks	Commercial banks	Savings banks	Commercial banks
1992	13.85	14.32	8.02	8.24	5.83	6.08
1993	11.24	10.83	4.07	4.06	7.17	6.77
1994	10.20	9.74	3.84	3.98	6.36	5.76
1995	9.63	8.78	3.70	3.70	5.93	5.08
1996	8.62	8.03	3.12	3.05	5.51	4.98
1997	8.11	7.17	2.71	2.58	5.40	4.59
1998	11.52	11.44	6.03	6.03	5.49	5.41
1999	9.64	9.45	4.06	4.18	5.58	5.27
2000	10.72	10.37	5.44	5.58	5.27	4.78
2001	10.94	10.39	5.72	5.76	5.22	4.63
2002	10.12	9.93	5.85	5.74	4.27	4.19
Average	10.42	10.04	4.78	4.81	5.64	5.23

This table reports the average interest rate on home mortgages and on ordinary deposits for all savings banks (PCCs and non-PCCs) and commercial banks. The margin is the difference between the two rates. Source: Central Bank of Norway.

Table 4: Balance sheet structure

Bank type	(a): Assets						Losses
	Fixed assets	Amortizable loans	Short-term assets	Overdraft facilities	Building loans	Other loans	
Non-PCC bank	2.3	73.1	17.6	5.8	2.8	0.3	-2.0
PCC bank	2.8	74.6	16.0	6.2	2.6	0.0	-2.2
Commercial bank	3.2	49.1	21.3	7.9	2.0	18.9	-2.4

Bank type	(b): Liabilities				
	Equity	Subordinated debt	Due to customers	Due to banks	Other liabilities
Non-PCC bank	8.6	0.3	75.0	9.5	6.6
PCC bank	5.3	3.0	63.0	13.6	15.2
Commercial bank	5.0	3.2	47.0	18.9	25.8

All figures in this table are reported as percentages of total assets, and are value weighted averages across banks and equally weighted across years. Fixed assets in panel (a) is buildings and investments in affiliated companies, and Amortizable loans is loans that involve gradual repayment of the principal. Short-term assets is cash, cash equivalents and securities held for trading, while , Overdraft facilities is trade credits and other fixed limit loans. Building loans is fixed limit loans, and Other loans is every remaining loan type, such as credit card debt and leasing. Losses is allowances for losses on all loan portfolios. Equity in panel (b) is total funds for savings banks (including PCC capital for PCC banks) and total shareholder equity for commercial banks. Subordinated debt is debt that can be regarded as capital for capital requirement purposes, Due to customers is regular deposits from customers, Due to banks is inter-bank loans including loans from the central bank, and Other liabilities is securites issued. The sample is all Norwegian Non-PCC banks, PCC banks, and commercial banks over the period 1985-2002.

Table 5: Return on assets

Year	<u>(a): Mean ROA</u>			<u>(b): Difference</u>		
	1: Non-PCC	2: PCC	3: Com	1 - 2	2 - 3	1 - 3
1985	0.43		0.35			0.08 (1.57)
1986	0.46		0.35			0.11* (1.79)
1987	0.55		0.07			0.49*** (4.60)
1988	0.40	-0.15	-0.97	0.55*** (3.20)	0.82 (1.02)	1.37* (1.74)
1989	0.64	-0.05	-0.51	0.69*** (2.86)	0.46 (0.52)	1.15 (1.36)
1990	0.50	-1.00	-0.19	1.50 (1.37)	-0.81 (-0.71)	0.69** (2.31)
1991	0.33	-1.14	-1.91	1.47** (2.04)	0.78 (0.71)	2.25** (2.61)
1992	2.60	0.01	-0.59	2.58*** (2.85)	0.60 (0.50)	3.18*** (3.93)
1993	1.41	1.55	0.98	-0.13 (-0.45)	0.57* (1.82)	0.44*** (3.65)
1994	1.15	0.99	0.96	0.16 (1.32)	0.03 (0.14)	0.19 (0.88)
1995	1.27	0.80	1.16	0.47 (1.58)	-0.37 (-0.98)	0.10 (0.43)
1996	0.67	0.56	0.92	0.11 (1.05)	-0.36 (-1.34)	-0.25 (-0.99)
1997	1.06	0.84	1.03	0.22 (1.58)	-0.19 (-0.98)	0.03 (0.19)
1998	0.83	0.80	0.74	0.03 (0.40)	0.06 (0.49)	0.09 (0.89)
1999	1.11	1.05	0.92	0.06 (0.72)	0.14 (0.95)	0.20 (1.59)
2000	1.18	1.00	0.91	0.17* (1.92)	0.09 (0.66)	0.27** (2.20)
2001	0.76	0.66	0.86	0.10 (1.07)	-0.20 (-1.19)	-0.10 (-0.67)
2002	0.52	0.22	0.63	0.31 (1.56)	-0.41** (-2.18)	-0.11 (-1.66)
1988-1992	0.89	-0.46	-0.84	1.36*** (5.49)	0.37 (0.65)	1.73*** (8.33)
1993-2002	1.00	0.85	0.91	0.15*** (5.26)	-0.06 (-1.72)	0.09 (0.98)
1985-2002	0.88	0.41	0.32	0.47*** (4.19)	0.09*** (3.07)	0.57*** (9.51)

This table shows the mean return on assets (ROA) across the three bank types. ROA is net income divided by total assets. The mean ROA per year is equally weighted across firms, and the average over multiple years at the bottom of the table is equally weighted across years. We report the mean for each bank type, the pairwise difference in means and its t-value in brackets. Statistically significant differences at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks.

Table 6: Base-case performance regressions

Independent variable	1985-2002	1988-1992	1993-2002
PCC	-0.181** (-2.27)	-1.510*** (-4.63)	-0.095* (-1.70)
Com	-0.765*** (-5.61)	-2.741*** (-6.84)	-0.119 (-0.96)
Asset risk	1.419*** (5.27)	1.352* (1.74)	1.321*** (5.89)
Liability risk	0.836*** (3.65)	4.385*** (6.33)	-0.482*** (-2.71)
Bank size	-0.063*** (-2.78)	-0.219*** (-3.18)	0.053*** (2.95)
Adj. R ² , %	31.11	37.20	33.08
Wald chi ²	1110.67	450.40	736.30
Prob. of chi ² , %	0.00	0.00	0.00
n	2660	738	1362

The table relates a bank's economic performance to its hypothesized determinants as specified in the leftmost column. Performance is measured as return on assets (ROA), which we operationalize as net income divided by total assets at year end. PCC (Com) is a dummy variable that equals 1 if the bank is a PCC bank (Commercial bank) and zero otherwise. Asset risk is the fraction of assets which is not cash, claims on the central bank, amortizable loans, or fixed assets. Liability risk is one minus deposits divided by total assets. We assume that the lower these two measures, the smaller the risk. Bank size is the log of the bank's assets in constant 2002 NOK.

The model is estimated with fixed time effects and random firm effects. We report the estimated regression coefficients and its t-statistic in brackets. Statistically significant relationships at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The bottom section of the table shows the adjusted R², the Wald chi², its p-value, and the number of observations. The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks.

Table 7: Alternative estimation techniques

Independent variable	<u>1985-2002</u>			<u>1988-1992</u>			<u>1993-2002</u>		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
Constant			1.835*** (4.80)			6.437*** (5.93)			2.020*** (6.60)
PCC	-0.181** (-2.27)	-0.319*** (-4.75)	-0.316*** (-4.00)	-1.510*** (-4.63)	-1.168*** (-4.55)	-1.098*** (-3.65)	-0.095* (-1.70)	-0.206*** (-4.99)	-0.157*** (-3.36)
Com	-0.765*** (-5.61)	-0.745*** (-7.71)	-0.922*** (-8.52)	-2.741*** (-6.84)	-2.156*** (-7.72)	-2.092*** (-6.39)	-0.119 (-0.96)	-0.321*** (-3.94)	-0.074 (-0.84)
Asset risk	1.419*** (5.27)	2.001*** (8.78)	0.256 (1.12)	1.352* (1.74)	2.074*** (3.16)	1.211*** (1.81)	1.321*** (5.89)	1.923*** (10.40)	2.461*** (12.22)
Liability risk	0.836*** (3.65)	0.799*** (4.22)	0.696*** (3.27)	4.385*** (6.33)	3.171*** (6.18)	2.587*** (4.36)	-0.482*** (-2.71)	-0.132 (-0.89)	-0.591*** (-3.71)
Bank size	-0.063*** (-2.78)	-0.057*** (-3.97)	-0.015 (-0.93)	-0.219*** (-3.18)	-0.223*** (-5.28)	-0.187*** (-3.80)	0.053*** (2.95)	0.064*** (5.72)	0.053*** (4.17)
Year dummies	yes	yes	no	yes	yes	no	yes	yes	no
Random effects	yes	no	no	yes	no	no	yes	no	no
Adj. R ² , %	31.11	30.88	3.76	37.20	37.10	13.92	33.08	33.43	12.97
F-value (Wald chi ²)	1110.67	55.00	21.77	450.40	49.30	23.68	736.30	49.83	41.58
Probability of F, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	2660	2660	2660	738	738	738	1362	1362	1362

The table relates a bank's economic performance to its hypothesized determinants as specified in the leftmost column. The models (a), (b), and (c) represent three alternative ways of handling the panel data structure as specified in the two first rows in the bottom section of the table. Performance is measured as return on assets (ROA), which we operationalize as net income divided by total assets at year end. PCC (Com) is a dummy variable that equals 1 if the bank is a PCC bank (Commercial bank) and zero otherwise. Asset risk is the fraction of assets which is not cash, claims on the central bank, amortizable loans, or fixed assets. Liability risk is one minus deposits divided by total assets. We assume that the lower these two measures, the smaller the risk. Bank size is the log of the bank's assets in constant 2002 NOK. The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks.

In the Year dummies row, a yes (no) reflects that we include (do not include) a time dummy to capture time-varying fixed effects. A yes (no) in the Random effects row means that we use (do not use) random effects estimation to capture unobserved heterogeneity at the firm level. We report the estimated regression coefficients and its t-statistic in brackets. Statistically significant relationships at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The bottom section of the table shows the adjusted R², the F-value (Wald chi² for random effects regressions), the corresponding p-value, and the number of observations.

Table 8: Size matching and ROA risk

Independent variable	<u>(a) Size matching</u>			<u>(b) ROA risk</u>		
	1985-2002	1988-1992	1993-2002	1985-2002	1988-1992	1993-2002
PCC	-0.220 (-1.18)	-0.289* (-1.84)	-0.145 (-0.84)	-0.027 (-0.38)	-0.921*** (-3.44)	-0.033 (-0.63)
Com	-0.652** (-2.57)	-0.639*** (-3.75)	-0.570*** (-3.06)	-0.466*** (-3.90)	-1.156*** (-4.12)	-0.154 (-1.29)
Asset risk	1.578 (1.25)	2.135* (1.76)	-3.106*** (-2.89)			
Liability risk	0.927* (1.80)	0.965 (2.66)	0.376 (0.97)			
ROA risk				-28.422*** (-9.03)	-26.734*** (-4.65)	-5.046 (-1.41)
Bank size	-0.032 (-0.38)	-0.031 (-0.63)	0.045 (0.87)	-0.073*** (-3.60)	-0.125** (-2.54)	0.016 (0.89)
Adj. R ² , %	28.27	16.79	30.27	38.95	46.26	25.17
Wald chi ²	162.34	24.27	101.60	1451.59	738.56	2778.02
Prob. of chi ² , %	0.00	0.39	0.00	0.00	0.00	0.00
n	473	145	229	2236	725	1220

This table reestimates the base-case model with size-matched samples in panel (a), and by using the volatility of ROA as a proxy for risk in panel (b). We only include savings banks in panel (a) that are larger than the smallest commercial bank, while ensuring that the sample has at least as many non-PCC banks as commercial banks. Performance is measured as return on assets (ROA), which we operationalize as net income divided by total assets at year end. PCC (Com) is a dummy variable that equals 1 if the bank is a PCC bank (Commercial bank) and zero otherwise. Asset risk is the fraction of assets which is not cash, claims on the central bank, amortizable loans, or fixed assets. Liability risk is one minus deposits divided by total assets. We assume that the lower these two measures, the smaller the risk. ROA risk in panel (b) is measured as the standard deviation of ROA over a 3-year window. Bank size is the log of the bank's assets in constant 2002 NOK.

The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks. All regressions include year dummies and are estimated with random effects. We report the estimated regression coefficients and its t-statistic in brackets. Statistically significant relationships at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The bottom section of the table shows the adjusted R², the Wald chi² statistic, its p-value, and the number of observations.

Table 9: Alternative performance measures

Independent variable	<u>1985 – 2002</u>				<u>1988 - 1992</u>				<u>1993 - 2002</u>			
	Gross return on assets	Return on equity	Profit margin	Interest rate margin	Gross return on assets	Return on equity	Profit margin	Interest rate margin	Gross return on assets	Return on equity	Profit margin	Interest rate margin
PCC	-0.383*** (-4.70)	-11.516*** (-3.14)	-2.640*** (-3.96)	0.247*** (6.13)	-1.483*** (-4.88)	-1.510*** (-4.63)	-11.217*** (-4.83)	0.148 (1.49)	-0.256*** (-4.02)	-0.974 (-1.57)	-1.546* (-1.95)	0.116** (2.46)
Com	-0.447*** (-3.09)	-28.526*** (-5.39)	-5.915*** (-5.43)	-0.272** (-2.04)	-2.478*** (-6.76)	-2.741*** (-6.84)	-18.471*** (-6.77)	-0.695*** (-4.25)	0.489*** (3.44)	1.713 (1.29)	-1.074 (-0.60)	-0.839*** (-5.33)
Asset risk	1.079*** (3.92)	-1.221 (-1.56)	15.441*** (6.82)	-0.550*** (-4.09)	0.264 (0.37)	-0.219*** (-3.18)	13.249** (2.43)	-0.814*** (-3.24)	1.223*** (4.79)	1.793*** (9.50)	18.380*** (5.87)	0.002 (0.01)
Liability risk	1.452*** (6.14)	29.160*** (2.83)	4.362** (2.29)	-2.211*** (-17.29)	5.302*** (8.29)	4.385*** (6.33)	29.663*** (6.14)	-2.625*** (-11.20)	1.068*** (5.26)	-7.134*** (-3.55)	-10.964*** (-4.33)	-1.804*** (-12.35)
Size	0.045* (1.86)	15.109 (1.22)	-0.191 (-1.08)	-0.185*** (-8.28)	-0.084 (-1.34)	1.352 (1.74)	-1.699*** (-3.72)	-0.111*** (-3.73)	0.077*** (3.76)	-3.013 (-1.19)	1.096*** (4.26)	-0.093*** (-3.86)
Adj. R ²	77.27	3.45	40.23	68.02	30.21	37.2	42.02	63.79	69.79	35.08	24.43	69.23
Wald chi ²	9933	94	1749	23172	359	450	548	616	3916	630	460	19362
Prob. of chi ²	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n	2660	2652	2660	2660	738	738	738	738	1362	1362	1362	1362

Using random firm effects and fixed time effects, this table re-estimates the base-case model under four alternative performance measures specified at the top of each column. Gross return on assets is income before funding costs divided by assets, return on equity is net income divided by book equity, profit margin is net income divided by revenues, and interest rate margin is net interest income divided by assets. Asset risk is the fraction of assets which is not cash, claims on the central bank, amortizable loans, or fixed assets. Liability risk is operationalized as one minus deposits divided by total assets. We assume that the larger these two measures, the higher the risk. Size is the log of the bank's assets in constant 2002 NOK.

We report the estimated regression coefficients and its t-statistic in brackets. Statistically significant relationships at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The bottom section of the table shows the adjusted R², the Wald chi², its p-value, and the number of observations. The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks .

Table 10: Ownership structure**(a): Owner types**

Year	<u>State</u>		<u>Personal</u>		<u>Financial</u>		<u>Industrial</u>		<u>Foreign</u>	
	PCC	Com	PCC	Com	PCC	Com	PCC	Com	PCC	Com
1989	3.0	0.0	30.0	23.3	37.7	29.7	13.3	28.5	14.0	16.6
1990	3.3	0.0	28.0	25.4	42.8	31.9	13.2	24.3	10.5	16.8
1991	2.5	3.7	30.5	26.6	48.3	20.0	11.2	35.0	5.2	12.9
1992	2.4	10.8	38.6	24.9	35.8	25.4	18.6	28.9	2.6	8.1
1993	12.0	17.3	37.4	22.3	25.4	25.4	18.8	23.6	4.2	9.3
1994	6.8	13.0	33.5	21.5	28.6	21.4	25.0	32.3	4.3	9.6
1995	5.2	12.3	43.9	21.1	16.9	21.3	29.2	24.8	2.8	18.3
1996	2.1	11.6	50.5	19.8	13.9	26.1	27.0	21.4	4.4	19.3
1997	2.6	11.6	52.6	19.0	13.4	25.9	25.5	22.8	3.9	18.9
1998	2.4	11.6	50.7	18.4	19.5	23.2	22.3	21.1	3.2	23.8
1999	2.0	16.7	55.2	22.2	15.3	23.5	20.9	22.5	4.3	13.8
2000	2.0	15.0	55.3	24.2	15.2	29.8	20.4	21.2	5.1	8.2
2001	2.0	12.4	54.0	24.0	15.4	30.2	19.5	21.0	6.8	10.4
2002	1.8	13.2	55.7	24.2	16.4	24.6	19.5	22.2	4.5	13.8
Average	2.9	9.8	48.7	22.4	20.0	25.7	21.3	25.3	5.0	14.9

(b): Ownership concentration

	<u>Largest owner</u>				<u>Five largest owners</u>			
	<u>Mean</u>		<u>Median</u>		<u>Mean</u>		<u>Median</u>	
	PCC	Com	PCC	Com	PCC	Com	PCC	Com
1989	18.3	11.7	9.5	10.0	36.2	33.7	27.0	31.0
1990	9.8	14.8	9.5	13.0	31.3	34.8	31.0	32.0
1991	20.3	14.0	12.5	11.0	39.5	41.7	33.0	43.0
1992	10.0	22.1	11.0	17.5	29.2	47.5	33.0	43.0
1993	16.2	23.8	7.0	11.0	31.4	42.4	25.0	34.0
1994	11.0	19.9	6.5	11.5	26.8	39.6	23.5	32.0
1995	8.6	19.6	6.0	13.0	20.9	35.9	19.0	28.0
1996	6.1	18.6	4.5	10.0	15.7	37.1	13.0	32.0
1997	4.6	17.0	4.5	10.0	13.5	40.9	14.0	44.0
1998	4.8	16.2	5.0	10.0	15.4	37.0	15.0	39.0
1999	6.1	15.7	6.0	9.5	16.4	36.7	18.0	31.5
2000	7.0	16.6	7.0	10.0	17.1	38.4	17.0	28.0
2001	7.4	16.6	8.0	10.0	18.0	36.2	18.0	32.0
2002	7.4	16.6	8.0	10.0	19.0	37.0	19.0	28.0
Average	8.1	17.2	6.0	10.0	20.1	38.3	18.0	35.5

Panel (a) reports the mean ownership fraction per firm across five owner types in PCC banks and commercial banks. Panel (b) shows the mean and median ownership fraction for the largest owner and for the five largest owners, respectively. We exclude observations where the largest owner holds 90% or more. The sample is all Norwegian PCC banks and listed commercial banks.

Table 11: The capitalisation ratio across years and bank types

Year	<u>Mean values</u>			<u>Difference in means</u>			<u>Extreme values</u>					
	1: Non-PCC	2: PCC	3: Com	1 - 2	2 - 3	1 - 3	<u>Non-PCC</u>		<u>PCC</u>		<u>Com</u>	
							Max	Min	Max	Min	Max	Min
1985	6.11		5.54			0.57 (1.28)	13.95	2.36			9.17	3.86
1986	5.82		6.12			-0.30 (-0.69)	14.00	0.00			9.91	3.51
1987	7.01		5.53			1.48*** (3.45)	18.31	2.29			8.72	3.36
1988	6.82	5.78	5.01	1.04 (1.34)	0.77 (0.63)	1.81* (1.83)	16.98	-1.62	7.18	4.67	7.93	-6.84
1989	7.41	5.43	4.86	1.97*** (3.40)	0.57 (0.41)	2.54* (1.94)	17.36	3.32	7.55	2.87	7.55	-11.55
1990	7.86	4.29	5.82	3.57** (2.48)	-1.53 (-1.02)	2.04*** (3.73)	17.50	1.03	7.50	-3.53	8.31	2.94
1991	7.71	5.63	6.13	2.08*** (2.86)	-0.50 (-0.61)	1.58** (2.59)	17.97	-16.20	8.67	2.70	9.67	4.22
1992	10.70	6.67	7.60	4.03*** (4.05)	-0.93 (-0.80)	3.11*** (4.32)	19.30	4.70	10.36	0.43	12.35	4.79
1993	11.53	9.10	11.33	2.43*** (3.62)	-2.23 (-1.07)	0.20 (0.10)	21.46	6.30	10.98	6.14	28.62	5.80
1994	12.27	9.23	9.47	3.05*** (6.15)	-0.24 (-0.50)	2.81*** (6.85)	22.43	5.77	11.95	7.72	11.31	8.35
1995	13.03	10.20	9.97	2.83*** (3.81)	0.23 (0.28)	3.06*** (5.08)	24.20	6.27	16.53	7.44	12.75	8.59
1996	13.23	10.91	8.78	2.31*** (2.86)	2.13** (2.51)	4.45*** (7.84)	26.06	6.52	19.09	8.47	10.20	6.87
1997	12.93	10.90	8.86	2.03** (2.24)	2.04** (2.16)	4.07*** (7.45)	26.40	7.29	19.04	7.55	10.07	6.78
1998	12.88	10.78	9.29	2.10*** (2.77)	1.49* (1.72)	3.59*** (5.53)	25.96	7.22	18.23	5.51	10.90	6.54
1999	12.85	10.58	8.66	2.27*** (3.42)	1.91* (1.88)	4.18*** (4.58)	26.88	8.31	17.70	6.72	10.63	6.65
2000	12.51	10.00	8.78	2.51*** (4.27)	1.23 (1.22)	3.74*** (3.92)	26.65	7.82	17.32	6.32	10.92	6.72
2001	11.98	9.65	8.12	2.33*** (4.53)	1.52* (1.72)	3.85*** (4.53)	26.15	7.29	16.10	7.09	9.51	6.78
2002	11.49	9.16	7.74	2.33*** (4.44)	1.42 (1.27)	3.74*** (3.42)	26.75	6.90	15.92	5.25	8.78	6.70
Average	9.82	9.38	7.14	0.44*** (3.48)	2.24 (0.65)	2.68*** (3.76)	21.57	3.64	13.61	5.02	10.96	4.12

This table shows distributional characteristics of the capitalisation ratio, which we operationalize as the book value of equity plus subordinated loans divided by the book value of assets. Statistically significant relationships at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks.

Table 12: Product market competition

Independent variable	1985-2002		1988-1992		1993-2002	
PCC	-0.039 (-0.32)	0.144 (0.87)	0.687 (1.08)	1.478** (2.09)	-0.105 (-1.56)	-0.117 (-1.31)
Com	-0.001 (0.00)	0.283 (0.83)	-0.640 (-1.40)	-0.262 (-0.46)	-0.205 (-1.23)	-0.161 (-0.76)
Asset risk	1.570*** (4.95)	1.570*** (4.91)	1.436** (2.07)	1.441** (2.01)	1.318*** (6.18)	1.296*** (6.04)
Liability risk	1.240*** (3.84)	1.305*** (4.05)	5.689*** (6.51)	6.081*** (6.89)	-0.291 (-1.49)	-0.290 (-1.48)
Bank size	-0.081** (-2.27)	-0.089** (-2.47)	-0.273*** (-4.31)	-0.269*** (-4.16)	0.043** (2.48)	0.040** (2.32)
Branch comp	0.009 (0.17)		-0.008 (-0.08)		0.017 (0.62)	
Branch comp * PCC	-0.208 (-1.14)		-6.107*** (-3.92)		0.019 (0.21)	
Branch comp * Com	-3.667*** (-7.01)		-6.035*** (-7.23)		0.097 (0.27)	
Bank comp		0.002 (0.09)		0.014 (0.29)		-0.003 (-0.20)
Bank comp * PCC		-0.180* (-1.91)		-2.498*** (-4.69)		0.016 (0.33)
Bank comp * Com		-1.490*** (-5.78)		-2.477*** (-5.82)		-0.003 (-0.02)
Adj. R ² , %	32.49	32.59	44.79	43.96	34.70	34.55
Wald chi ²	1098.14	1078.09	600.55	579.32	777.74	777.58
Prob. of chi ² , %	0.00	0.00	0.00	0.00	0.00	0.00
n	2209	2209	717	717	1348	1348

The table relates a bank's economic performance to its hypothesized determinants as specified in the leftmost column. Performance is measured as return on assets (ROA), which we operationalize as net income divided by total assets at year end. PCC (Com) is a dummy variable that equals 1 if the bank is a PCC bank (Commercial bank) and zero otherwise. Asset risk is the fraction of assets which is not cash, claims on the central bank, amortizable loans, or fixed assets. Liability risk is one minus deposits divided by total assets. We assume that the lower these two measures, the smaller the risk. Bank size is the log of the bank's assets in constant 2002 NOK. Competition is alternatively measured by the number of branches (Branch comp) and by the number of unique banks (Bank comp) operating in the same municipalities as the bank in question. Both measures account for the fraction of the bank's total assets that is exposed to competition in the different municipalities.

The model is estimated with fixed time effects and random firm effects. We report the estimated regression coefficients and its t-statistic in brackets. Statistically significant relationships at the 10%, 5%, and 1% level are labelled as *, **, and ***, respectively. The bottom section of the table shows the adjusted R², the Wald chi², its p-value, and the number of observations. The sample is all Norwegian non-PCC banks, PCC banks, and listed commercial banks.