Competition versus agency costs: An analysis of charter values in European banking

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Abstract

It remains an empirical question whether deregulation and consolidation in European banking have a tangible effect on bank behavior and bank performance. In this paper, we investigate how competition and efficiency affect the franchise value of European banks. We compute a noise-adjusted bank-specific time-varying measure of bank charter value for a large sample of listed European banks for the period 1995-2003, using stochastic frontier analysis and combining accounting data and stock market variables. We investigate the determinants of this noise adjusted Tobin's Q, which correlates very strongly with the shortfall from the market value frontier. We use our measure to discriminate between Market-Power and Efficient-Structure hypotheses. We find strong economic and statistical evidence for the Relative Market Power hypothesis and the X-efficiency hypothesis. We also analyze the extent to which leverage limits the potential agency costs if there is separation between bank ownership and bank management. We find that more levered banks perform better than less levered banks, but the relationship switches at higher capital ratios. These findings are robust when controlling for diversification in bank activities, bank profitability, bank risk, institutional features and the macro-economic environment.

Keywords: agency costs, market power, Tobin's Q, stochastic frontier
JEL: G21, G32, L10.

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1 Introduction

The European banking sector has been characterized by a number of profound changes. On the one hand, advances in technology, financial liberalization and deregulation, the ongoing economic integration and the introduction of the Euro are expected to increase the degree of competition in the European banking sector. On the other hand, the wave of bank mergers and acquisitions, which has reduced the number of competitors significantly, can be expected to have the opposite effect. Many banking studies, using different methodologies, have tried to quantify the overall impact of these events (see e.g. Degryse et al. (2000), Corvoisier and Gropp (2001) and De Bandt and Davis (1999)). The results are mixed and the conclusions on bank behavior vary across countries and across bank products. Yet, from a policy perspective it is important to have a solid understanding of the effects on bank behavior. If on the one hand, the market structure of the banking system has a significant impact on bank profits, this would call for regulatory action in the area of competition and merger policy. If on the other hand, bank profits are driven by bank-specific determinants, such as operational efficiency, or by macroeconomic factors and not by the market structure, this would support a policy of encouraging (cross-border) consolidation.

In this paper, we try to contribute to this debate by investigating the competition-performance relationship using a longer-term concept of firm rents. We think that using a market-based and forward-looking measure of bank performance may be superior to accounting-based performance measures to investigate the relationship between market structure, bank behavior and bank performance. We use market values of a large sample of listed European banks to construct a noise-adjusted Tobin's Q ratio. The time-varying measure of the bank's charter value is obtained using the stochastic frontier methodology. Using a bank's market value also allows us to control for utility-maximizing behavior by managers. We analyze the determinants of bank charter value and test two hypotheses. The first set of empirical tests confronts the relative market power, the structure-conduct-performance and efficiency-structure hypotheses in a forward-looking framework. Our analysis of the impact of market share, concentration and efficiency on long-run performance yields new empirical results and has implications for the relative importance of the underlying drivers of competition in European banking. The second hypothesis claims that leverage is positively related to market capitalization by reducing the agency problem between managers and shareholders. We find that this proposition holds for certain levels of bank capitalization, but also that the effect of bank capital on bank market value can be interpreted in a risk-based setting. Our results have implications for various fields of regulation, from competition policy to capital adequacy regulation.

Our analysis is related to strands of the banking literature that have used bank market value to investigate the relationship between the riskiness of a bank and

its stock market performance. The charter value (or franchise value) is usually defined as the present value of the current and future profits that a firm is expected to earn as a going concern. Since the seminal paper by Keeley (1990), many papers have investigated the effect of the value of a bank charter on the extent of bank's risk taking[1]. However, little empirical evidence exists on the determinants of the charter value. In this paper we try to shed some light on the bank, market -or country-related factors that influence the market value of a bank. Research on the determinants of charter value can yield further insight in the sources of financial stability and the tasks of the supervisors and regulators to maintain this stability. Regulators are interested in the sources of financial instability and mechanisms to avoid it. Antitrust authorities are looking for algorithms to assess the trade-off between the value-enhancing effects of mergers and acquisitions and their potentially negative impact on the level of competition. Bank owners and managers are primarily interested in the underlying drivers of their long-term capital market performance.

The hypotheses of interest are explained in the next section. Section 3 describes the methodology and the data. In section 4, we present the estimation results of the baseline regression and perform some robustness checks on the hypothesis of interests. Section 5 contains additional regressions that control for other factors that have a potential impact on bank charter values. Section 6 concludes the analysis.

2 Theoretical foundations

Many studies in the Industrial Organization literature in general, and in the banking literature in particular, have found a statistically significant positive relationship between measures of market structure and profitability. Four hypotheses are typically postulated as potential drivers of this relationship. First of all, the traditional Structure-Conduct-Performance (SCP) paradigm states that the positive relationship between profit and market structure reflects non-competitive pricing behavior in more concentrated markets. Second, the Relative-market-power (RMP) hypothesis claims that only firms with large market shares are able to exercise market power and earn abnormal profits. The third and fourth hypotheses share the idea that efficiency may account for the relationship between concentration and/or market share and profitability. The X-efficiency version asserts that firms with superior management or production technologies

[1] The franchise value of a bank, proxied by the Tobin's Q ratio, has been used in other studies. Keeley (1990) and Allen and Rai (1996) both use a two-step approach to estimate the effect of bank charter value on bank risk. In a first step, Keeley (1990) regresses Q on financial liberalization measures and bank specific proxies for market power to obtain a purified, exogenous market power measure. In a similar analysis, Allen and Rai (1996) obtain a country specific component in banks' charter values. In the second step, they investigate the relationship between the instrumented Q and default risk and risk-adjusted capital ratios, respectively. Salas and Saurinas (2003) investigate the relationship between deregulation, market power and risk behaviour in Spanish banks.

have lower costs and simultaneously reap higher profits and gain larger market shares. The scale-efficiency version assumes that some firms operate at a more efficient scale than others, leading to lower unit costs and higher profits (Stigler (1964), Demsetz (1973), Berger (1995a), Vander Vennet (1996, 2002)).

There is, however, no general consensus about the relative importance of these competing hypotheses due to the lack of robust empirical support, neither for Europe nor the US. Nevertheless, knowing the essential drivers of bank profits, is important for antitrust policy. While the first and second hypothesis claim that mergers could be motivated by the ability to alter prices unfavourably for customers (thereby eroding consumer surpluses) and to increase margins, the third and fourth state that M&A improve overall welfare. Hence, they call for different actions by the competition authorities, both at the national level and at the level of the European Commission, who is responsible for merger and competition cases with a EU dimension.

There are different reasons why different studies find conflicting evidence. First of all, only since Berger (1995a) introduced a reduced form, which nests all four hypotheses, the observational equivalence problem encountered in previous studies has been solved. Furthermore, accounting profits have been utilized (ROA, ROE) to measure firm rents. These are, however, noisy measures of firm profitability as a result of differences in tax laws and accounting standards across countries. They also reflect short-run performance, rather than capturing long-run equilibrium behaviour. Considerable biases could also be created by different capitalization and depreciation practices and discretion over the accounting procedures used. The noise and biases in the dependent variable results in low values of goodness-of-fit tests in basically all empirical set-ups (Schmalensee (1989), Smirlock et al. (1984), Thomadakis (1977), Stevens (1990)). Moreover, accounting profits are backward-looking by nature. They only reflect the relative success of past investments and other operational decisions. On the other hand, sudden and large changes in market structure and efficiency variables (e.g. caused by consolidation) will create new equilibria. These will have an impact on banks' franchise values (measured by market values). Therefore, the four paradigms mentioned are all forward-looking and should be tested in this perspective.

In this paper, we want to investigate the profit-structure relationship from a different perspective. Assuming semi-strong efficiency of financial markets, an adequate forward-looking measure of bank profitability should be based on the market value of the bank (Smirlock et al., 1984). The market value of a bank consists of three components: 1) the capitalized value of rents due to monopoly power, 2) the capitalized value of rents attributable to scarce factors of production, 3) and the present value of the firm's existing capital stock. The market capitalization of a bank thus reflects both the successes of past behaviour as well as the expectations about the future excess returns of the assets already in place. It also reflects the anticipations of investors about (the success of)

potential future investment projects (Thomadakis, 1977). The current market structure and banks' market share, X-efficiency and scale efficiency are the main factors behind the formation of these expectations (and thus the franchise value). The advantages of using capital market data to evaluate bank performance are manifold. The forward-looking nature of asset prices is more in line with the concept of equilibrium profits. Potential distortions due to differences in tax laws or accounting standards are mitigated. Moreover, stock prices should also include the market valuation of a bank's risk profile (Smirlock et al., 1984).

Some authors (Smirlock et al. (1984), Thomadakis (1977), Hirschey (1985), Gonzalez (2004) among others) already used Tobin's Q ratio as the performance indicator in order to test the structure-conduct-performance hypothesis. We construct an analogous measure that also attempts to control for two drawbacks associated with market values. First, we clean the measure for noise, which is an inherent feature of stock returns. Second, we take into account that managers may fail to maximize the value of the firm by pursuing utility maximizing objectives and we adjust the Q ratio accordingly. This adjustment is jusitified by the 'Agency Cost hypothesis'. In traditional banking theory, bank managers are supposed to be value maximizers. However, in the presence of a separation between ownership and control, bank managers may pursue utility-maximizing behavior such as exerting insufficient work effort, perk consumption, increasing job security, building empires, etc. If bank managers, acting as agents of shareholders, do not maximize firm value, how large are the costs of this principal agent problem? Are there mechanisms to minimize these agency costs?

Theory suggests that the choice of capital structure may help to mitigate these agency costs. Berger and Bonacorssi di Patti (2003) claim that under the agency costs hypothesis, initially stated by Jensen and Meckling (1976), higher leverage reduces the agency costs of outside equity and increases firm value by constraining managers to act more in the interest of shareholders. The alignment of interest might come from the potential threat of liquidation, associated with personal losses for the management as a consequence (Grossman and Hart, 1982), or through the pressure to generate more cash flow to pay interest payment obligations to outside debt holders (Jensen, 1986).

Most studies of corporate control and agency problems focus on non-financial firms. But agency costs may also be non-negligible in the banking industry. The crucial role played by the banking industry in providing credit to non-financial firms, in the transmission of monetary policy, and in providing stability to the economy as a whole warrants a separate analysis. Moreover, banks have two related characteristics that make their corporate governance a special case. First, banks are informationally more opaque than other firms. In addition, banks in general and bank capital structure in particular are heavily affected by regulation, which may by itself affect the level of agency costs (Berger and Bonacorssi di Patti, 2003, Levine, 2003). Hence we test the hypothesis that the degree of leverage may have an impact on bank profitability and, hence, on its market

value.

3 Methodology and Data

3.1 Methodology

In order to discriminate between the alternative competition and efficiency hypotheses in a coherent framework, we estimate equations of the following form:

$$\begin{aligned} \mathrm{P\,erf}_{i,j,t} &= f(MS_{i,j,t},\ Conc_{j,t},\ X-Eff_{i,j,t},\ S-Eff_{i,j,t}, \\ &\quad Lev_{i,j,t},\ Bank_{i,j,t},\ Country_{j,t}) + \varepsilon_{i,j,t} \end{aligned} \tag{1}$$

The dependent variable is a long-run profitability measure, $\mathrm{Perf}_{i,j,t}$, constructed using stochastic frontier analysis, which varies over banks i, countries j and time t. It is based on Tobin's Q ratio. Therefore, it has the advantage that it takes into account both historical, current and expected future cash flows. We elaborate on the exact computation of $P\,\mathrm{erf}_{i,j,t}$ in section 3.3.1.
In order to test the relative importance of competition, market structure and the efficiency hypotheses, we include four variables in the equation[2]. First, $MS_{i,j,t}$ is a proxy for the relative market power of a bank in its home market. Second, the Herfindahl-Hirschman index is our preferred measure of concentration, $Conc_{j,t}$. Third, the cost-to-income ratio measures the operational costs of the bank as a percentage of total generated income before provisions. Regulators, analysts and researchers use this measure frequently to capture X-inefficiency, $X-Eff_{i,j,t}$. Fourth, the natural logarithm of total assets should capture size-related costs or benefits. Scale-efficiency is denoted by $S-Eff_{i,j,t}$. In order to explicitely account for the occurence of agency costs, we include the degree of leverage, $Lev_{i,j,t}$, and is measured by (and inversely related to) the ratio of equity capital to total assets.

In addition, we also incorporate control variables that are either defined at the bank ($Bank_{i,j,t}$) or the country level ($Country_{j,t}$). The control variables can be broadly categorized in variables measuring i) diversification of bank activities, ii) bank profitability, iii) riskiness, iv) regulation and supervision, and v) the macro-economic environment.

[2] The variables appearing on the first line correspond to the reduced form, suggested by Berger (1995a), that allows all four hypotheses to be valid simultaneously. To the extent that any of the key variables have positive estimated coefficients, this may be taken as evidence of the marginal contribution of the corresponding hypothesis.

3.2 Construction of the Dataset

This study uses annual data from banks' balance sheets and income statements for a sample of 255 banks from 17 European countries (EU15, Norway and Switzerland) between 1995 and 2003, obtained from the Bankscope database maintained by Fitch/IBCA/Bureau Van Dijk. Stock market returns and market capitalization are obtained from Datastream. The panel dataset is unbalanced due to delistings (e.g., caused by mergers and acquisitions) and contains 255 banks. We account for a potential survivorship bias by also including stocks of banks that have been delisted.
Since listed banks are usually relatively large, the banks in the sample account for more than 80% of the total assets of the European banking industry. In some countries the coverage is more than 90% of domestic bank assets. To our knowledge, this sample is larger than the ones used in previous analyses of listed European banks.
Appendix A provides information on the number of listed banks over time and country. Appendix B shows some summary statistics for the variables[3] used in this paper.

3.3 Description of the Data

3.3.1 Tobin's Q and Stochastic Frontier Analysis

The charter value of a bank is equal to the present value of the current and future profits that a bank is expected to earn. In empirical analyses, the charter value of a bank is usually proxied by Tobin's Q, which is the ratio of the market value of a bank divided by the replacement costs of the bank's assets. However, the market value of a bank's assets cannot be measured directly. An approximation is obtained by summing the market value of its equity (the market capitalization) and the book value of liabilities. The market value of liabilities should be close to its book value, since most of a bank's liabilities are short-term debt (deposits). The Q ratio has the advantage of permitting comparability across banks of all sizes. However, it also has two potential shortcomings. Bank managers may not maximize the value of the firm, although of interest to shareholders, if there is a separation between ownership and control. That is, they may not achieve the highest potential market value of their assets given their operating and investment decisions. Hence the measured Tobin's Q is an inadequate measure of effective performance because it fails to account for the difference between the highest potential value and the achieved value. Moreover, measurement error and (bad) luck may have an effect on the market-to-book ratio of bank assets.

Therefore, we follow Hughes et al. (1999, 2003, 2003, 2004) and estimate the following stochastic frontier model:

[3] Definitions of the variables are explained in the text in the section they appear for the first time.

$$\ln(MVA_{i,t}) = \beta_0 + \beta_1 * \ln(BVA_{i,t}) + \beta_2 * (\ln(BVA_{i,t}))^2 + \varepsilon_{i,t} \qquad (2)$$

$$\varepsilon_{i,t} = v_{i,t} - u_i * \exp(\eta(t-T)) \qquad (3)$$

We opt for a translog specification when fitting a stochastic upper envelope to the market values (MVA) of the bank's assets (BVA). The composite error term (3) consists of statistical noise, $v_{i,t} \sim iid\ N(0, \sigma_v^2)$, and systematic time-varying departures (shortfalls), $u_{i,t} = u_i * \exp(-\eta(t-T))$, from the translog production frontier (Battese and Coelli, 1995)[4]. The u_i's are assumed to be independently and identically distributed and are obtained by truncation at zero (to capture non-negativity) of the $N(\mu, \sigma^2)$ distribution. We also include time dummies in equation (2).

We estimate one frontier for the whole sample of European banks. All listed banks operating in the European Union are considered to have access to virtually the same technology, operate in a common regulatory environment and produce relatively homogeneous products[5]. Maximum likelihood estimates[6] of the parameters of the model are presented in Table 1. The likelihood ratio test allows us to conclude that the stochastic frontier specification, which includes an additional one-sided error term, offers a significant improvement in the value of the log likelihood over a model with a single-component error term. We can confidently reject the hypothesis that $u_i = 0$. Further evidence in favour of our model is that gamma is significantly different from zero as well as from one, pointing respectively to the existence of inefficiency (hence, not all bank managers maximize their charter value) and the stochastic nature of the frontier (SFA versus DEA). Both μ and η are statistically significantly different from zero. The shortfalls from the frontier become smaller over time, albeit at a very slow pace.

Turning to the coefficients of equation (2), we see that we cannot reject the hypotheses that $\beta_1 = 1$ and $\beta_2 = 0$. We can also identify a hump-shaped pattern for the time dummies (1995 is the reference period). From 1997, we see a gradual buildup of market values until the end of 1999 and a subsequent poorer Tobin's Q until the end of the sample period. This coincides with the general evolution of the European stock markets over the sample period.

[4] T is the last period of the panel and t=1,...,T; thus the random variable can be considered as the inefficiency effect for the i-th bank at the last period of the panel. If the parameter η is positive, then $-\eta(t-T)$ is non-negative, which implies that $u_{i,t} \geq u_i$. In the case of a positive value for η, the inefficiencies systematically decline over time.

[5] If we estimated bank-specific departures from a country-specific stochastic frontier, then we would obtain biased results for the country-specific determinants of the measured shortfall. For instance, if we assumed that banks operating in more concentrated banking markets are more efficient, there would be no significant relationship between the measured efficiencies and concentration when we calculate a country-specific frontier, since the frontier moves along with the other banks (Berger and Hannan, 1998).

[6] ML estimates are obtained using the computer program FRONTIER 4.1, made available by Tim Coelli (1996).

From our estimates we compute a noise-adjusted Q ratio, $Q_{i,t}^{NA}$, which can be written as:

$$Q_{i,t}^{NA} = \frac{\exp(\ln(MVA_{i,t}) - v_{i,t})}{BVA_{i,t}} = \frac{MVA_{i,t}}{BVA_{i,t} * \exp(v_{i,t})} \tag{4}$$

We use this measure of long-run profitability as a proxy for the charter value in the remainder of the paper. In studies of profit and cost efficiency, it is common to use the estimated inefficiency component as the dependent variable in the second step. Hughes et al. (2003), who estimate an analogous frontier for a sample of US Bank Holding Companies, use the market value inefficiency term as the dependent variable in their second stage regressions. For comparison with other studies that use ordinary Q measures, we opt to elaborate on the noise-adjusted Q ratio. Nevertheless, the two concepts are highly related to each other in our set-up. Imposing our estimated parameters of the model (i.e. $\beta_1 = 1$ and $\beta_2 = 0$), we find that:

$$Q_{i,t}^{NA} = \exp\left(\beta_0 - u_{i,t} + \sum_{j=1996}^{2003} dum(j) * I(j = t)\right) \tag{5}$$

Hence, not surprisingly (given the precision of the point estimates), the correlation (in absolute value) between $Q_{i,t}^{NA}$ and $u_{i,t}$ is very high, exceeding 0.97, as can be seen in Table 2.

Table 2 presents some summary statistics of our charter value measure for each year of the sample period. For comparison, we report in the last column the values that Hughes and Moon (2004) obtain for a sample of 169 US Bank Holding Companies in 1994.
Average Q^{NA} exceeds one in each year and increases gradually from 1.0189 in 1995 to its highest value of 1.0507 in 1999. From 2000 onwards, average market-to-book ratios decrease, reaching a lowest value of 1.0021 in 2002. The development of the profitability measure mimics the overall macroeconomic conditions in the European Union during the sample period. In the Eurozone, GDP growth increased gradually until early 2000, followed by rapidly decreasing growth rates reaching minimum growth levels of 0.5 in 2003 (ECB, Monthly Bulletin). Maximum Q^{NA} exhibits the same time pattern, with a maximum of 1.2061 in 1999. The standard Q-ratio also shows the same behavior over time, but reaches some unreasonably high maximum values and has a greater standard deviation in all time periods compared to the Q^{NA}-ratio. The correlation between both performance measures fluctuates around 0.80 over the sample period. Potential Q, which is the ratio of the market value that a bank would obtain if it were on the frontier to its book value, is also mentioned in the table. The table also shows that the level of efficiency gradually increases over time, but as already mentioned, at a very low speed. This is due to the η coefficient, which is small but statistically significant. On average, a bank in the sample reaches about 86.5 % of the market value at the frontier. This amounts to an average loss of

market value of 5433 million US dollars in 1995 and increasing to 12372 million US dollar in 2003 (keep in mind that the average size of a bank is also increasing over the sample period, so the share does not change).
The correlations at the bottom of Table 2 show that size has a low correlation with Q^{NA} but is strongly negatively correlated with potential Q. The very high correlation between Q^{NA} and the inefficiency term implies that we can use either one in the subsequent analysis. When working with Q^{NA} in our empirical analysis, we can compare our results with studies that use the standard Tobin's Q ratio. Moreover, we can also compare our results qualitatively with the results obtained by Hughes et al., who try to explain a bank's market value shortfall to the stochastic frontier.
We now define potential determinants of adjusted Q.

3.3.2 Market Share and Concentration

Market share (MS) should proxy for the relative market power a bank has in its home market. It is measured as the bank's share of assets in the sum of total assets of all listed[7] banks operating in that country at that point in time. In the European Union, listed banks have an average market share of 7 %, with a maximum of almost 90 %. A large market share should facilitate the long-term generation of future profits. It may create rents obtained from market power in the loan and/or deposit markets. If market share is found to have a significant positive impact on Tobin's Q, we would conclude that the relative market power hypothesis is corroborated.
The Herfindahl-Hirschman index (HHI)[8], the sum of squared market shares (according to total assets) of all banks in country j at time t, is our preferred measure of concentration. It provides information on the variation in the market shares of all banks in a country at a given point in time. On average, the European banking industry is not concentrated. Nevertheless, some countries, such as Belgium and Finland, exhibit values for the HHI above 0.2. For robustness, we check our findings using the CR5 ratio. The CR5 of a country equals the percentage share of the five largest institutions ranked according to assets, in the sum of the assets of all banking institutions in that particular country. The finding of a significant positive relationship between concentration and long-run operational performance would support the hypothesis that high concentration fosters tacit and/or explicit collusion. All banks operating in a concentrated market will benefit equally, independent of their relative importance in that market. If we find a negative impact on the charter value, this would imply that the increased benefits from the exploitation of market power in pricing behavior are outweighed by the increased costs from managers enjoying a 'quiet

[7] Since listed banks comprise the vast majority in terms of total banking assets in most countries, this market share measure will not be too different from the overall market share the listed bank has (with Germany as a notable exception). Our measure only implies a rescaling within a country, but may create slight distortions over countries given that the fraction of listed banks varies over countries.

[8] Data on concentration measures are taken from 'Report on EU banking structure – November 2004', (ECB, 2004).

life'[9]. As a robustness check, we also include the interaction between market share and concentration. A positive relationship indicates that the rents from collusive behavior are disproportionally distributed in favor of the larger firms. A negative sign is consistent with the hypothesis that the ability to exert market power depends on the absence of other large rivals (Smirlock, 1985).

3.3.3 Efficiency

The cost-to-income ratio (CI) measures the operational costs of running the bank as a percentage of total income before provisions (i.e., the ratio of all operational expenses as a fraction of the sum of net interest and noninterest revenues). Regulators, analysts and researchers frequently use this indicator to capture bank (in)efficiency. Firms with superior management have lower costs and subsequently reap higher profits.
The natural logarithm of total assets is intended to capture size-related costs or revenue benefits associated with scale or scope economies. We control for potential non-linearities in the size–Tobin's Q relationship.

3.3.4 Leverage

The use of a capital ratio as a measure of leverage is standard in the empirical banking literature, partly due to the regulatory attention paid to capital ratios. The book value of equity to total assets is inversely related to the level of leverage. By analogy with Berger and Bonacorssi di Patti (2003), we specify a quadratic functional form to allow the relationship between agency costs and leverage to be non-monotonic. When leverage is sufficiently high, an additional decrease in the capital to assets ratio may result in lower charter values if the agency costs of debt outweigh the benefits in terms of reduced agency costs of outside equity. Moreover, less-capitalized banks face higher expected bankruptcy costs. Investors will therefore demand a higher return as a reward for the exposure to risk. As a robustness check, we also use the Tier 1 capital-to-total-assets ratio.
However, as pointed out in Berger (1995b), capital serves different purposes and the predicted relationship between capital and earnings in the different hypotheses is not necessarily in the same direction. In addition, bank capital levels are highly regulated. Capital regulation is motivated principally by the concern that a bank may hold less capital than is socially optimal relative to its riskiness as negative externalities resulting from bank default are not reflected in market capital requirements. Capital requirements can reduce the moral hazard incentives by forcing bank shareholders to absorb a larger part of the losses. With more capital and less risk-taking, the effect is clearly a decrease in the bank's default probability.

[9] Berger and Mester (1997) and Berger and Bonaccorsi di Patti (2003) find that concentration in US banking markets has a positive effect on profit efficiency. Berger and Mester (1997) and Berger and Hannan (1998) find a significant negative effect of concentration on cost efficiency.

4 Empirical Analysis

To recapitulate, the baseline equation that is estimated has the following form:

$$\begin{aligned} Q_{i,j,t}^{NA} &= \beta_0 + \beta_1 * MS_{i,j,t} + \beta_2 * Conc_{j,t} \\ &\quad + \beta_3 * CI_{i,j,t} + \beta_4 * \mathrm{Si}\, ze_{i,j,t} + \beta_5 * \mathrm{Si}\, ze^2 \\ &\quad + \beta_6 * Lev_{i,j,t} + \beta_7 * Lev_{i,j,t}^2 + \varepsilon_{i,j,t} \end{aligned} \tag{6}$$

On the first two lines, we find the four variables that should discriminate between the market structure and the efficiency hypotheses. On the last line, we state the variables of interest for the agency cost hypothesis. The estimation results can be inspected in Table 3[10]. We estimate the long-run profitability equation with country fixed-effects[11]. Each table also provides within-country R^2's for each regression. There are 1210 observations in the baseline equation, distributed over 205 banks, 7 years and 15 countries[12]. Column (1) and (2) report the estimated coefficients and t-statistics for the baseline equation without and with time dummies[13]. The estimated coefficients and their significance do not change qualitatively when including time dummies[14]. Not surprisingly, the pattern of the time dummies is very similar to the one obtained in Table 1. $Q_{i,t}^{NA}$ is high and increasing from 1997 to 1999. From 2000 onwards, $Q_{i,t}^{NA}$ decreases to reach a minimum, in our sample period, in 2002.

The results of the baseline regression with time dummies are in column (2). We observe that all coefficients, except size, have the expected sign. Only the concentration measure and size squared are not significantly different from zero. Banks with a larger market share have higher Q ratios; as well as banks operating in more concentrated banking markets. We thus find evidence for the relative market power hypothesis in the group of listed banks in the EU15. Vander

[10] Estimating the baseline equation with random country effects rather than fixed effects, does not affect the results qualitatively. The sign as well as the significance of coefficients remain unchanged. Formal testing by means of a Hausman test also reveals that the null hypothesis of no systematic difference in the estimated coefficients can not be rejected. The slight correlation between the country effects and the independent variables persuaded us to use the within estimator.

[11] The variation in the country fixed effects is equally large as the variation in the random noise of the regression (not reported). The magnitude of the country fixed effects ranges from -0.05 to 0.07 with a standard deviation of 0.035. The magnitude and the dispersion of the country fixed effects are very robust over the different equation specifications used throughout the paper. Thus, the behavior of the listed banks operating in the different member states of the EU15 is still not perfectly integrated.

[12] The analysis of the determinants focuses only on EU15 banks. Norway and Switzerland are, for reasons of data availability and comparability, no longer included in the analysis. The number of banks is now reduced to 205 banks.

[13] We take 2003 as the base period when time dummies are included.

[14] Recall that from equation (5), i.e. the formula of $Q_{i,t}^{NA}$, time dummies should be included by construction.

Vennet (2002) finds no significant role for the relative market power hypothesis using accounting profits. However, using a forward-looking market-based performance measure, we find that market share may be a long-term generator of superior future profits rather than having immediate impact on current profitability. However, note that, even in the set of listed banks, the market share variable is heavily skewed. The economic impact of an increase in market share[15] is relatively small. An increase by 0.01 in the adjusted market-to-book ratio requires, ceteris paribus, an absolute increase in market share of 25 %. Controlling for market share and operational efficiency, we find no support for the Structure-Conduct-Performance hypothesis, the coefficient of HHI is insignifant. This finding implies that the increased benefits from the exploitation of market power in pricing behavior and the increased costs from managers enjoying a 'quiet life'[16] are either in balance or both absent in the European banking industry. Absence of support for the Structure-Conduct-Performance hypothesis in the European banking industry is inconsistent with the findings of Corvoisier and Gropp (2002) and Vander Vennet (2002). They find that banks operating in more concentrated markets can generate rents by anti-competitive pricing behavior. Our results corroborate those reported by Smirlock (1985), who finds that support for the SCP hypothesis vanishes when market share is controlled for in a regression framework with bank profits as the dependent variable. Smirlock et al. (1984), Hirschey (1985) and Stevens (1990) find similar results, a significant positive coefficient for market share and an insignificant effect of concentration, for a sample of manufacturing firms using Tobin's Q as the dependent variable.

The cost-to-income measure is inversely related to the level of X-efficiency. It is both statistically significant and of economic importance. In order to increase the noise-adjusted Tobin's Q ratio with 0.005, a bank should improve its operational efficiency such that the cost income ratio decreases with 0.16. Larger banks perform worse, everything else equal, than smaller ones. This is consistent with diseconomies of scale for megabanks, a result that is often found in empirical banking studies investigating determinants of various concepts of profitability and efficiency. Allen and Rai (1996) find that, for banks operating in a subset of OECD countries, charter values as measured by Tobin's Q decrease in size. They even discover that the size-charter value relationship is non-monotonic for some sample years. Berger and Mester (1997) and Berger and Bonaccorsi di Patti (2003) find that profit efficiency of U.S. banks is also decreasing in size. Bonin et al. (2005) report a negative relationship between size and cost and profit efficiency for a large sample of Central and Eastern European banks. Altunbas et al. (2003) also obtain a significant negative re-

[15] Market share is measured in a [0,1] interval.

[16] Berger and Mester (1997) and Berger and Bonaccorsi di Patti (2003) find that concentration in US banking markets has a positive effect on profit efficiency. Berger and Mester (1997) and Berger and Hannan (1998) find a significant negative effect of concentration on cost efficiency. We find that the first effect dominates the second for a large sample of listed European banks.

lationship between size and cost efficiency in the Western European banking industry.

In sum, we find evidence for the relative market power hypothesis, even after controlling for efficiency and market structure. Our results also lend support to the X-efficiency part of the efficient structure hypothesis[17].

Leverage is measured by the equity–to-asset ratio. A decrease in the capital-to-asset ratio represents an increase in leverage. Both β_6 and β_7 are significantly different from zero and have the expected sign, resp. $-$ and $+$. The effect of leverage on the noise-adjusted market-to-book ratio is non-monotonic and reaches a minimum at a capital to asset ratio of approximately 0.11. At capital ratios below 0.11, an increase in leverage increases bank performance measured by Q^{NA}. These findings are consistent with the agency costs hypothesis[18] for almost all banks, given that 75 % of the banks have capital ratios well below this threshold. An increase of leverage from the 25^{th} percentile (capital ratio of 0. 108) to the 75^{th} percentile (capital to asset ratio of 0.047) corresponds with an increase in Q^{NA} of approximately 0.011 (0.015 when time dummies are excluded from the regression). Berger and Bonacorssi di Patti (2003) obtain similar results in a slightly different set-up[19]. For a sample of US banks, they find that the effect of leverage on profit-efficiency is positive for all values of the capital to asset ratio below 0.17. Additional support, again from a sample of US banks, for these results can be found in Hughes et al. (2003). They find a dichotomous strategy for value maximization, one involving relatively higher financial leverage and another with lower financial leverage. They also find that some banks choose sub-optimal capital strategies. High-leverage banks that under-perform are relatively under-levered and should increase leverage even further to achieve optimal performance levels. Low-leverage banks that under-perform are relatively over-levered and should do the opposite. Their findings thus corroborate our estimated U-shaped relationship between capital and Tobin's Q. For a large sample of European banks between 1992 and 2000, Altunbas et al. (2003) find that more-levered (low-capitalized) banks are less cost-inefficient[20].

Columns (3) to (6) report the results for a number of sensitivity analyses.
First, we confirm most of the findings when we use the Tier 1 capital ratio[21] as

[17] Berger (1995) suggests estimating auxiliary regressions in order to test the condition that efficiency is related to structure as well as to performance. We find that X-efficiency has an insignificant impact on market share, while size affects market share positively (probably due to endogeneity).

[18] The performance boost created by a better alignment of managers and shareholders interests at low capital levels seems to outweigh any potential market disciplining effect of higher risk associated with low capital levels.

[19] They use two-stage least squares to control for the endogeneity of leverage. However, they still find a negative relationship between equity capital and performance when estimating their equations with OLS.

[20] Altunbas et al. (2003) do not specify a non-linear relationship between capital and inefficiency.

[21] Note that the sample size is much lower when using the alternative leverage measure.

our inverse leverage ratio. The leverage-charter value relationship is still non-linear. The charter value is again minimized at a capital ratio of 0.11. We still find support for the RMP hypothesis and the X-efficiency hypothesis.
Second, we use lagged capital ratios to test the leverage hypothesis. This way, we want to circumvent the reversed causation running from performance to capital structure under both the efficiency-risk and the franchise-value hypothesis (Berger and Bonaccorsi di Patti, 2004 and Keeley, 1990). The results in columns (2) and (4) of Table 3 are qualitatively and quantitatively the same. Only the degree of leverage corresponding with the lowest charter value increases a little and the steepness of the relationship flattens. The conclusions confirming the agency cost hypothesis are unchanged.
Third, we use CR5 ratio as a substitute for the HHI measure of concentration. The SCP paradigm is still rejected. Support for the leverage, RMP and X-efficiency hypothesis remains robust.
Fourth, we include the interaction between market share and concentration as an additional regressor. The sign of interaction term is negative and the coefficient is significantly different from zero (as in Smirlock, 1985). The negative coefficient might reflect a decrease in the ability of leading firms to exploit advantages due to the oligopolistic competition with other large market share rivals[22]. For low levels of concentration, the market share-performance relationship is positive. However a bank expanding in a market with a HHI in excess of 0.208 reduces its market-to-book value. Note that the turning point in the market share-performance relationship coincides with the cut-off point that is used by the European Commission to judge competition concerns in a merger approval.
Fifth, in column (7) and (8) of Table 3, we control for the degree of contestability. The Second Banking Directive of 1989 introduced a number of mechanisms aimed at increasing the cross-border contestability of bank markets in the European Union. The principles of home-country control, the single banking licence and mutual recognition have transformed the Single Market in banking services. The Directive has resulted in a marked increase in the number of branches opened by credit institutions in other European Member States. The continuous threat of entry is expected to positively affect competitive bank behaviour even in the most concentrated markets. We compute two measures of foreign bank participation[23]. The first one measures the foreign presence of banks and is the ratio of subsidiaries from the European Economic Area (EEA) and third countries to the number of credit institutions in a particular country. The second measures the importance of these foreign subsidiaries and is constructed as the ratio of assets of subsidiaries from EEA and third countries to total banking assets in a country.
The results show that banking markets with a larger degree of foreign penetration experience a more intense competitive pressure resulting in lower charter

[22] It thus seems that managers of a bank with a large (and increasing) market share in a concentrated market consume more agency goods. They are more prone to the 'Quiet Life' (Hicks, 1935).

[23] Data on foreign presence are taken from 'Report on EU banking structure – November 2004', (ECB, 2004).

values. The coefficient is however not significantly different from zero[24]. Apparently, the de jure absence of restrictions on entry and foreign access as well as the de facto presence of foreign banks are (yet) unable to prevent incumbent banks with a large market share to gain larger rents.

5 Robustness

In addition, we also incorporate control variables that are either defined at the bank or the country level. The control variables can be broadly categorized in variables measuring: i) diversification of bank activities, ii) bank profitability, iii) riskiness, iv) regulation and supervision, and v) the macro-economic environment.

5.1 Diversification

First of all, we control for the type of activities a bank operates in. Banks that are more involved in hedging activities, measured by off-balance sheet items to total assets (OBS), and are better diversified, measured by the ratio of non-interest income to total revenues (DIV), should be less exposed to risk (Vander Vennet et al., 2004). These measures may affect the value of a bank charter through the discount factor that is used to actualize future profits. We incorporate the loans-to-assets ratio (LTA) as a measure that is inversely related to liquidity. But it could also proxy for the relative specialization of a bank in the lending business.
We also include a Commercial bank type dummy, which constitutes the majority of institutions in the sample. After controlling for diversification and specialization, we again find strong support for the leverage and the Relative Market Power hypothesis. Efficient banks are also more valuable.
Concerning diversification, we find mixed results. Inspection of column (2) and (4) reveals that our asset-based (LTA) and income-based (DIV) measures of the extent to which banks engage in lending activities or fee- and trading based activities, point towards a diversification benefit. Our findings thus contrast with those of Laeven and Levine (2004) who find a diversification discount in a sample of 836 banks across 43 countries (a mix of developed and developing countries). In addition to LTA and DIV, they construct measures of diversity[25] that yield the same results in their study. We include a nonlinear specification for LTA and DIV to find the optimal level of diversification. The squared diversification measure is not significant and the nonlinear relation between the loans-to-asset and charter value surprisingly reaches a minimum at a value of the LTA ratio of 0.75 (which corresponds to 90^{th} percentile), which provides weak evidence for a diversification discount.

[24] We also investigate possible interaction effects between contestability and market structure variables but found no significant relationships.

[25] In the construction of their measures of diversity, they assume that a value of LTA (and DIV), both measured in an [0,1] interval, closer to 0.5 implies better diversification.

Column (6) of Table 4 reveals that commercial banks, which constitute by far the largest group in our sample, have a significantly higher Q^{NA} than the other types of banks.

5.2 Profitability

From the definition of charter values, i.e. the present value of current and future profits, it is clear that we should control for current operational performance. Return (profit after tax) on average assets (ROAA) and the annualised average monthly stock return (AvgRET) are used as accounting and market-based profitability measures, respectively. The net interest margin (NIM) measures the gap between what the bank pays savers and what the bank receives from borrowers. Thus, the net interest margin focuses on the traditional borrowing and lending activities of the bank. We add these variables, one at a time, to the baseline regression. We expect them to have a positive effect on the long run profitability measure. Columns (1) to (3) in Panel A of Table 5 show the results. All three 'current' performance measures have a positive impact on the present discounted value of current and future profits. Only the coefficient corresponding to the return on assets ratio enters the equation significantly[26]. An increase in ROAA with 0.7 adds 0.01 to Q^{NA}. The significance and size of the coefficients of the baseline equation are largely unaffected. We still find robust evidence in favor of the leverage and the relative market power hypothesis. The accounting profit measure seems to absorb the explanatory power of the cost-to-income ratio, probably due to the high correlation between efficiency and current profits.

5.3 Risk

Bank managers who are not very efficient at assessing and monitoring loans are not likely to be very efficient in achieving a high level of operating efficiency. However, bank stock investors and bank analysts are not very privy to information about the riskiness of banks' loans. Therefore, data on the amount of reserves are useful to outsiders, since they provide information about the quality and riskiness of the loan portfolio. We include the ratio of Loan loss reserves over Gross Loans (LLR) as measure of credit risk. Loan loss reserves are funds that banks set aside to cover bad loans. Thus, loan loss reserves should be forward looking to absorb expected future losses in the bank's loan portfolio. The higher the ratio the poorer the quality of the loan portfolio and the worse the overall bank performance will be. From column (5) of Table 5 we can indeed infer that a higher provision of loan loss reserves has a significant negative effect on a bank's Tobin's Q ratio[27]. A one standard deviation increase in LLR

[26] ROAA is one of a few variables that significantly improve the overall fit, as measured by the R^2-within, of the baseline equation.

[27] Note that an increase in loan loss reserves (LLR) also affects a bank's capital ratio. Since 1988, loan loss reserves have been included in Tier 2 capital. As LLR increases, the capital ratio may improve. The negative relationship between capital and Q^{NA} might thus be driven

(equal to 2.17) decreases Q^{NA} with 0.004. Using the event study methodology, Docking et al. (1997) find that bank announcements of additions to loan loss reserves result in negative stock returns. Apparently, investors view such announcements as foreshadowing more bad news.
We include the annualised volatility of monthly stock returns (StdRET) to capture the bank's risk profile as perceived by the stock market. A one standard deviation increase in stock return volatility positively affects Q^{NA} with 0.004. This is obvious in the light of the risk-return trade-off investors are facing. High levels of uncertainty are associated with higher potential returns that boost market-based performance measures.
Most importantly, all conclusions with respect to the hypotheses of interest remain valid (also in the much smaller sample when LLR is included) and robust.

5.4 Regulation and Supervision

Notwithstanding the fact that the banks operating in the countries in our sample, i.e. the European Union, share to a large extent a common regulation; we control for potentially remaining differences in regulation, supervision and the overall institutional environment. In analogy with Demirgüç-Kunt et al. (2004), we include the following variables: KKZ, Property Rights, Regulation, Banking Freedom and Economic Freedom[28]. However, in our sample, the variation of these variables is much lower than in studies that investigate a broader set of countries.
KKZ is an aggregate index of the level of institutional development, based on a survey conducted by Kaufmann et al. (2001). Higher values indicate a better-developed institutional framework. Property Rights is an indicator of the protection of private property rights. Regulation is an overall index of a country's regulation. Banking freedom is an overall index of banking freedom with respect to activities and openness of the banking industry. These last three variables are all part of the overall index of Economic Freedom and are obtained from the Heritage Foundation. The higher the score on a factor, the greater the level of government interference in the economy and the less economic freedom a country enjoys.
We include these indicators separately in the baseline specification. The results are reported in Table 6, Columns (1) to (5). As expected, none of the variables is significant. The regulatory environment in the European Union is quite harmonized and does not significantly affect banks operating in a particular country.
In the last column of Table 7, we include the average yearly turnover of the stocks of each bank. We find that the level of trading has a significant positive impact on the long run performance measure. Pastor and Stambaugh (2003) and Acharya and Pedersen (2004) find that liquidity is a priced factor in stock

by LLR rather than the leverage hypothesis. However, when we substituted the Tier 1 capital ratio for the Capital-to-Assets ratio, we still obtain the same results regarding the leverage hypothesis.

[28] We do not include data from Barth et al. because they do not vary over time and are therefore perfectly correlated with the country fixed effects.

returns. Investors demand a higher expected return as a reward for the possible difficulty of selling these stocks during stock market downturns. As a result, the market capitalization, and thus Tobin's Q, will be higher for more frequently traded bank stocks.
None of the variables included in this section alters the findings found in our main empirical analysis of part 4. In addition, the country fixed effects remain large even after controlling for the regulatory and institutional environment.

5.5 Macroeconomic Control Variables

Table 7 analyses the relationship between Q, leverage, competitive behavior and efficiency while controlling for the macro-economic environment.
GDP growth, as a proxy for business cycle fluctuations and general business opportunities, inflation and the long-term interest rate are included in the regressions to control for country-specific macroeconomic conditions. The growth rate of a broad country-index should control for the general evolution on the stock market and investors' perception of the macro-economic situation. In previous regressions, we always included time fixed effects, partly to capture the general macro-economic situation in the EU as a whole. We included time fixed effects in the regressions debated in this subsection, only when it is explicitly mentioned in Table 7. First of all, we included the macro-variables one at a time. The sign of the macro-variables is the same in the regressions with and without time fixed effects. However, the variables capturing the macro-environment are only significant when the general (macro) economic evolution of the European economic area is not taken into account (by means of time dummies). This might reflect that listed banks, although mostly operating at a national level, are not that much affected by the time variation in a country's macro-economic environment[29]. Irrespective of significance, we find that banks operating in a country with a higher rate of growth in GDP, lower inflation, a higher long-term interest rate and a better performing stock market perform better. Second, we included all macro-variables simultaneously (neglecting collinearity). We obtain the same results. They have the same sign as when they are included separately, again irrespective of the inclusion of time dummies. Again, they are only significant when time fixed effects are dropped from the regression.
All conclusions with respect to the main hypotheses on relative market power and leverage remain valid.

6 Conclusion

In this paper, we investigate whether deregulation and consolidation in European banking have a tangible effect on bank behavior and bank performance.

[29] Country fixed effects are still included in the model and the variation of these effects is relatively large. The standard deviation of the country fixed effects is on average 0.035 (averaged over the different estimated regressions).

More specifically, we analyze whether the competitive setting affects the franchise value of European banks. We compute a noise-adjusted time-varying measure of bank charter value for a large sample of listed European banks for the period 1995-2003, using stochastic frontier analysis and combining accounting data and stock market variables. We investigate the determinants of this noise adjusted Tobin's Q, which correlates very strongly with the shortfall from the market value frontier. The first set of hypotheses tests the relative market power, the structure-conduct-performance and efficiency-structure hypotheses in a forward-looking framework. Analyzing the impact of market share, concentration and efficiency on long-run profitability gives new insights in the relative importance of the underlying drivers of competition. This is in the interest of regulators and supervisors. The second hypothesis claims that leverage is positively related to performance by reducing the agency problem between managers and shareholders if there is separation between ownership and control.

First, we find that more levered banks perform better than less levered banks, but the relationship switches at higher capital ratios. Higher leverage reduces the agency costs of outside equity and increases firm value by constraining managers to act more in the interest of shareholders. The alignment of interest at higher leverage might come from the potential threat of liquidation or the greater pressure to generate more cash flow to meet interest payment obligations to outside debt holders (depositors).
Second, we find strong economic and statistical evidence for the Relative Market Power hypothesis. Using a forward-looking market-based performance measure, we find that market share may be a long-term generator of superior future profits rather than having immediate impact on current profitability.
Third, more cost efficient banks reap higher profits, now and in the future. Banks with superior management or production technologies are better valued by stock market investors.
These findings are robust when controlling for diversification in bank activities, bank profitability, bank risk, institutional features and the macro-economic environment.

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Table 1: Measurement of Q^{NA} : Estimation of the Stochastic Frontier

	coefficient	standard-error	t-ratio
beta0	0.1994	0.0688	2.90
beta1	0.9931	0.0119	83.40
beta2	0.0002	0.0006	0.32
dum1996	-0.0027	0.0094	-0.29
dum1997	0.0140	0.0096	1.46
dum1998	0.0221	0.0102	2.17
dum1999	0.0254	0.0112	2.26
dum2000	0.0077	0.0117	0.66
dum2001	-0.0073	0.0121	-0.60
dum2002	-0.0185	0.0125	-1.48
dum2003	-0.0077	0.0133	-0.58
sigma-squared	0.0052	0.0014	3.74
gamma	0.6796	0.0423	16.07
mu	0.1191	0.0224	5.33
eta	0.0224	0.0089	2.50

log likelihood function	2438.12
LR test of the one-sided error (3 restrictions)	830.88
number of iterations	18
number of cross-sections	255
number of time periods	9
total number of observations	1662
obs not in panel	633

Note: $\sigma^2=\sigma_v^2+\sigma_u^2$

$\gamma=\sigma_u^2/\sigma^2$

Table 2: Measurement of Q^{NA} : Some Summary Statistics

		EU15+Norway+Switzerland: 1995-2003									US
		1995	1996	1997	1998	1999	2000	2001	2002	2003	1994
Market Value of Assets	mean	34359	40415	52987	58968	59708	68839	70828	80139	106773	12081
(MVA)	std	92869	91549	117062	129674	135799	159734	159826	176329	235590	27680
(million USD)	min	45	40	37	44	41	37	37	49	80	
	max	489545	554594	730844	728831	834516	876681	820303	882537	1168430	
Market Value Efficiency	mean	0.8581	0.8588	0.8652	0.8666	0.8673	0.8681	0.8696	0.8725	0.8754	
=exp(-U)	std	0.0373	0.0458	0.0462	0.0477	0.0483	0.0464	0.0443	0.0436	0.0439	
	min	0.7900	0.7556	0.7603	0.7198	0.7251	0.7303	0.7354	0.7404	0.7453	
	max	0.9974	0.9980	0.9979	0.9980	0.9980	0.9981	0.9981	0.9983	0.9983	
Lost Market Value	mean	5433	5523	7112	7831	7716	8601	8606	9464	12373	456
(Consumption of Agency	std	14047	12563	15902	17538	17857	20381	19702	20683	27310	374
Goods)	min	0.80	0.24	0.61	0.83	1.38	2.47	2.29	2.70	6.50	
(million USD)	max	73473	81458	94791	102594	115493	123900	111965	106605	138267	
Q	mean	1.0021	1.0001	1.0253	1.0391	1.0486	1.0272	1.0098	1.0004	1.0151	1.0360
(MTB)	std	0.0423	0.0531	0.0706	0.1010	0.1363	0.0945	0.0592	0.0508	0.0559	0.0330
	min	0.9402	0.9196	0.9134	0.8537	0.8554	0.8498	0.8586	0.8586	0.8552	
	max	1.1216	1.3575	1.5733	1.6880	1.9372	1.9327	1.3056	1.2811	1.2579	
Q-noise adjusted	mean	1.0189	1.0210	1.0417	1.0486	1.0507	1.0305	1.0139	1.0021	1.0126	1.0320
(MTBNA)	std	0.0400	0.0453	0.0475	0.0504	0.0521	0.0495	0.0470	0.0466	0.0484	0.0200
	min	0.9470	0.9173	0.9333	0.8996	0.9024	0.8865	0.8728	0.8619	0.8709	
	max	1.1793	1.1823	1.1972	1.2048	1.2061	1.1819	1.1643	1.1502	1.1588	
Potential Q	mean	1.1702	1.1665	1.1857	1.1948	1.1989	1.1776	1.1596	1.1456	1.1570	1.3600
(PMTB)	std	0.0096	0.0097	0.0100	0.0099	0.0099	0.0097	0.0094	0.0088	0.0085	0.3660
	min	1.1542	1.1508	1.1698	1.1793	1.1830	1.1622	1.1449	1.1321	1.1440	
	max	1.1923	1.1897	1.2107	1.2193	1.2238	1.2029	1.1850	1.1701	1.1800	
correlations		1995	1996	1997	1998	1999	2000	2001	2002	2003	
corr(MTBNA,MVA)		-0.0557	0.1161	0.0786	0.0743	0.0832	0.0996	0.1287	0.1489	0.1442	
corr(MTBNA,U)		-0.9736	-0.9815	-0.9817	-0.9837	-0.9847	-0.9848	-0.9851	-0.9867	-0.9882	
corr(MTBNA,MTB)		0.844	0.8044	0.8124	0.861	0.7949	0.7782	0.9067	0.839	0.7646	
corr(PMTB,MTB)		-0.5232	-0.5827	-0.5933	-0.5974	-0.5824	-0.5768	-0.5839	-0.5905	-0.5866	
corr(PMTB,MVA)		0.0765	-0.1224	-0.0704	-0.0513	-0.0527	-0.169	-0.247	-0.2281	-0.0257	
number of observations		30	177	202	209	216	220	209	207	192	169

Table 3: Determinants of Q^{NA} : Baseline Regression Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	1.1712***	1.1300***	1.0543***	1.0999***	1.1248***	1.1153***	1.1328***	1.1376***
	[54.579]	[56.577]	[56.608]	[54.953]	[47.846]	[55.554]	[54.585]	[52.050]
Leverage	-0.8034***	-0.6239***			-0.625***	-0.6720***	-0.6249***	-0.6243***
	[7.205]	[6.184]			[6.194]	[6.677]	[6.191]	[6.188]
(Leverage)^2	3.5949***	2.9007***			2.9038***	3.0488***	2.9016***	2.9052***
	[7.802]	[6.974]			[6.983]	[7.366]	[6.974]	[6.984]
Market Share	0.0502***	0.0378***	0.0502***	0.0310**	0.0380***	0.1347***	0.0381***	0.0375***
	[3.502]	[2.926]	[4.225]	[2.393]	[2.942]	[5.373]	[2.947]	[2.900]
HHI	-0.0037	0.0226	-0.0139	0.013		0.0924	0.012	0.0222
	[0.051]	[0.343]	[0.226]	[0.191]		[1.378]	[0.173]	[0.338]
X-Inefficiency	-0.0306***	-0.0304***	-0.0522***	-0.0323***	-0.0303***	-0.0337***	-0.0303***	-0.0301***
	[3.429]	[3.792]	[6.410]	[4.058]	[3.780]	[4.223]	[3.777]	[3.745]
Size	-1.1744***	-0.9704***	0.3505	-0.8371**	-0.9706***	-0.4622	-0.9609***	-0.9635***
	[3.121]	[2.867]	[1.106]	[2.459]	[2.868]	[1.305]	[2.833]	[2.845]
Size^2	2.2547	2.329	-3.6906**	2.3961	2.3204	-1.4768	2.2648	2.3047
	[1.095]	[1.260]	[2.076]	[1.290]	[1.255]	[0.731]	[1.222]	[1.247]
dum97		0.0230***	0.0211***	0.0223***	0.0235***	0.0210***	0.0224***	0.0215***
		[6.390]	[5.966]	[6.037]	[6.208]	[5.823]	[5.913]	[5.361]
dum98		0.0303***	0.0286***	0.0322***	0.0307***	0.0286***	0.0298***	0.0291***
		[8.573]	[8.336]	[9.100]	[8.458]	[8.111]	[8.146]	[7.710]
dum99		0.0325***	0.0346***	0.0355***	0.0327***	0.0309***	0.0318***	0.0315***
		[9.302]	[10.213]	[10.057]	[9.300]	[8.877]	[8.579]	[8.557]
dum00		0.0141***	0.0155***	0.0150***	0.0143***	0.0133***	0.0135***	0.0136***
		[3.993]	[4.578]	[4.224]	[3.998]	[3.808]	[3.663]	[3.799]
dum01		-0.0015	0.0002	-0.0005	-0.0015	-0.0024	-0.0016	-0.0014
		[0.422]	[0.070]	[0.150]	[0.435]	[0.682]	[0.449]	[0.410]
dum02		-0.0118***	-0.0110***	-0.0112***	-0.0119***	-0.0124***	-0.0118***	-0.0113***
		[3.360]	[3.275]	[3.175]	[3.374]	[3.544]	[3.361]	[3.152]
Tier1			-0.0699					
			[1.050]					
Tier1^2			0.3198**					
			[2.005]					
Leverage(-1)				-0.2181***				
				[3.204]				
Leverage(-1)^2				1.2287***				
				[5.829]				
CR5					0.0141			
					[0.508]			
MS*HHI						-0.6469***		
						[4.497]		
ForeignAss							-0.015	
							[0.510]	
ForeignPres								-0.0913
								[0.863]
Observations	1210	1210	858	1171	1210	1210	1210	1210
Nr. of Countries	15	15	15	15	15	15	15	15
R-squared within	0.117	0.293	0.332	0.294	0.293	0.305	0.294	0.294

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Regression Results: Controlling for Diversification

	(1) MTBNA	(2) MTBNA	(3) MTBNA	(4) MTBNA	(5) MTBNA	(6) MTBNA
Constant	1.1309***	1.1110***	1.1112***	1.1571***	1.1783***	1.0956***
	[55.823]	[57.202]	[57.196]	[57.837]	[56.859]	[55.079]
Leverage	-0.6428***	-0.6714***	-0.7007***	-0.4838***	-0.4644***	-0.6435***
	[6.288]	[6.840]	[6.649]	[4.784]	[4.610]	[6.552]
(Leverage)^2	2.8170***	2.6522***	2.7787***	2.1332***	2.0181***	3.0419***
	[6.657]	[6.564]	[6.363]	[5.036]	[4.776]	[7.507]
Market Share	0.0441***	0.0368***	0.0361***	0.0326**	0.0320**	0.0370***
	[3.315]	[2.932]	[2.862]	[2.565]	[2.535]	[2.944]
HHI	0.0062	0.0213	0.0236	0.0483	0.0364	0.0663
	[0.088]	[0.325]	[0.360]	[0.747]	[0.566]	[1.031]
X-Inefficiency	-0.0320***	-0.0425***	-0.0435***	-0.0444***	-0.0388***	-0.0339***
	[3.923]	[5.451]	[5.501]	[5.459]	[4.707]	[4.341]
Size	-0.8686**	-0.7854**	-0.7923**	-0.7315**	-0.6846**	-0.4391
	[2.545]	[2.404]	[2.424]	[2.189]	[2.058]	[1.307]
Size^2	1.5939	1.4603	1.445	0.6136	0.728	-0.6895
	[0.853]	[0.819]	[0.810]	[0.335]	[0.399]	[0.375]
OBS	0.0005					
	[0.699]					
DIV		0.0946***	0.1110***			
		[10.215]	[4.747]			
DIV^2			-0.0223			
			[0.765]			
LTA				-0.0500***	-0.1747***	
				[6.786]	[5.032]	
LTA^2					0.1165***	
					[3.674]	
TypeComm						0.0190***
						[8.165]
Observations	1142	1196	1196	1210	1210	1210
Number of Countries	15	15	15	15	15	15
R-squared within	0.29	0.349	0.349	0.32	0.328	0.331

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 5: Regression Results: Controlling for Profitability and Risk

	Panel A: Profitability			Panel B: Risk	
	(1)	(2)	(3)	(4)	(5)
	MTBNA	MTBNA	MTBNA	MTBNA	MTBNA
Constant	1.1175***	1.1239***	1.1197***	1.1172***	1.1715***
	[57.945]	[55.623]	[51.983]	[55.396]	[48.752]
Leverage	-0.7243***	-0.6166***	-0.6862***	-0.5891***	-0.7296***
	[7.409]	[6.102]	[6.116]	[5.829]	[6.558]
(Leverage)^2	2.5280***	2.8708***	3.1355***	2.7388***	3.2212***
	[6.279]	[6.892]	[6.889]	[6.563]	[7.220]
Market Share	0.0296**	0.0374***	0.0378***	0.0365***	0.0535***
	[2.369]	[2.897]	[2.925]	[2.838]	[3.908]
HHI	0.0796	0.0377	0.0253	0.0339	0.058
	[1.251]	[0.563]	[0.384]	[0.516]	[0.643]
X-Inefficiency	-0.0065	-0.0282***	-0.0303***	-0.0323***	-0.0527***
	[0.799]	[3.490]	[3.787]	[4.024]	[5.639]
Size	-1.2250***	-0.9418***	-0.8033**	-0.8036**	-1.3160***
	[3.743]	[2.779]	[2.212]	[2.368]	[3.207]
Size^2	3.8549**	2.1663	1.589	1.3158	4.3982**
	[2.156]	[1.169]	[0.820]	[0.708]	[2.006]
ROAA	0.0143***			0.0228***	
	[9.608]			[3.238]	
AvgRET		0.0044			-0.0019***
		[1.289]			[3.161]
NIM			0.0015		
			[1.268]		
Observations	1210	1205	1210	1205	895
Number of Countries	15	15	15	15	14
R-squared within	0.345	0.296	0.294	0.302	0.326

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 6: Regression Results: Controlling for Regulation and Supervision

	(1)	(2)	(3)	(4)	(5)	(6)
	MTBNA	MTBNA	MTBNA	MTBNA	MTBNA	MTBNA
Constant	1.1327***	1.1290***	1.1433***	1.1363***	1.1421***	1.1469***
	[30.652]	[53.543]	[44.728]	[52.318]	[52.849]	[57.053]
Leverage	-0.6237***	-0.6239***	-0.6201***	-0.6241***	-0.6174***	-0.7451***
	[6.178]	[6.182]	[6.141]	[6.186]	[6.117]	[7.287]
(Leverage)^2	2.9005***	2.9006***	2.8888***	2.8939***	2.8821***	3.3244***
	[6.971]	[6.971]	[6.941]	[6.955]	[6.930]	[7.952]
Market Share	0.0378***	0.0379***	0.0374***	0.0382***	0.0361***	0.0287**
	[2.926]	[2.928]	[2.890]	[2.956]	[2.782]	[2.137]
HHI	0.0234	0.0216	0.0246	0.0286	0.0419	0.0101
	[0.352]	[0.327]	[0.374]	[0.431]	[0.624]	[0.149]
X-Inefficiency	-0.0304***	-0.0304***	-0.0307***	-0.0302***	-0.0308***	-0.0387***
	[3.791]	[3.790]	[3.824]	[3.770]	[3.846]	[4.671]
Size	-0.9690***	-0.9671***	-0.9850***	-0.9628***	-0.9905***	-1.1072***
	[2.858]	[2.848]	[2.905]	[2.842]	[2.925]	[3.253]
Size^2	2.3214	2.3092	2.435	2.2724	2.5122	3.1382*
	[1.254]	[1.245]	[1.314]	[1.228]	[1.357]	[1.664]
AvgTrading						0.0167***
						[3.086]
Regulation					-0.0054	
					[1.463]	
PropertyRights				-0.0046		
				[0.740]		
EconFreedom			-0.0061			
			[0.839]			
BankFreedom		0.0004				
		[0.135]				
KKZ	-0.002					
	[0.089]					
Observations	1210	1210	1210	1210	1210	1144
Number of Country	15	15	15	15	15	14
R-squared	0.293	0.293	0.294	0.294	0.295	0.314

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 7: Regression Results: Controlling for the Macroeconomic Environment

	(1) MTBNA	(2) MTBNA	(3) MTBNA	(4) MTBNA	(5) MTBNA	(6) MTBNA	(7) MTBNA	(8) MTBNA	(9) MTBNA	(10) MTBNA
Constant	1.1298***	1.1248***	1.1327***	1.2090***	1.1219***	1.1269***	1.1295***	1.1624***	1.1253***	1.1208***
	[56.497]	[53.596]	[54.598]	[57.316]	[48.829]	[47.344]	[55.284]	[55.732]	[50.044]	[47.747]
Leverage	-0.6240***	-0.7100***	-0.6259***	-0.7769***	-0.6200***	-0.7582***	-0.6239***	-0.7873***	-0.6857***	-0.6209***
	[6.183]	[6.636]	[6.194]	[7.217]	[6.135]	[6.815]	[6.182]	[7.273]	[6.605]	[6.134]
(Leverage)^2	2.8999***	3.2578***	2.9008***	3.3412***	2.8900***	3.4878***	2.9016***	3.5210***	3.1113***	2.8780***
	[6.969]	[7.374]	[6.969]	[7.500]	[6.943]	[7.610]	[6.972]	[7.871]	[7.267]	[6.899]
Market Share	0.0380***	0.0482***	0.0378***	0.0468***	0.0377***	0.0456***	0.0378***	0.0518***	0.0456***	0.0378***
	[2.933]	[3.516]	[2.923]	[3.381]	[2.917]	[3.197]	[2.926]	[3.726]	[3.424]	[2.914]
HHI	0.0221	0.0702	0.0245	-0.0039	0.0242	0.0429	0.0243	0.0522	0.1162*	0.0267
	[0.336]	[1.024]	[0.371]	[0.056]	[0.367]	[0.598]	[0.359]	[0.750]	[1.730]	[0.392]
X-Inefficiency	-0.0305***	-0.0314***	-0.0305***	-0.0330***	-0.0304***	-0.0305***	-0.0303***	-0.0295***	-0.0315***	-0.0307***
	[3.797]	[3.681]	[3.798]	[3.831]	[3.787]	[3.448]	[3.777]	[3.409]	[3.821]	[3.811]
Size	-0.9706***	-0.9732***	-0.9781***	-1.2840***	-0.9631***	-1.0720***	-0.9697***	-1.1792***	-1.0308***	-0.9747***
	[2.866]	[2.700]	[2.884]	[3.533]	[2.843]	[2.862]	[2.863]	[3.228]	[2.950]	[2.871]
Size^2	2.3237	1.776	2.3599	2.9859	2.3066	2.1012	2.3251	2.2706	2.2051	2.3534
	[1.256]	[0.902]	[1.275]	[1.501]	[1.247]	[1.027]	[1.257]	[1.136]	[1.156]	[1.270]
Stock market index							0.0018	0.0760***	0.0552***	-0.0027
							[0.109]	[8.594]	[5.994]	[0.156]
Long Term Interest Rate					0.1713	0.5963***			0.3457**	0.3294
					[0.711]	[4.188]			[2.298]	[1.123]
Inflation			-0.0959	-1.5581***					-0.7910***	-0.2108
			[0.483]	[9.457]					[4.003]	[0.897]
GDP growth	0.0335	0.9430***							0.6698***	0.0395
	[0.224]	[10.586]							[6.461]	[0.245]
	Time dummies included		**Time dummies included**		**Time dummies included**		**Time dummies included**			**Time dummies included**
Observations	1210	1210	1208	1208	1210	1210	1210	1210	1208	1208
Number of Countries	15	15	14	14	15	15	15	15	14	14
R-squared within	0.293	0.193	0.294	0.179	0.294	0.13	0.293	0.169	0.248	0.294

Absolute value of t statistics in brackets

* significant at 10%; ** significant at 5%; *** significant at 1%

Appendix A: Incidence of Listed Banks over Time and Country

	1997	1998	1999	2000	2001	2002	2003	All Periods
Austria	4	6	6	6	6	6	6	40
Belgium	6	5	3	3	3	3	3	26
Denmark	42	42	41	41	40	38	35	279
Finland	4	3	3	2	2	2	2	18
France	17	17	21	21	20	20	19	135
Germany	16	16	16	18	14	14	13	107
Greece	9	10	10	10	10	10	10	69
Ireland	3	4	4	4	4	4	3	26
Italy	25	27	32	35	32	32	27	210
Luxembourg	1	1	0	0	0	0	0	2
Netherlands	5	5	6	5	4	4	4	33
Portugal	7	9	9	6	4	4	4	43
Spain	17	16	16	15	16	16	15	111
Sweden	3	3	4	4	4	4	4	26
UK	12	12	12	13	12	12	12	85
All Countries	171	176	183	183	171	169	157	1210

Appendix B: Variables employed in the Model Estimation

	Mean	Std Dev	5th Percentile	25th Percentile	50th Percentile	75th Percentile	95th Percentile
			Dependent variable				
MTBNA	1.035	0.052	0.957	1.004	1.028	1.059	1.135
			Baseline Specification				
Market Share	0.071	0.130	0.000	0.002	0.009	0.078	0.372
HHI	0.070	0.050	0.015	0.026	0.055	0.112	0.152
X-Inefficiency	0.642	0.130	0.404	0.576	0.650	0.718	0.844
Size	0.089	0.025	0.048	0.071	0.089	0.108	0.130
Leverage	0.079	0.043	0.029	0.047	0.065	0.108	0.159
			Baseline Specification: Robustness				
Tier1	0.098	0.048	0.054	0.070	0.084	0.113	0.183
Leverage(-1)	0.078	0.044	0.029	0.047	0.066	0.107	0.158
Cr5	0.468	0.193	0.200	0.280	0.450	0.670	0.760
ForeignAss	0.139	0.136	0.041	0.056	0.093	0.160	0.505
ForeignPres	0.084	0.090	0.009	0.020	0.042	0.153	0.218
			Diversification				
OBS	0.388	1.409	0.032	0.109	0.207	0.346	1.375
DIV	0.215	0.130	0.043	0.146	0.202	0.257	0.419
LTA	0.594	0.149	0.340	0.511	0.600	0.700	0.814
TypeComm	0.687	0.464	0	0	1	1	1
			Profitability				
ROAA	0.923	0.892	0.090	0.443	0.770	1.170	2.220
AvgRET	0.139	0.334	-0.360	-0.053	0.122	0.318	0.690
NIM	3.099	1.666	0.865	1.940	2.780	4.060	6.436
			Risk				
AvgVOL	0.269	0.163	0.095	0.154	0.230	0.337	0.579
LLR	3.234	2.171	0.410	1.735	2.760	4.280	7.786
			Regulation and Supervision				
KKZ	1.426	0.352	0.861	1.199	1.562	1.756	1.829
BankFreedom	2.174	0.750	1	2	2	3	3
EconFreedom	2.214	0.277	1.79	2.03	2.24	2.34	2.79
PropertyRights	1.490	0.532	1	1	1	2	2
Regulation	2.607	0.568	2	2	3	3	3
AvgTrading	0.046	0.206	0.00000	0.00002	0.00041	0.00395	0.18673
			The Macro-Economic Environment				
GDP Growth	0.025	0.016	0.004	0.016	0.025	0.034	0.045
Inflation	0.021	0.009	0.006	0.015	0.020	0.026	0.036
Long Term Interest Rate	0.052	0.008	0.042	0.047	0.050	0.056	0.064
Stock Market Index	0.050	0.113	-0.112	-0.045	0.053	0.131	0.229

Note: Definitions of the variables are explained in the text in the section they appear for the first time.