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WORKING PAPER

Does the stock market value bank diversification?

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August 2006

2006/402

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Abstract

This paper investigates whether or not functionally diversified banks have a comparative advantage in terms of long-term performance/risk profile compared to their specialized competitors. To that end, this study uses market-based measures of return potential and bank risk. We calculate the franchise value over time of European banks as a measure of their long-run performance potential. In addition, we measure risk as both the systematic and the idiosyncratic risk sensitivities derived from a bank stock return model. Finally, we analyze the return/risk trade-off implied in different functional diversification strategies using a panel data analysis over the period 1989-2004. A higher share of non-interest income in total income affects banks' franchise values positively. Diversification of revenue streams from distinct financial activities increases the systematic risk of banks while the effect on the idiosyncratic risk component is non-linear and predominantly downward-sloping. These findings have conflicting implications for different stakeholders, such as investors, bank shareholders, bank managers and bank supervisors.

Keywords: Second Banking Directive, diversification, bank stock returns, charter value, risk factors

JEL: G21, G28, L25.

*We thank Jan Annaert, Mark Flood, Philip Molyneux, Steven Ongena, Maria Fabiana Penas, two anonymous referees and participants in the SUERF/NIESR seminar on 'Deregulation and Integration in European Banking', the European Banking Symposium (Milan), the 2006 FMA European Conference (Stockholm) for helpful comments and discussions. Financial support from the European Commission: DG Research in cooperation with DG ECFIN and DG ESTAT (Contract No. SCS8-CT-2004-502642) is gratefully acknowledged. De Jonghe is Research Assistant of the Fund for Scientific Research - Flanders (Belgium) (F.W.O.-Vlaanderen). Vander Vennet acknowledges financial support from the Federal Public Planning Service Science Policy, Interuniversity Attraction Poles Program Contract No. P5/21.

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1 Introduction

The Second Banking Directive of 1989 has allowed European banks to pursue functional diversification across activities such as commercial banking, investment banking, insurance and other financial services. This has resulted in a large degree of cross-sectional variation in the diversification strategies pursued by European banks. Some banks have elected to remain focused on intermediation in the retail market, whereas others have become full-blown financial conglomerates. The research question we address in this paper is: Do financial conglomerates possess a comparative advantage in terms of return/risk profile?

In order to answer this question, we analyze the long-term performance and riskiness of banks with different degrees of functional diversification using stock market data. We prefer capital market data to accounting data because equity prices are forward-looking and hence better identifiers of prospective performance and risks associated with different strategic choices. As a measure of long-term potential value, we use a modified version of Tobin's Q. This measure captures the market's expectation of future profits, but we control for valuation inefficiencies. At the risk side, we estimate an extended version of the market model to decompose total bank risk into a systematic and an idiosyncratic component. While well diversified investors are mainly interested in the systematic risk incorporated in the bank equity returns, regulators, bank managers, large stakeholders, and bank customers also care about idiosyncratic and total volatility. Finally, we quantify the effect of diversification on both risk and return in a panel study for a large set of European banks over the period 1989-2004.

In this paper, we focus on the European banking sector. Previous evidence on this matter is predominantly US oriented (see e.g. Demsetz and Strahan (1997) and Stiroh (2005, 2006)). In our opinion, however, Europe offers a more fertile ground for investigating the effect of diversification on the risk/return trade-off of banks. Historically, US banks have been confronted with legal restrictions prohibiting their entry in non-banking activities (Glass-Steagall Act). In 1999 the Gramm-Leach-Bliley Act came into force, permitting banks to pursue broader diversification in Financial Holding Companies. In Europe, the scope for functional diversification has been deregulated earlier and more completely. The Second Banking Coordination Directive, enacted in 1989, was intended to create a level playing field for bank competition by introducing a single banking license, by allowing free cross-border servicing and establishment, and by introducing common regulatory and supervisory standards. But the Directive also laid the groundwork for functional diversification of European banks. Since then, banks are allowed to operate broad franchises, combining commercial banking, securities, insurance and other financial activities in a conglomerate organizational form. In subsequent years, this regulatory framework was extended with regulation aimed at the

harmonization of areas such as investment services, insurance, capital adequacy and the prudential supervision of financial conglomerates. Hence, not only can European banks engage in a wider range of activities than their US counterparts, they have also been able to do this for a longer period of time. This should enable us to distinguish banks that have pursued different functional diversification strategies for a sufficiently long time span. Consequently, our empirical analysis covers the 15-year period since the Second Banking Directive of 1989.

The findings in this paper suggest that the relationship between diversification and bank risk and return is different in Europe relative to other developed markets, notably the US. First, we find a positive relationship between franchise value and the degree of functional diversification. Apparently, the stock market anticipates that functional diversification can improve future bank profits. This observation differs from the one reported by Stiroh (2006) for the US and Laeven and Levine (2006) for a set of 43 developed markets. Second, we find a non-linear relationship between diversification and bank-specific risk (total risk). Most banks are located on the downward-sloping part of the relationship. For these banks diversification can actually decrease idiosyncratic risk (total risk), which will make them safer since it reduces their probability of default. This finding differs from that reported for US banks by Stiroh (2005, 2006). He concludes that diversified banks are more risky, measured as return volatility. We do confirm the finding of Stiroh (2006) that banks that rely more on non-interest sources of income have systematically higher market betas and hence higher systematic risk. We discuss a number of implications for different bank stakeholders. Diversified investors are primarily interested in systematic risk exposures, since they can construct a portfolio in which idiosyncratic risk exposures are diversified away. Large shareholders in one bank are by definition bank-dependent. They should mainly consider idiosyncratic risk, similar to borrowers and customers. Finally, bank supervisors care about bank sector stability. Hence they are interested in both bank-specific risk, which may cause contagion effects, and systematic risk of banks.

2 The impact of functional diversification on return and risk

Banks are allowed to diversify functionally. They can combine commercial banking, securities, insurance and other financial activities in a conglomerate organizational form. From a regulatory perspective, a financial institution is considered to be a conglomerate (and is treated as such for supervisory purposes) when it combines at least two of three financial activities: banking, securities-related activities, or insurance. In practice, researchers look at the sources of non-interest income to measure the extent of functional diversification of bank activities. Non-interest income effectively captures all income streams that functionally diversified banks generate by providing a broad array

of financial services, ranging from underwriting and distributing securities, underwriting and distributing insurance policies, securitizing assets, selling mutual funds to providing payments and cash-related services.

What are the potential advantages functionally diversified banks have over their specialized peers in terms of long-run profitability? From the profit dimension, the question is whether or not the benefits of conglomeration exceed the costs¹. First, the formation of financial conglomerates would be beneficial if there are positive cost and/or revenue effects from combining various financial services activities. Consolidated revenues would be improved if the income-generating capacity of the combined institutions is enhanced. Similarly, the operating costs of financial conglomerates would be lower relative to specialized banks if integration leads to operational synergies, e.g., through economies of scope. The sharing of inputs such as labour, technology and information across multiple outputs constitutes the major source of such potential cost savings. Second, banks possess information from their lending relations that may facilitate the efficient provision of other financial services, including securities underwriting or insurance. Similarly, information acquired through securities or insurance underwriting can improve loan origination and credit risk management. Thus, financial conglomerates could enjoy economies of information that boost performance and market valuations. Third, the potential for functional diversification may improve corporate governance through the working of the takeover market. When cross-activity mergers are allowed, managers of financial firms incur stronger monitoring by the takeover market (Saunders, 1994).

On the cost side, agency costs may arise due to the complexity of the conglomerate organization. Diversification of activities in a conglomerate structure could intensify agency problems, between insiders and outsiders, but also between the divisions of the conglomerate and between the conglomerate firm and its customers in the form of conflicts of interest. Managers may pursue diversification to enhance their ability to extract private benefits, even when diversification would lower the market value (Jensen and Meckling, 1976). The question is whether or not internal mechanisms can be designed to align interests or whether external discipline can alleviate some of the agency problems. In addition, on the costs side, regulatory costs associated with multiple supervision can be invoked.

Theoretically it is unclear whether or not the potential benefits of functional diversification are larger than the costs. Empirically, due to econometric difficulties and data limitations, it has proven to be very difficult to assess the actual impact of economies of scope or agency costs in banking. Similar disagreement exists in the literature on conglomeration in non-financial corporations (e.g. Berger and Ofek, 1995 and Villalonga, 2004). Berger and Ofek (1995) also report that, although industry diversification reduces value on average, relatedness mitigates the value loss.

¹ Useful surveys can be found in De Young and Roland (2001), Stiroh (2004) or Laeven and Levine (2006).

Arguably, the activities undertaken in financial conglomerates have a higher degree of similarity than in most other industries. In an event study of European financial mergers, Cybo-Ottone and Murgia (2000) report that abnormal returns are higher in cross-product deals than in horizontal bank mergers. On the efficiency side, Vander Venet (2002) finds that financial conglomerates in Europe are more cost efficient than specialized banks. However, the cost advantage does not translate into a significant advantage in terms of profit efficiency. Using Tobin's Q, Laeven and Levine (2006) find a diversification discount in financial conglomerates across 43 countries. Their results are consistent with the argument that diversification intensifies agency problems in financial conglomerates with adverse implications for market values. Apparently, these diversification costs outweigh any benefits accruing from economies of scope. DeLong (2001) obtains that bank mergers that focus in terms of activity and geography enhance stockholder value, whereas mergers that induce more functional diversification do not create value.

The theoretical predictions are less clear with respect to the riskiness of financial conglomerates vis-à-vis specialized banks. From the risk dimension, standard portfolio theory predicts that the combined cash flows from non-correlated revenue sources should be more stable than the constituent parts. Securities and insurance activities have the potential to decrease conglomerate risk, but the effect largely depends on the type of diversifying activities that bank holding companies undertake (Kwan and Laderman, 1999).

Studies using accounting data suggest that an increased reliance on non-interest income raises the volatility of accounting profits without raising average profits. DeYoung and Roland (2001) and Stiroh (2004) find little gains from the shift towards more diversified banks in the US. Stiroh and Rumble (2005) conclude that diversification benefits exist in Financial Holding Companies, but the gains are offset by the increased exposure to non-interest activities, which are much more volatile, while not more profitable, than interest-generating activities. The US results based on equity data arrive at a similar conclusion. For a sample of US banks over the period 1997-2004, Stiroh (2006) finds no link between non-interest income exposure and average returns across banks, but a significant positive link between non-interest income and the volatility of market returns. He concludes that some banks may have over-extended in diversifying activities.

3 Data

This study uses data on listed banks from 17 European countries (EU15, Norway and Switzerland) over the period 1989-2004. The sample period starts in 1989, the year in which the Second Banking Coordination Directive laid

the groundwork for functional diversification of European banks. The sample covers the 15-year period following the deregulation and should allow us to detect long-term effects of diversification on bank performance and risk. The time frame of the sample also ensures that it contains periods with different business cycle and stock market conditions. Since listed banks are usually relatively large, the banks in the sample account for the majority of total assets of the European banking industry². The dataset contains 255 banks. The panel dataset is unbalanced due to delistings (e.g., caused by mergers and acquisitions). We account for a potential survivorship bias by also including stocks of banks that have been delisted.

Annual data from bank balance sheets and income statements are obtained from the Bankscope database maintained by Fitch/Bureau Van Dijk. End-of-year market capitalization data and daily stock market returns are obtained from Datastream. For the estimation of bank risk we employ daily stock returns, hence it is important to account for liquidity considerations³. Since stocks that are traded infrequently may yield uninformative returns, we disregard a year of stock market data for a particular bank if more than 15% of the bank's daily stock returns in that year are zero. As a result, we eliminated 112 banks, all of them are relatively small⁴ local savings banks (predominantly from Denmark, France and Norway). In the bank stock return model, we use market returns, interest rates, and exchange rates; they are taken from Datastream. The final panel dataset contains 143 banks and covers over 1200 bank-year observations.

4 Bank franchise value and bank risks

The objective of the paper is to assess the impact of diversification on the long-run performance and riskiness of European banks. In the next two subsections, we describe the measurement of both the performance and the risk indicators. We use the bank's franchise value, measured as the adjusted Tobin's Q, as the proxy for its performance potential. Various return-based risk indicators are obtained by decomposing the total volatility of each bank's stock

²Using only listed banks may affect the country-specific coverage. In general the listed banks in the sample cover more than 90% of the assets in the national banking market. For Germany this is much lower. However, even for Germany we do have a mix of listed banks with varying levels of functional diversification, which is the focus of our paper. Moreover the majority of non-listed German banks are small savings banks with very low levels of diversification. Since we do have listed savings banks with similar features (but from other countries) in the sample, we do not think that the relatively weaker coverage of German banks will bias the results.

³We use daily instead of weekly data because Merton (1980) and Nelson (1992) showed that sufficiently high-frequency data is necessary to accurately measure historical volatilities. Problems of asynchronous trading are relatively limited given our exclusive focus on Europe. By only selecting sufficiently liquid bank stocks, we alleviate potential biases in our beta estimates due to autocorrelated returns.

⁴These 112 small, local savings banks contribute less than 5% to the total market capitalization of the initial sample of 255 listed banks.

return into a systematic and idiosyncratic risk component.

4.1 Long-run performance measure: bank franchise value

If a bank possessed comparative advantages that have a positive impact on its long-term performance, this should be reflected in its franchise value. The franchise value of a bank is equal to the present value of the current and future profits that a bank is expected to earn. A number of studies, following Keeley (1990), have used Tobin's Q as a proxy for bank franchise value. Tobin's Q is the ratio of the market value of a bank divided by the replacement costs of the bank's assets. This ratio has the advantage of permitting comparability across banks of all sizes. However, the Q ratio has two potential shortcomings. Bank managers may not maximize the value of the firm when there is a separation between ownership and control. That is, bank managers may not achieve the highest potential market value of their assets given their operating and investment decisions. They may, e.g., pursue a suboptimal degree of diversification. 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. Furthermore, measurement error and (bad) luck may have an effect on the market-to-book ratio of bank assets.

To obtain a long-run performance measure that overcomes these drawbacks, we follow Hughes et al. (1999) and De Jonghe and Vander Vennet (2005) and estimate the following stochastic frontier model:

$$\ln(MVA_{i,t}) = \beta_0 + \beta_1 \ln(BVA_{i,t}) + \beta_2 (\ln(BVA_{i,t}))^2 + \varepsilon_{i,t} \quad (1)$$

We opt for a translog specification when fitting a stochastic upper envelope for banks' market values (MVA) using the book value of banks' assets (BVA). The composite error term, $\varepsilon_{i,t}$, is the sum of statistical noise, $v_{i,t} \sim iid N(0, \sigma_v^2)$, and systematic time-varying departures (shortfalls, market value inefficiencies), $u_{i,t}$, from the translog production frontier (Battese and Coelli, 1995). The $u_{i,t}$'s are assumed to be independently and identically distributed and are obtained by truncation at zero (to capture non-negativity) of the $N(\mu, \sigma_u^2)$ distribution. From the estimation of a stochastic frontier model, we compute a noise-adjusted Q ratio, $Q_{i,t}^{NA}$. This measure of the franchise value can be written as:

$$Q_{i,t}^{NA} = \frac{\widehat{MVA}_{i,t}}{BVA_{i,t} * \exp(u_{i,t})} \quad (2)$$

\widehat{MVA} is the market value that banks would obtain if they were on the frontier (the fitted values of equation (1)).

$u_{i,t}$ are shortfalls from the frontier (market value inefficiencies). Hence, the noise-adjusted Tobin's Q is a function of market value inefficiency and the potential Tobin's Q ratio. As a result, the correlation (in absolute value) between $Q_{i,t}^{NA}$ and $u_{i,t}$ is very high, exceeding 0.90 on average.

Table 1 presents some summary statistics of our franchise value measure for each year of the sample period. There is considerable variation in the Q^{NA} ratio, both across banks and over time⁵. Average Q^{NA} increases gradually from 0.96 in the beginning of the nineties to its highest value of 1.058 in 1999. The evolution of the long-run performance measure mimics the overall macroeconomic conditions in the European Union over the sample period and the associated broad stock market trends. However, we control for the evolution of the overall stock market by using time dummies in the Q regressions and time-varying risk exposures in a market model. The maximum values of Q^{NA} exhibit a similar time pattern, with a maximum of 1.212 in 1999. The traditional (unadjusted) Tobin's Q ratio shows a comparable behaviour over time. In general, it exhibits a larger standard deviation compared to the Q^{NA} ratio as a result of outliers. Stochastic frontier analysis enables us to disentangle these outliers into a noise component and an exceptional performance (efficiency) part. Hence, we consider the adjusted Q ratio to be a more reliable indicator of long-term bank performance potential. The correlation between both performance measures (see bottom row of panel A of Table 1) fluctuates, and is on average 75% over the sample period.

< **Insert Table 1 around here** >

Potential Q (i.e. the charter value or the value of the bank assets in a competitive auction) measures the market value that a bank would obtain if it were on the frontier as a proportion of its book value, and fluctuates between 1.1 (in 1992) and 1.21 (in 1999). On average, a bank in the sample reaches about 89% of the market value at the frontier.

In Section 5 we use the Q^{NA} ratio to investigate the effect of functional diversification on banks' franchise values. Based on the existing empirical evidence (for the U.S. or a worldwide sample) we would expect that financial conglomerates are unable to systematically outperform their more specialized competitors. Stiroh (2006) finds for a panel of US bank holding companies over the period 1997-2004 that banks most reliant on activities that generate non-interest income do not earn higher average equity returns. In a panel of banks from 43 countries over the period 1998-2002, Laeven and Levine (2006) find that the Tobin's Q of financial conglomerates that have engaged in multiple activities is lower than if those institutions were broken into financial intermediaries that specialize in the individual

⁵To illustrate the economic importance of the variation, consider an average-sized bank with an average equity over total assets ratio. Starting from a long-run equilibrium, a market value of equity of 4, a book value of liabilities 56 and a book value of total assets of 60 implies that the Tobin's Q equals 1. Another bank with equal size and liabilities should have a market value of equity of 5.2 in order to achieve a Tobin's Q of 1.02. This corresponds to a 30% increase in the market capitalization of the bank.

activities⁶. However, the European banking landscape differs markedly from that in the US. European banks have been able to operate broad franchises for a longer time period and some banks have expanded into activities that have long been forbidden territory for US banks, e.g. insurance. Moreover, a number of European banks have integrated insurance activities or mutual fund distribution in their retail networks. This may have increased the acceptance of customers for one-stop shopping and may have enabled banks to extract reputational rents from these activities. In addition, European financial supervisors have a longer tradition of cooperation across functional areas and this may have alleviated agency costs both within conglomerates and vis-à-vis customers. As a result, we hypothesize that functional diversification may enable banks to realize long-term comparative performance advantages. Our hypothesis is that diversified banks will exhibit a higher long-term performance, measured with the adjusted Tobin's Q, than more specialized banks.

4.2 Decomposing Bank Risks

The next step is to identify and measure the relevant bank risks. According to the single index model, total firm risk can be decomposed in a systematic and a firm-specific component: $R_{i,t} = \beta_{i,t}R_{m,t} + e_{i,t}$, where $R_{i,t}$ and $R_{m,t}$ represent the excess returns on the individual firm and the market. $\beta_{i,t}$ is a measure of the firm's systematic risk (its market beta), and $e_{i,t}$ is a firm-specific shock. Given that $R_{m,t}$ and $e_{i,t}$ are orthogonal by construction, the total variance $\sigma_{i,t}^2$ is given by $\sigma_{i,t}^2 = \beta_{i,t}^2\sigma_{m,t}^2 + \sigma_{e,t}^2$, where $\sigma_{m,t}$ and $\sigma_{e,t}$ represent market and firm-specific (idiosyncratic) volatility. A number of authors have argued that the single index model should be extended to include other risk factors. Flannery and James (1984) show that the typical maturity mismatch between bank assets and liabilities causes bank stock returns to be exposed to interest rate shocks. Other studies have related bank stock returns also to unexpected inflation shocks (Dermine and Lajeri, 1999), exchange rate risk (Choi et al. 1992), or changes in the yield spread and the default spread (Demsetz and Strahan, 1997 and Stiroh, 2006). In this paper, we estimate the following specification:

$$R_{i,t} = \beta_{i,t}R_{m,t} + X_t'\gamma_{i,t} + Y_{i,t}'\lambda_{i,t} + e_{i,t} \quad (3)$$

where $R_{m,t}$ is the excess return on a broad European stock market index, X_t' is a $(k \times 1)$ vector of factor innovations common to all banks and countries, and $Y_{i,t}'$ a $(z \times 1)$ vector of country-specific factor innovations. X_t' includes the return on a German 10-year government bond index, the German term spread, and the US default spread⁷. $Y_{i,t}'$

⁶These studies use somewhat different measures of long-run performance (namely, returns or Tobin's Q). In the robustness section, we show, however, that our results are not due to the differences in the long-run performance measure.

⁷The German term spread is defined as the difference between the 10-year and 1-year German government bond yield. Given the thin European corporate bond market in the first half of the 1990s, we use the US default spread (yield difference between Moody's BAA and AAA) as an

contains instruments that are specific to the country in which the bank is headquartered; they include the return on the local stock market index, changes in the local exchange rate vis-à-vis the German Mark (euro after 1999) and local interest rate changes. All coefficients in equation (3) have a time subscript, i.e. they vary through time. We follow Bekaert et al. (2005) and Stiroh (2005, 2006), and estimate factor exposures and bank-specific volatility on a year-by-year basis using daily bank stock returns. The main advantage of this approach is that we can treat the exposures and residual volatilities as observable and hence use standard econometric methods to describe both their cross-sectional and time-series variation (see e.g. Campbell et al., 2001).

Equation (3) relates bank stock returns to a wide range of potential risk factors. For a number of reasons, our preferred return-generating model is the market model augmented with a European interest rate factor. First, Flannery and James (1984) showed that including an interest rate factor is economically meaningful for bank stocks and our results confirm that conjecture. Second, the adjusted R -squared is on average higher when including an interest rate factor. Third, adding the other (theoretically plausible) drivers of bank stock returns does not improve the fit of the return model (as measured by the adjusted R^2). Fourth, adding extra factors does not improve the capacity of the model to explain sample correlation between banks⁸.

Table 1 presents yearly averages for the market betas and for the total and idiosyncratic volatilities⁹. The average market beta over the 15-year period and across banks amounts to 0.61. We observe substantial time and cross-sectional variation in the bank betas. The average yearly idiosyncratic volatility is about 24%. Volatility is especially high in the period 1998-2000 (up to 34% in 1998), but drops substantially afterwards (down to 16% in 2004). Idiosyncratic volatility accounts on average for 91% of total risk, even though its importance has decreased slightly over time (from about 95% in 1989 to about 89% in 2004). As in previous studies, we find that larger banks have on average higher market betas and a higher proportion of their total volatility explained by market volatility.

When investigating the effect of diversification, we distinguish between various types of bank risk. Different stakeholders such as shareholders, managers or supervisors are interested in different types of risk. Total risk will be influenced by unanticipated changes in the underlying cash flows, i.e. bank profits, and discount rate shocks. Since

alternative. Results are qualitatively similar when – instead of German rates – we use the French long-term interest rate and term spread, or a GDP-weighted average of European long-term interest rates. Similarly, we find similar results when the post-1999 European default spread is used instead of the US default spread.

⁸Bekaert et al. (2005) compare competing factor models by their capacity to model the sample correlation between stock returns. We do find some added value from including exchange rate fluctuations in the early 1990s. However, the estimated values for the market betas and the idiosyncratic volatilities of the banks are largely unaffected.

⁹Although the interest rate factor is included in the market model, we disregard the interest rate beta in the remainder of the paper since the market beta contributes by far the most to the explained variation in bank stock returns.

diversified banks are more exposed to market-wide volatility, we expect their exposure to market risk (the market beta) to be higher. Moreover, a potential benefit for financial conglomerates is their ability for cross-selling, whereby multiple financial products are sold to similar customers. However, while this may increase revenues, they are also more likely to be exposed to the same type of shocks. Idiosyncratic volatility, on the other hand, should be lower since the effect of diversification is expected to operate primarily through the channel of bank-specific profits. Hence, our hypothesis is that the market risk of financial conglomerates will exceed that of specialized banks. Idiosyncratic risk is expected to be lower.

5 Does diversification pay?

5.1 Specification

The estimated risk and performance measures vary over the cross-section of banks and over time. To examine the impact of functional diversification on bank risk and potential return measures, we exploit the panel structure of the data. We estimate the following specification:

$$y_{i,j,t} = X_{i,j,t-1}^1 \beta_1 + X_{i,j,t-1}^2 \beta_2 + \sum_t \delta_t Year_t + \sum_j \delta_j Country_j + \varepsilon_{i,j,t} \quad (4)$$

The dependent variable $y_{i,j,t}$ is either the market-based measure of potential return (Q^{NA}) or each of the bank risks (systematic risk, measured by the market beta, β_M , idiosyncratic volatility, σ_ε , or total bank risk, σ_i). We include time fixed effects, $Year_t$, and country dummies, $Country_j$ to capture unobserved time and country heterogeneity. Standard errors are adjusted for heteroscedasticity by clustering at the bank-level. All explanatory variables are lagged one year to alleviate endogeneity. The vector X^1 contains the explanatory variables of interest, i.e. different indicators of functional diversification of bank activities. The construction of the diversification measures is described in Section 5.2. As control variables, X^2 , we include bank capital, cost inefficiency, loan loss provisions and bank size. Bank capital structure serves different purposes (e.g. signal of private information on future performance, inducing depositor discipline, reducing agency costs, a buffer to shocks, ...). The predicted relationship between capital and earnings (or riskiness) in the different hypotheses is not uniformly in the same direction (Berger, 1995). Moreover, the relative importance of the hypotheses varies with the level of capital. In order to capture this trade-off between the different roles of capital more adequately, we specify a quadratic functional form to allow the relationship between capital and return (or risk) to be non-monotonic (as in Demsetz and Strahan, 1997 and Berger and Bonaccorsi di Patti,

2006). Second, the cost-to-income ratio (i.e., the ratio of all operating expenses as a fraction of the sum of net interest and non-interest revenues) measures the operational efficiency of each bank. Efficient banks are expected to have a higher franchise value, while we expect no particular effect on bank risk. Third, bank stock investors and analysts are confronted with asymmetric information when they want to assess the quality of a bank's loan portfolio. One of the few observable signals about loan quality is the amount of loan loss provisions that management reserves to cover unexpected losses from bad loans. As a result, loan loss provisions are bank-specific signals of credit risk and those signals will affect the stock market assessment of the bank's riskiness. Hence, we expect that loan loss provisions will have a positive impact on bank-specific risk. Finally, we include (the log of) bank size to account for any remaining size-induced valuation effect. However, bank size is highly correlated with the other control variables, and, more important, with the measures of functional diversification. Therefore we orthogonalize bank size so that the residual of that regression can be interpreted as a pure size effect. We expect that larger banks will have higher market betas. The idiosyncratic risk could be lower, e.g., when the bank is considered to be too big to fail (Penas and Unal, 2004).

5.2 Measures of functional diversification

The construction of bank diversification measures is restricted by data availability. Disclosure requirements in Europe are such that only very few banks provide information on the different types of income generated by different business units. For our empirical analysis we adopt a pragmatic definition for the degree of functional diversification. We rely on one broad revenue and one asset-based measure of relative diversification that are publicly available and used by analysts and investors to assess the long-term potential and risk of a bank.

Our preferred measure of diversification is the ratio of non-interest income to total operating income. The higher the ratio the more a bank focuses on non-traditional bank activities. We prefer this measure because it effectively captures all the sources of non-interest income that diversified banks generate by providing a broad array of financial services, ranging from underwriting and distributing securities, underwriting and distributing insurance policies, securitizing assets, selling mutual funds to providing payments and cash-related services. The asset-based measure is the loan-to-asset ratio, which captures the proportion of loans relative to total assets. One should be careful not to interpret the loan-to-asset ratio as an alternative indicator of the reliance of a bank on interest income, since other types of assets such as securities also generate interest revenues.

Our objective is to assess the impact of bank diversification on bank return potential and risk. We measure diversification along a continuum from full specialization in traditional banking to full specialization in non-traditional banking. However, diversified banks may only benefit from increasing their reliance on non-interest generating activi-

ties up to a certain threshold. Therefore, we also include squared revenue -and asset-based measures of bank activities in our performance and risk regressions. This approach should allow us to identify the degree of diversification that the stock market perceives to be optimal in terms of risk and potential return.

Another way to accommodate this concern is to follow Laeven and Levine (2006) and construct measures of asset and revenue diversity. The asset diversity is based on stock variables and revenue diversity is based on flow variables. They are defined as follows: $Diversity = 1 - |2x - 1|$, where x is either the loan-to-asset ratio or the ratio of non-interest income to total operating income. The diversity variables take values between 0 and 1 and are increasing in the degree of diversification. However, this relies on the assumption that an equal division between lending and non-lending activities constitutes the optimal diversification mix. We use these diversity measures¹⁰ to check the stability of the results.

Summary statistics of the measures of functional diversification are presented in panel A of Table 2. The share of non-interest income in total operating income has increased from 10% in the beginning of the sample period to 25% in 2004¹¹. The dispersion in the non-interest revenue share across banks is large and has also increased substantially. This provides an indication of the extent to which different banks exhibit a diverging degree of diversification. The shift towards other banking activities is also reflected in the evolution of the mean and standard deviation of the revenue diversity measure.

< **Insert Table 2 around here** >

5.3 Results

Table 3 contains the results of the franchise value regressions. Banks with a higher share of non-interest income have, all else equal, a higher value of Q^{NA} . The coefficient on the non-interest income share measure is positive and significant at the 1% level (see Column 1 of Table 3) indicating that the market judges more diversified banks to have a higher return potential¹². An increase of this ratio by 0.13, which is the difference when a bank moves from

¹⁰Asset and revenue diversity (or concentration) are similar in spirit to the Hirschmann-Herfindahl index of concentration of asset activities or revenue streams. The use of the latter measure of activity concentration can be found in e.g. Stiroh and Rumble (2005), Hirtle and Stiroh (2005) and Acharya et al. (2006).

¹¹We use the ratio of gross non-interest income to gross total operating income. The ratio of net non-interest income to net total operating income is larger, but shows a similar picture over time. The level of the 'net' ratio increases from 25% in 1989 to a maximum of 40% in 2000. The evolution is similar to the one in the US.

¹²Using annualized returns, Stiroh (2006) does not find that US Financial Holding Companies with the largest share of non-interest income earn higher average equity returns.

the 25th to the 75th percentile, implies an economically meaningful increase in Q^{NA} by 0.012. The relationship is non-linear, since the coefficients of the non-interest income ratio and its squared value are both positive and jointly significant at the 1% level¹³. Hence, stock market investors anticipate that financial conglomerates are able to generate higher current and future profits. The finding of a revenue-based diversification benefit is confirmed by the significant positive relationship between the revenue diversity measure and the long-run performance measure (Column 5 of Table 3).

< **Insert Table 3 around here** >

This is consistent with the findings of De Jonghe and Vander Venet (2005) for a similar sample (over a shorter time period). The result is, however, in contrast to the conclusions of Laeven and Levine (2006) who obtain a diversification discount in financial conglomerates (for a worldwide sample). Since we use a similar measure of revenue diversity, the most probable explanation for the difference is the scope of the sample. The fact that diversified European banks have a longer track record and have committed sufficient operating and managerial resources to all these activities may explain the conviction that they will generate adequate profits. We find that asset-based diversification does not affect the long-run performance of European banks. None of the specifications yields significant coefficients for the loan-to-asset ratio. Hence, stock markets do not focus on the relative specialization of banks in lending; investors appear to base their valuations on the income potential of non-traditional revenue sources.

Concerning the control variables, we discover that well capitalized banks have higher franchise values. In addition, the relationship between the cost-to-income ratio and Q^{NA} is both statistically and economically significant. Firms with superior management or technology have lower costs and subsequently reap higher profits. Larger banks perform worse, everything else equal, than smaller ones. The conclusion of the franchise value regressions is that more diversified banks are closer to (or constitute) the estimated potential performance frontier. A diversified bank will, all else equal, be perceived as less market value inefficient than a specialized one.

Next, we turn to the interpretation of the regressions with market risk, idiosyncratic risk and total bank risk as the dependent variables, in that order. Table 4 presents the results for the determinants of market betas. All specifications reveal a positive relationship between diversification and market betas. A bank that is more oriented towards non-traditional banking activities (a lower loan-to-asset ratio or a higher non-interest revenue share) has a higher market beta. Moreover, a bank's market beta increases quadratically with the share of non-interest income in total income

¹³Since a variable is, in general, highly correlated with its squared term, the standard errors of the corresponding coefficients will be high due to multicollinearity. Therefore, we also present joint significance tests of the concerned variables.

(see Column 3 of Table 4). The results are both statistically and economically significant. For example, if the share of non-interest income in total operating income increases by 0.10¹⁴ (starting from the sample mean of 0.17), a bank's market beta increases by 0.106. The revenue and asset diversity measures confirm that diversified banks have higher systematic risk (as can be inferred from Columns 5 and 6 of Table 4). Consider the same example. An increase in the share of non-interest income by 0.10 induces an increase in the revenue diversity measure from 0.34 to 0.54. As a result the market beta increases by $0.20 * 0.62 = 0.124$. Stiroh (2006) also discovers a significantly positive relationship between the non-interest share and market betas for a sample of US Financial Holding Companies. These results are in line with expectations; more diversified banks have a higher exposure to changes in market sentiment (e.g., because of their reliance on investment banking) or economy-wide shocks.

< **Insert Table 4 around here** >

The relationship between the capital-to-asset ratio and β_{market} is non-linear in all specifications. The relationship reaches a minimum at a capital ratio of at least -depending on the specification- 16.3%. In other words, for the majority of banks in our sample (> 95% of the banks), a higher degree of capital adequacy lowers the systematic risk of the bank. This result is expected; a higher capital buffer offers protection against adverse market shocks and this is appreciated by the stock market. This underscores the function and the importance of capital adequacy regulation. Larger banks are also more exposed to systematic risk. Stiroh (2006) finds no effect for capital, but also discovers a positive effect of size on market betas. He argues that smaller banks are more likely to be influenced by local economic conditions, especially when they rely on local intermediation business (Stiroh, 2005 and Stiroh, 2006).

The corresponding results for idiosyncratic risk are presented in Table 5. The coefficient on the non-interest income share reveals that an increasing reliance on non-interest income decreases a bank's idiosyncratic volatility (see Column 2 of Table 5). However, this relationship is non-linear. Once a bank becomes too exposed to non-traditional banking activities, its bank-specific risk increases. This shift in the relationship occurs once the share of non-interest income exceeds 36% (as can be derived from the results in Column 3 of Table 5). Stock market investors believe that banks can reduce their idiosyncratic risk by diversifying their income sources, but only to a certain extent. Once banks become overly dependent on non-interest income, their bank-specific riskiness is judged to become larger. Stiroh (2006) finds a similar non-linear relationship for the US. He obtains that US Financial Holding Companies can reduce their idiosyncratic volatility by increasing their share of non-interest income as long as the ratio is below 16%.

¹⁴An increase of the non-interest income share with 0.10 is less than the observed increase in the average non-interest income share over the period 1989-2004 and is approximately the magnitude of the standard deviation of the cross-section of non-interest income shares.

In his sample, this implies that for the majority of banks, albeit the smaller ones, the relationship is downward sloping.

< **Insert Table 5 around here** >

From the results, we can also compute the relative volatility of (non-) interest income. Returns from non-interest income generating activities are almost twice as volatile as returns from activities that generate interest income. This difference is economically and statistically significant. This corroborates the findings of Stiroh (2005) for the US. The implied correlation between the two sources of income is 0.16, which is smaller than in the US. The low correlation is indicative for the large potential of diversification benefits. On the other hand, we find that the share of loans in total assets is not an important driver of idiosyncratic risk (Column 2 of Table 5). The revenue diversity measure confirms that a more equal reliance on lending versus non-lending activities reduces idiosyncratic banking risk. Note however that the diversity measure implies that an equal division of income sources is considered to constitute the optimal degree of diversification. Our estimates suggest that this may not be optimal from a bank-specific risk point of view. To illustrate the economic impact of revenue diversification on bank-specific risk; an increase in the share of non-interest income by 0.10 relative to the mean of 0.17 decreases idiosyncratic volatility by only 0.015. Hence, while the relationship is statistically significant, the economic impact seems rather small compared to the effect of revenue diversity on systematic risk.

For the control variables we find that cost inefficiency, measured by the cost-to-income ratio, is positively related to bank-specific risk. This effect is not predicted; it implies that banks with superior management skills or better technologies are perceived to be less risky. Presumably, investors are convinced that a higher efficiency will shelter banks from unexpected profit shocks. In accordance with expectations, banks with relatively high loan loss provisions exhibit higher bank-specific risk. When a bank has to announce higher loan loss provisions, this is consistently interpreted as bad news by the stock market (Docking et al., 1997). Idiosyncratic risk tends to fall with size. Recall that we construct a size measure that is orthogonal to all other bank-specific variables. Hence, being big lowers idiosyncratic risk, irrespective of the level of diversification. The negative relationship between size and a market-based measure of bank-specific risk is corroborated by the findings of Demsetz and Strahan (1997) and Stiroh (2006) for samples of US bank holding companies. We find that an increase in the capital ratio only reduces idiosyncratic bank risk if the capital-to-asset ratio is below 0.075 (approximately, depending on the specification). At very low capital levels, an increase in leverage may increase expected distress costs. This result is in line with the findings of Stiroh (2006). However, we notice that an increase in capital raises bank risk for already well capitalized banks (capital ratio above 7.5%).

Table 6 shows the results when total return volatility is treated as the dependent variable. Total return volatility can be decomposed into systematic risk and idiosyncratic volatility. Hence, the results for total bank risk will be driven by both underlying components. Since we report that these components are to a large extent determined by different bank-specific variables, the impact of, e.g., revenue diversity on total risk cannot be directly inferred from a bank's exposure to systematic and idiosyncratic risk. Table 6 shows that the non-interest income revenue share is significantly related to total risk. The relationship inherits its non-linear form from the idiosyncratic component. However, the non-interest income share at which total risk is minimized drops to 22% (it is 36% for idiosyncratic risk). This is due to the positive effect of the share of non-interest income on the market beta of a bank. Looking at the revenue diversity measure, we find the unexpected result that the effects on the underlying risk components cancel out at the aggregate level. Since the loan-to-asset ratio is insignificantly related to idiosyncratic risk, total bank risk exhibits the same negative relationship as in the case of market betas. Banks that rely less heavily on traditional lending activities have higher total risk. The regression of total risk on asset diversity confirms this finding (see Column 6 of Table 6).

< Insert Table 6 around here >

For bank size we obtain a diverging impact on systematic and bank-specific risk. Overall, bank size is positively related to total risk. Hence, the effect of the pure size measure on market beta dominates the size-idiosyncratic volatility relationship. The effects of the other variables are as expected since they work either in the same direction or are not significant in one of the components of total risk.

It might be that the determinants of risk and return are driven by portfolio considerations. Investors will require a reward in terms of higher returns for risk that cannot be diversified, which is captured by a bank's market beta. For diversified investors, idiosyncratic risk, on the other hand, should not be compensated by higher returns. As a result, it could be that the positive relationship between diversification and Q^{NA} is spurious and due to the positive effect of functional diversification on banks' market betas. We test this conjecture in different ways. First, when we include a bank's market beta, β_{market} , in the franchise value regression we discover indeed that a higher exposure to systematic risk is rewarded through higher returns. The coefficient of the market beta in the franchise value regression is significantly positive. More importantly, the coefficients of interest, those on the different measures of functional diversification, are still as significant as they are in the specifications reported in Table 3 (franchise value regressions). Their magnitude only drops slightly. Second, we specify systems of equations for the franchise value, Q^{NA} , and

market beta, β_{market} , measures and estimate these using the seemingly unrelated regression approach. This allows for simultaneity between the franchise value and systematic risk when investigating the impact of functional diversification on bank performance while also controlling for important other bank-specific factors (a similar set-up is used in e.g. Altunbas et al., 2006). The estimation results largely confirm the findings on diversification obtained in the above-mentioned check and the results reported in Table 3 and Table 4. This shows that the effects of diversification on performance and risk are predominantly ‘pure’ relationships that are qualitatively unaffected by the risk-return trade-off.

6 Robustness¹⁵

The first set of robustness checks is motivated from an economic point of view. The relationship between the diversification variables and return or risk could reflect a reverse causality story¹⁶ (Stiroh and Rumble, 2005). Banks with a low franchise value may want to boost their performance by expanding into riskier or more volatile activities. We redo the entire analysis for the sample of banks with a return on assets above the 10th percentile (0.18%) as well as for banks with a capital ratio above 3.33% (also the 10th percentile). Hence, we eliminate the most risky banks (from a profitability or capitalization perspective). For both subsamples, the results of the long-run performance measure and the market betas are very stable. Banks that diversify either on a revenue basis or an asset basis have higher systematic risk, whereas revenue diversity boosts a bank’s franchise value. Moreover, the relationship with the share of non-interest income is still non-linear and jointly significant. The least profitable banks have significantly lower diversity levels and higher idiosyncratic volatility. Leaving them out reduces the significance of the negative relationship between diversification and bank-specific risk. Overall, the vast majority of conclusions remain valid in both subsamples.

Even in the set of listed, frequently traded banks, there still is large variation in banks’ total assets. We check whether there are differential effects for large banks. When leaving out the 10% smallest banks, all conclusions remain unchanged. We also consider the subset of the 50% largest banks. Again, all effects of diversification on return potential and risk as described in the previous sections hold. In addition, we discover some additional effects

¹⁵In the interest of brevity, the regression results of the robustness checks are not reported in this paper but are available from the authors on request.

¹⁶Note that our right-hand side variables are lagged one period. However, if bank-specific data are somewhat rigid, lagging the variables will not be sufficient. We use a Granger causality test to check for reverse causality. We do not obtain unequivocal evidence of reverse causality, neither for a performance or risk measure nor for a given diversification variable. For reasons of clarity and uniformity, we perform the robustness checks on all diversification measures and all risk/return measures even if there is only weak statistical evidence for reverse causality.

for the asset diversity measure. Large banks with a more balanced asset composition have a lower idiosyncratic volatility. Surprisingly, they also have somewhat lower franchise values. Hence, while the first effect corroborates the effect of revenue diversity, the second works in the opposite direction. We conclude that the advantages or costs of diversification are not notably different for large and small banks.

We control for the effect of important mergers in the following fashion. We only include a bank-year observation if the growth in assets is moderate both in the current and previous year (as in Laeven and Levine, 2006). We define moderate changes in assets as all percentage changes between -5% and 30% . While large changes in assets may reflect other phenomena, it will also eliminate the effect of large mergers. We now have reduced the sample to approximately 800 bank-year observations. Overall, we obtain the same results. The conclusions with respect to the market betas and the franchise value are qualitatively unaffected. As for the 'profitable' subsample, we obtain that higher values of revenue diversity no longer imply lower idiosyncratic volatility. Banks that experienced a large asset growth in the previous or current year, exhibit a low level of revenue diversity and high idiosyncratic volatility. Hence, the corresponding growth in assets may be inspired by an incentive to increase diversification through non-related mergers or acquisitions.

In addition, we also perform a number of robustness checks that are more data -and specification-related. First, in the panel analysis the independent variables are lagged one year. Point estimates and significance are largely unaffected when performing the analysis with contemporaneous variables. Second, extreme outliers may drive the results. We redo the entire analysis using a winsorized sample. For each variable, we replace the values below (above) the 1st percentile (99th percentile) with the values from that percentile. All conclusions concerning the variables of interest and the control variables remain unchanged. Third, throughout the entire paper the revenue-based measures are based on the gross non-interest income share in gross total operating income. While the level of the net non-interest income ratio to net total operating income is higher, the evolution and the cross-sectional dispersion is very similar. Changing the definition of the revenue-based diversification measures alters the magnitude but not the level of significance of the estimated coefficients. Finally, we investigate the effect of diversification on long-run performance using the traditional Tobin's Q measure. Using Tobin's Q rather than Q^{NA} , we still obtain that stock market investors anticipate that banks with a diversified revenue stream will be able to gain higher current and future profits. Hence, the differences between our findings and those of Laeven and Levine (2006) are not driven by the use of a different long-run performance measure.

7 Conclusions

Should a bank maintain a narrow focus on lending or can banks be broader and offer an array of financial services? This long-standing debate has received renewed interest over the last decade. Both in the US (Gramm-Leach-Bliley Act 1999) and in Europe (Second Banking Directive 1989), important regulatory steps have been taken to expand the functional scope of banking institutions. As a result banks have pursued different strategies, from narrow intermediaries to broad financial services firms. In this paper we analyze whether diversified banks in Europe possess a systematic comparable advantage over specialized banks in terms of return potential and risk. Europe is an appropriate place to investigate this issue because deregulation has provided ample scope for functional diversification in banking since at least 1989 onwards.

We find a strongly positive relationship between franchise value and the degree of functional diversification. Apparently, the stock market anticipates that diversification of income sources has the potential to improve future bank profits. This means that, on average, the revenue and cost benefits of functional diversification are judged to exceed the costs of increased complexity and the associated agency costs. Obviously, the fact that we detect this effect in our European bank sample does not necessarily mean that unlimited diversification is optimal. Conclusions have to be made carefully because of differences in samples and methodologies, but our European evidence seems to conflict with results found in other developed economies, and notably the US. We argue that diversified European banks have been able to operate broader franchises and establish longer track records. Whether the anticipated gains from diversification can be transposed to other economies and regulatory jurisdictions remains a topic of further scrutiny.

On the risk side, we find a non-linear relationship between diversification and bank-specific risk. Hence, for some banks diversification can actually decrease idiosyncratic risk and make them safer. In our sample the relationship is predominantly downward-sloping, implying that most banks can reduce their risk by diversifying their revenues, although taking care that they do not exceed the optimal threshold. We argue that this feature could again be specific for the European case, since banks engage in a wider variety of activities, the returns of which are only moderately correlated in most periods. In the case of systematic risk, or the market beta, we confirm existing evidence that larger and more diversified banks have systematically higher market betas and hence higher systematic risk. This is not unexpected, the broader the exposure of banks to market or business cycle shocks, the higher the covariance with the market will be.

These results have a number of implications for different stakeholders. Investors that are able to diversify them-

selves, such as pension funds, are primarily interested in systematic risk exposures. In the case of listed European banks, they face a trade-off: expected returns (proxied by the Q ratio) may be higher, but they are associated with higher systematic risk (market beta). This reflects the classical return/risk trade-off. On the other hand, bank shareholders with large stakes and bank-dependent parties such as borrowers, customers or managers, should mainly care about idiosyncratic risk. For these parties, diversification seems to have a payoff in terms of reduced bank-specific risk, at least in the European case that we consider. However, too much reliance on non-interest types of revenues may make banks less safe, since the relationship is non-linear. Presumably, it will matter what types of diversifying activities the bank undertakes and how they interact with economy-wide shocks, but this is beyond the scope of this paper. Finally, regulators and bank supervisors care about bank sector stability, hence they are interested in both the systematic and the idiosyncratic risk of banks. Concerning the systematic part of risk, since large diversified banks tend to have higher market betas, these financial conglomerates need to be monitored carefully. The current European practice of combining different types of functional supervision in one financial sector supervisor seems more than appropriate.

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Table 1: Measurement of Q^{NA} and Decomposing banking risk: Summary statistics

Panel A of this table presents summary statistics on the noise-adjusted franchise value, the potential Tobin's Q of European banks and the correlation between the noise-adjusted Tobin's Q, Q^{NA} , and Tobin's Q. Panel B presents summary statistics on the decomposition of bank stock returns of European banks. This panel contains information on the market beta (β_{market}), and annualized idiosyncratic (σ_e) and total volatility (σ_T). The return-generating model is based on the traditional market model augmented with an interest rate factor. Factor exposures and bank-specific volatility are estimated on a year-by-year basis using daily bank stock returns. For each variable of interest, we present the mean, the standard deviation, the minimum and maximum in each sample year. We consider a sample of 143 listed banks active in the European Union (15 member states) and Norway and Switzerland in the period 1989-2004.

Europe (17 countries): 1989-2004																
Panel A																
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Tobin's Q^{NA}																
mean	0.9740	0.968	0.959	0.955	0.979	0.972	0.978	0.985	1.014	1.035	1.058	1.037	1.014	1.010	1.015	1.022
standard deviation	0.059	0.057	0.056	0.053	0.053	0.052	0.056	0.056	0.054	0.055	0.057	0.053	0.048	0.049	0.050	0.051
minimum	0.863	0.859	0.852	0.847	0.869	0.864	0.868	0.877	0.903	0.923	0.944	0.928	0.911	0.906	0.911	0.917
maximum	1.167	1.164	1.150	1.144	1.171	1.163	1.197	1.211	1.225	1.245	1.261	1.227	1.204	1.200	1.197	1.207
Potential Tobin's Q																
mean	1.113	1.107	1.098	1.094	1.122	1.115	1.122	1.129	1.161	1.186	1.212	1.189	1.165	1.161	1.166	1.174
standard deviation	0.027	0.026	0.027	0.026	0.027	0.027	0.028	0.028	0.028	0.027	0.027	0.025	0.022	0.022	0.021	0.021
minimum	1.071	1.067	1.059	1.054	1.079	1.074	1.078	1.087	1.119	1.145	1.170	1.151	1.131	1.127	1.133	1.141
maximum	1.175	1.172	1.170	1.155	1.188	1.178	1.204	1.218	1.232	1.259	1.275	1.239	1.214	1.209	1.215	1.222
Correlation(Tobin's Q^{NA} , Tobin's Q)																
	0.593	0.613	0.710	0.684	0.753	0.813	0.781	0.792	0.807	0.816	0.809	0.744	0.890	0.782	0.740	0.745
Panel B																
Market Beta (β_{market})																
mean	0.5091	0.6720	0.7135	0.5311	0.6391	0.5792	0.7059	0.6020	0.6439	0.8160	0.6126	0.3854	0.5689	0.5863	0.6168	0.6440
standard deviation	0.399	0.481	0.522	0.516	0.511	0.512	0.562	0.541	0.442	0.494	0.488	0.276	0.496	0.610	0.621	0.493
minimum	-0.545	-0.049	-0.233	-0.339	-0.226	-0.248	-0.181	-0.292	-0.139	-0.079	-0.209	-0.052	-0.096	-0.088	-0.174	-0.136
maximum	1.375	1.683	1.803	2.053	2.032	1.961	2.227	1.930	1.643	1.787	2.217	1.155	1.571	2.201	2.494	1.614
Idiosyncratic Volatility (σ_e)																
mean	0.213	0.258	0.220	0.257	0.252	0.225	0.197	0.195	0.256	0.336	0.276	0.288	0.246	0.246	0.220	0.161
standard deviation	0.088	0.149	0.109	0.151	0.139	0.094	0.084	0.093	0.102	0.116	0.105	0.103	0.085	0.091	0.091	0.058
minimum	0.071	0.073	0.037	0.071	0.085	0.057	0.045	0.038	0.057	0.073	0.063	0.056	0.057	0.044	0.054	0.044
maximum	0.513	0.847	0.701	0.915	0.845	0.455	0.439	0.605	0.671	0.709	0.631	0.569	0.588	0.543	0.636	0.354
Total Volatility (σ_T)																
mean	0.225	0.280	0.244	0.273	0.262	0.243	0.217	0.208	0.283	0.387	0.297	0.298	0.283	0.303	0.262	0.180
standard deviation	0.089	0.152	0.110	0.153	0.139	0.096	0.089	0.095	0.107	0.128	0.112	0.109	0.106	0.137	0.112	0.061
minimum	0.073	0.075	0.038	0.072	0.090	0.057	0.045	0.039	0.059	0.075	0.064	0.057	0.059	0.044	0.054	0.045
maximum	0.517	0.909	0.747	1.002	1.005	0.473	0.450	0.617	0.679	0.735	0.632	0.587	0.597	0.608	0.660	0.369

Table 2: Measures of functional diversification and other bank-characteristics: Summary statistics

Panel A of this table presents summary statistics on the measures of functional diversification. The table contains information on the non-interest revenue share (ratio of non-interest income to total operating income), the loans-to-assets ratio, revenue diversity and asset diversity. The diversity measures are defined as follows: $Diversity = 1 - \sqrt[2]{x - |x|}$, where x is either the loan-to-asset ratio or the ratio of interest income to total operating income. The diversity variables take values between 0 and 1 and are increasing in the degree of diversification. For each variable of interest, we present the mean, the standard deviation, the minimum and maximum in each sample year. The lower panel, Panel B, shows the mean and the standard deviation of the bank-specific control variables. As control variables, we include bank capital (equity-to-assets), cost-inefficiency (cost-to-income), loan loss provisions (loan loss provisioning to the sum of net interest and non-interest revenues) and (the natural logarithm of) bank size.

Europe (17 countries): 1989-2004																
Panel A: Measures of functional diversification																
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Non-Interest Revenue Share																
mean	0.101	0.092	0.107	0.112	0.140	0.135	0.134	0.144	0.168	0.185	0.230	0.215	0.205	0.205	0.234	0.248
std dev.	0.057	0.067	0.072	0.072	0.089	0.097	0.101	0.096	0.100	0.103	0.126	0.118	0.109	0.107	0.112	0.109
minimum	0.010	0.024	0.026	0.001	0.005	0.000	0.004	0.000	0.003	0.002	0.010	0.004	0.000	0.000	0.005	0.007
maximum	0.294	0.391	0.405	0.503	0.612	0.635	0.705	0.780	0.760	0.717	0.766	0.759	0.651	0.617	0.664	0.669
Loans-to-Total Assets																
mean	0.585	0.617	0.621	0.613	0.575	0.576	0.571	0.580	0.588	0.613	0.608	0.623	0.637	0.652	0.655	0.661
std dev.	0.137	0.149	0.148	0.145	0.167	0.182	0.173	0.173	0.175	0.171	0.171	0.169	0.158	0.171	0.176	0.178
minimum	0.375	0.330	0.322	0.313	0.208	0.155	0.149	0.152	0.064	0.160	0.167	0.225	0.181	0.137	0.137	0.134
maximum	0.829	0.903	0.914	0.887	0.852	0.890	0.894	0.908	0.912	0.911	0.921	0.933	0.926	0.936	0.937	0.948
Revenue Diversity																
mean	0.202	0.185	0.214	0.224	0.272	0.282	0.256	0.273	0.322	0.356	0.432	0.410	0.399	0.405	0.458	0.485
std dev.	0.114	0.134	0.143	0.143	0.142	0.160	0.153	0.126	0.144	0.159	0.182	0.178	0.188	0.197	0.197	0.192
minimum	0.020	0.048	0.052	0.002	0.010	0.000	0.008	0.000	0.005	0.004	0.020	0.009	0.000	0.000	0.010	0.013
maximum	0.588	0.783	0.810	0.995	0.777	0.794	0.984	0.879	0.882	0.806	0.996	0.895	0.983	0.922	0.973	0.913
Asset Diversity																
mean	0.752	0.712	0.697	0.706	0.702	0.689	0.720	0.713	0.703	0.681	0.678	0.660	0.658	0.619	0.605	0.591
std dev.	0.205	0.244	0.230	0.220	0.211	0.239	0.246	0.249	0.255	0.254	0.243	0.240	0.240	0.252	0.253	0.250
minimum	0.342	0.195	0.172	0.226	0.296	0.220	0.212	0.195	0.128	0.178	0.159	0.135	0.148	0.127	0.127	0.105
maximum	0.997	0.998	0.999	0.993	0.990	0.993	0.998	0.992	0.995	0.994	1.000	0.993	0.990	0.991	0.999	0.998
Panel B: Bank-specific control variables																
	Mean															
Equity-to-Assets	0.064															
Cost-to-Income	0.620															
Loan Loss Provisions	0.198															
ln(Size)	10.540															
	Standard deviation															
Equity-to-Assets	0.032															
Cost-to-Income	0.129															
Loan Loss Provisions	0.232															
ln(Size)	1.918															

Table 3: Franchise value regressions

This table presents OLS regressions of the franchise value, Q^{NA} , on measures of revenue and asset diversification. The first specification describes the effect of the non-interest revenue share on the dependent variable, Q^{NA} . The second column shows the results when that relationship is allowed to be non-linear. The third and fourth column present the relationship between Q^{NA} and the loans-to-assets ratio in a linear and quadratic way, respectively. Columns 5 (and 6) contain the regressions in which revenue diversity (asset diversity) is linked to long-run performance. In all regressions, we control for a number of bank-specific characteristics. We include bank capital (equity-to-assets), cost-inefficiency (cost-to-income), loan loss provisions and bank size (residual of an auxiliary regression that can be interpreted as a pure size effect, which is orthogonal to the diversification measures and the other control variables). Country and year dummy variables are included, but not reported, in all specifications. All balance sheet and income statement variables are lagged one year. *, **, *** denote statistical significance at the 10%, 5% and 1%, respectively. Standard errors are adjusted for clustering at the bank-level. z statistics, i.e. estimated coefficients divided by their robust-estimated standard errors, are reported in brackets. The line containing 'joint significance of linear and quadratic term' reports p-values from the Wald test of the joint significance of the included linear and squared term of the revenue-based (or asset-based) measure of functional diversification.

	Q^{NA}	Q^{NA}	Q^{NA}	Q^{NA}	Q^{NA}	Q^{NA}
Non-Interest Revenue Share	0.0949*** [4.635]	0.0593 [1.357]				
(Non-Interest Revenue Share) ²		0.0645 [0.662]				
Loans-to-Total Assets			-0.0012 [0.109]	0.0085 [0.124]		
(Loans-to-Total Assets) ²				-0.0086 [0.153]		
Revenue Diversity					0.0449*** [4.914]	
Asset Diversity						-0.003 [0.434]
Equity-to-Assets	-0.1696 [0.742]	-0.1285 [0.522]	-0.1786 [0.761]	-0.1803 [0.766]	-0.2499 [1.034]	-0.183 [0.785]
(Equity-to-Assets) ²	2.8295** [2.198]	2.5706* [1.812]	3.5076*** [2.680]	3.5225*** [2.672]	3.5317*** [2.603]	3.5192*** [2.679]
Cost-to-Income	-0.0517*** [4.962]	-0.0497*** [4.666]	-0.0398*** [3.716]	-0.0401*** [3.735]	-0.0518*** [4.968]	-0.0383*** [3.622]
Loan Loss Provisions	0.001 [0.246]	0.0014 [0.347]	0.002 [0.517]	0.0019 [0.502]	0.001 [0.266]	0.0019 [0.479]
ln(Size)	-0.0015 [1.299]	-0.0013 [1.109]	-0.0033** [2.513]	-0.0033*** [2.700]	-0.0024* [1.827]	-0.0032** [2.401]
Constant	0.9759*** [67.656]	0.9761*** [68.634]	0.9749*** [61.199]	0.9724*** [40.193]	0.9779*** [66.051]	0.9759*** [64.994]
Joint Significance of linear and quadratic term		0.000***		0.9708		
Number of observations	1220	1220	1220	1220	1220	1220
Number of cross-sections	136	136	136	136	136	136
R-squared	0.71	0.71	0.70	0.70	0.71	0.70

Table 4: Market beta regressions

This table presents OLS regressions of the market beta, β_{market} , on measures of revenue and asset diversification. The first specification describes the effect of the non-interest revenue share on the dependent variable, β_{market} . The second column shows the results when that relationship is allowed to be non-linear. The third and fourth column present the relationship between β_{market} and the loans-to-assets ratio in a linear and quadratic way, respectively. Columns 5 (and 6) contain the regressions in which revenue diversity (asset diversity) is linked to systematic risk. In all regressions, we control for a number of bank-specific characteristics. We include bank capital (equity-to-assets), cost-inefficiency (cost-to-income), loan loss provisions and bank size (residual of an auxiliary regression that can be interpreted as a pure size effect, which is orthogonal to the diversification measures and the other control variables). Country and year dummy variables are included, but not reported, in all specifications. All balance sheet and income statement variables are lagged one year. *, **, *** denote statistical significance at the 10%, 5% and 1%, respectively. Standard errors are adjusted for clustering at the bank-level. z statistics, i.e. estimated coefficients divided by their robust-estimated standard errors, are reported in brackets. The line containing 'joint significance of linear and quadratic term' reports p-values from the Wald test of the joint significance of the included linear and squared term of the revenue-based (or asset-based) measure of functional diversification.

	β_{market}	β_{market}	β_{market}	β_{market}	β_{market}	β_{market}
Non-Interest Revenue Share	1.3295*** [9.753]	0.6422** [2.207]				
(Non-Interest Revenue Share) ²		1.2448*** [2.707]				
Loans-to-Total Assets			-1.0087*** [11.350]	-1.0965** [2.290]		
(Loans-to-Total Assets) ²				0.0779 [0.195]		
Revenue Diversity					0.6167*** [7.568]	
Asset Diversity						0.3816*** [6.145]
Equity-to-Assets	-9.3177*** [8.502]	-8.5998*** [7.564]	-6.6607*** [5.946]	-6.6460*** [5.898]	-10.1468*** [8.776]	-8.8465*** [7.242]
(Equity-to-Assets) ²	19.6705*** [4.036]	15.1279*** [2.935]	13.9151*** [2.690]	13.7872*** [2.628]	27.8354*** [5.104]	27.0097*** [4.641]
Cost-to-Income	0.0681 [0.803]	0.1049 [1.221]	-0.1084 [1.222]	-0.1056 [1.185]	0.0709 [0.815]	0.0906 [0.964]
Loan Loss Provisions	-0.0135 [0.295]	-0.006 [0.131]	0.062 [1.371]	0.0627 [1.382]	-0.0106 [0.229]	0.0095 [0.195]
ln(Size)	0.1950*** [23.398]	0.2004*** [23.587]	0.1849*** [22.059]	0.1853*** [21.236]	0.1819*** [20.487]	0.1618*** [17.700]
Constant	0.6827*** [4.541]	0.6907*** [4.636]	1.3492*** [8.349]	1.3715*** [6.611]	0.7005*** [4.654]	0.4015*** [2.601]
Joint Significance of linear and quadratic term		0.000***		0.000***		
Number of observations	1208	1208	1208	1208	1208	1208
Number of cross-sections	135	135	135	135	135	135
R-squared	0.65	0.65	0.66	0.66	0.63	0.62

Table 5: Idiosyncratic volatility regressions

This table presents OLS regressions of the idiosyncratic volatility, σ_e , on measures of revenue and asset diversification. The first specification describes the effect of the non-interest revenue share on the dependent variable, σ_e . The second column shows the results when that relationship is allowed to be non-linear. The third and fourth column present the relationship between σ_e and the loans-to-assets ratio in a linear and quadratic way, respectively. Columns 5 (and 6) contain the regressions in which revenue diversity (asset diversity) is linked to firm-specific risk. In all regressions, we control for a number of bank-specific characteristics. We include bank capital (equity-to-assets), cost-inefficiency (cost-to-income), loan loss provisions and bank size (residual of an auxiliary regression that can be interpreted as a pure size effect, which is orthogonal to the diversification measures and the other control variables). Country and year dummy variables are included, but not reported, in all specifications. All balance sheet and income statement variables are lagged one year. *, **, *** denote statistical significance at the 10%, 5% and 1%, respectively. Standard errors are adjusted for clustering at the bank-level. z statistics, i.e. estimated coefficients divided by their robust-estimated standard errors, are reported in brackets. The line containing 'joint significance of linear and quadratic term' reports p-values from the Wald test of the joint significance of the included linear and squared term of the revenue-based (or asset-based) measure of functional diversification.

	σ_e	σ_e	σ_e	σ_e	σ_e	σ_e
Non-Interest Revenue Share	-0.0670** [2.105]	-0.2930*** [4.009]				
(Non-Interest Revenue Share) ²		0.4092*** [3.332]				
Loans-to-Total Assets			0.0047 [0.235]	0.1044 [0.839]		
(Loans-to-Total Assets) ²				-0.0885 [0.830]		
Revenue Diversity					-0.0511*** [2.929]	
Asset Diversity						0.004 [0.272]
Equity-to-Assets	-0.7154** [1.994]	-0.4794 [1.345]	-0.7409** [2.060]	-0.7576** [2.110]	-0.6375* [1.796]	-0.7279** [2.062]
(Equity-to-Assets) ²	4.8538*** [2.618]	3.3606* [1.809]	4.5655** [2.500]	4.7108*** [2.583]	4.4008** [2.439]	4.5112** [2.512]
Cost-to-Income	0.1086*** [5.175]	0.1207*** [5.679]	0.1017*** [4.631]	0.0985*** [4.502]	0.1139*** [5.390]	0.0985*** [4.685]
Loan Loss Provisions	0.0765*** [5.476]	0.0790*** [5.747]	0.0754*** [5.332]	0.0746*** [5.273]	0.0768*** [5.515]	0.0758*** [5.396]
ln(Size)	-0.0048** [2.285]	-0.003 [1.346]	-0.0036* [1.755]	-0.0040* [1.894]	-0.0045** [2.220]	-0.0036* [1.726]
Constant	0.1818*** [4.003]	0.1844*** [4.102]	0.1803*** [3.748]	0.1549*** [2.692]	0.1791*** [3.963]	0.1810*** [3.886]
Joint Significance of linear and quadratic term		0.0002***		0.7034		
Number of observations	1208	1208	1208	1208	1208	1208
Number of cross-sections	135	135	135	135	135	135
R-squared	0.48	0.49	0.48	0.48	0.49	0.48

Table 6: Total volatility regressions

This table presents OLS regressions of the total risk of a bank, σ_i , on measures of revenue and asset diversification. The first specification describes the effect of the non-interest revenue share on the dependent variable, σ_i . The second column shows the results when that relationship is allowed to be non-linear. The third and fourth column present the relationship between σ_i and the loans-to-assets ratio in a linear and quadratic way, respectively. Columns 5 (and 6) contain the regressions in which revenue diversity (asset diversity) is linked to total bank risk. In all regressions, we control for a number of bank-specific characteristics. We include bank capital (equity-to-assets), cost-inefficiency (cost-to-income), loan loss provisions and bank size (residual of an auxiliary regression that can be interpreted as a pure size effect, which is orthogonal to the diversification measures and the other control variables). Country and year dummy variables are included, but not reported, in all specifications. All balance sheet and income statement variables are lagged one year. *, **, *** denote statistical significance at the 10%, 5% and 1%, respectively. Standard errors are adjusted for clustering at the bank-level. z statistics, i.e. estimated coefficients divided by their robust-estimated standard errors, are reported in brackets. The line containing 'joint significance of linear and quadratic term' reports p-values from the Wald test of the joint significance of the included linear and squared term of the revenue-based (or asset-based) measure of functional diversification.

	σ_i	σ_i	σ_i	σ_i	σ_i	σ_i
Non-Interest Revenue Share	0.046	-0.1743**				
	[1.291]	[2.179]				
(Non-Interest Revenue Share) ²		0.3991***				
		[2.955]				
Loans-to-Total Assets			-0.0802***	-0.0163		
			[3.532]	[0.120]		
(Loans-to-Total Assets) ²				-0.0567		
				[0.489]		
Revenue Diversity					0.009	
					[0.455]	
Asset Diversity						0.0332**
						[2.064]
Equity-to-Assets	-1.3107***	-1.0805***	-1.1122***	-1.1229***	-1.3170***	-1.2847***
	[3.493]	[2.857]	[2.945]	[2.973]	[3.450]	[3.451]
(Equity-to-Assets) ²	5.7291***	4.2726**	4.9619***	5.0550***	5.9864***	6.0068***
	[2.994]	[2.190]	[2.583]	[2.628]	[3.084]	[3.164]
Cost-to-Income	0.1071***	0.1189***	0.0854***	0.0834***	0.1106***	0.1002***
	[4.776]	[5.232]	[3.677]	[3.597]	[4.887]	[4.504]
Loan Loss Provisions	0.0667***	0.0691***	0.0720***	0.0715***	0.0671***	0.0678***
	[4.658]	[4.896]	[4.983]	[4.944]	[4.688]	[4.741]
ln(Size)	0.0084***	0.0102***	0.0088***	0.0085***	0.0077***	0.0069***
	[3.607]	[4.109]	[3.816]	[3.574]	[3.343]	[2.960]
Constant	0.2168***	0.2194***	0.2715***	0.2552***	0.2164***	0.1943***
	[4.619]	[4.716]	[5.415]	[4.152]	[4.625]	[4.093]
Joint Significance of linear and quadratic term		0.0067***		0.0011***		
Number of observations	1208	1208	1208	1208	1208	1208
Number of cross-sections	135	135	135	135	135	135
R-squared	0.51	0.52	0.52	0.52	0.51	0.51