The Impact of European Bank Mergers on Bidder Default Risk*

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Abstract

We analyze the implications of European bank consolidation on the default risk of acquiring banks. For a sample of 134 bidding banks, we employ the Merton distance to default model to show that, on average, bank mergers are risk neutral. However, for the least risky banks, mergers generate a significant increase in default risk. This result is particularly pronounced for cross-border and activity-diversifying deals as well as for deals completed under weak bank regulatory regimes. Also, large deals, which pose organizational and procedural hurdles, experience a merger-related increase in default risk. Our results cast doubt on the ability of bank merger activity to exert a risk-reducing and stabilizing effect on the European banking industry.

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1 Introduction

The purpose of this paper is to analyze the default risk effects of mergers and acquisitions (M&A) for a sample of European bidding banks. In the past two decades, consecutive waves of consolidation have transformed the European banking industry. M&A has widened the scale and scope of banking firms and led to a sharp increase in concentration levels in most banking markets. Recently, this asset consolidation process has been given further impetus by the financial crisis which emphasized the role of acquisitions as a means to prevent bank failures and costly bank bailouts by policy makers (see Group of Thirty, 2009). However, whether bank mergers are effective in reducing default risk and contribute to a more stable banking sector remains an open question.

Previous work on risk-taking and bank mergers does not analyze default risk, but relies instead on accounting (e.g. z-scores) or equity-based indicators of risk (which estimate a market model to decompose bank stock returns into systematic and idiosyncratic risk). However, equity-based measures of banking risk are unable to provide a direct assessment of default likelihood, and accounting measures of risk have little power to predict distress for US banks (Evanoff and Wall, 2001; IMF, 2009). Our analysis, by contrast, estimates the changes in default risk around bank mergers based on a Merton distance to default (DD) model which draws on both accounting and market data. The critical advantage of this method is that it implicitly captures a bank's expected returns via the inclusion of the market value of assets. Gropp et al. (2006) show that DD scores are an appropriate indicator of bank fragility for European banks which even outperform pure market measures of risk such as subordinated bond spreads.

Risk considerations may be linked to merger strategies with different outcomes for the riskiness of the resulting institution. Two themes surface in the literature on the risk implications of bank M&A: consolidation delivers diversification effects (and reduces risk) or, alternatively, the risk effects of consolidation are shaped by regulatory incentives (which may induce an increase in risk). As regards risk diversification strategies behind M&A, a number of simulation studies estimate the diversification potential of bank M&A. These studies report that bank M&A lowers the default probability of US institutions as a result of portfolio diversification (Emmons et al., 2004), geographic diversification (Hughes et al., 1999), and activity diversification (e.g. through mergers

between banking and insurance firms (Boyd et al., 1993; Estrella, 2001)). However, the results of simulation studies should be interpreted with care, because they disregard the organizational complexity, operational inefficiencies, and changes in bank strategy associated with acquisitions (Hughes et al., 1999; Knapp et al., 2005). Akhavein et al. (1997) show that geographic diversification may leave the overall level of risk unaffected if banks—against the background of a more diversified loan portfolio—sharply increase lending in the post-merger period.[1]

Consistent with the argument that mergers are complex and their risk effects uncertain ex ante, studies that focus on the realized risk diversification effects of US bank mergers have produced mixed findings. While Mishra et al. (2005) find merger-related synergies reduce both total and idiosyncratic risk for a sample of 14 US bank acquirers, other studies question the relevance of risk diversification as a major force behind bank mergers. Amihud et al. (2002) find cross-border bank mergers do not reduce the market risk of acquiring banks. Similar results are found by Craig and Santos (1997) for US bank mergers on the basis of accounting-based measures of risk. In a related study, Craig and Santos (1996) provide further evidence against risk diversification as a motive for mergers by showing that acquired banks tend to be transformed post-M&A to resemble the strategic features of the acquiring institution.

Next to diversification effects, regulatory regimes may also give rise to a risk-related motive behind bank M&A. Elyasiani and Jia (2008) point out that banks with a high default risk face increased scrutiny by regulators and are more likely to be subjected to regulatory intervention. In cases where institutional failure appears imminent, regulators may even intervene and engineer deals (see Koetter et al., 2007). Further, stricter regulatory regimes may generally be more effective

[1]The extent to which diversification in banking is associated with measurable risk reduction benefits remains debated. It appears that, if they exist at all, risk reduction benefits from diversification are small. For a sample of Italian banks, Acharya et al. (2006) find that only risky banks benefit from loan diversification and achieve lower risk. Other European studies show that more diversified banking activities do not lead to risk reduction benefits (Baele et al., 2007; Lepetit et al., 2008; Mercieca et al., 2007). At a macro level, Wagner (2008) suggests that diversification—by lowering banks' need for outside liquidity—encourages risk-taking and, because it exposes banks to similar type risks, discourages the provision of liquidity to other institutions. Diversification may, thus, increase the likelihood of a systemic crisis.

in containing risk-taking in the context of mergers. Buch and DeLong (2008) show for a sample of cross-border mergers that deals lead to a reduction in return variability (total risk) if the regulatory regime in the home market is stricter than the target bank regime.

The operation of bank bailout policies and deposit insurance schemes also give rise to well-defined moral hazard problems in the context of M&A and may lead to a merger-related increase in default risk. For instance, underpriced deposit insurance schemes may encourage banks to enhance their deposit subsidy through mergers that increase the risk and size of an institution with the purpose of becoming too-big-to-fail (John et al., 1991). However, the empirical evidence that banks use mergers for regulatory arbitrage or to extract deposit insurance benefits has hitherto been weak (Benston et al., 1995; Buch and DeLong, 2008).[2]

In this paper, we analyze the default risk implications of M&A on acquiring banks from Europe. We start by showing that the average European bank merger does not affect the default risk of the acquirer. Next, we show this result also holds for merger types which offer the a priori largest scope for risk-related diversification benefits (i.e. cross-border and product diversifying M&A). By contrast, the least risky bidders increase their default risk in the post-merger period. Further, the possibility of merger-related increases in risk is particularly pronounced for the least risky banks when deals are diversifying and/or completed under a bank regulatory regime in the country of the biding bank which is relatively weak.

Our results point to difficulties in achieving sustainable risk reduction benefits from bank M&A, especially for banks which are already well-diversified. We also show that prudential regulation plays a role in preventing risk-increasing deals. Further, the regression analysis consistently identifies larger deals as causing an increase in bidder default risk. The overall results are critical of bank mergers exerting a risk-reducing and, thus, stabilizing effect on the safety and soundness of the banking sector in Europe.

Our analysis adds to the existing literature on mergers and banking risk in several ways. First,

[2]Benston et al. (1995) examine takeover premiums in the US banking industry in the 1980s. The authors report that takeover premiums reflect a target's potential earning diversification over the ability of the merged institution to extract gains from deposit insurance.

this paper is the first to study the realized risk implications of bank M&A by adopting a distance to default model. The Merton DD model boasts a wide range of empirical (e.g., Akhigbe et al., 2007; Vassalou and Xing, 2004) and commercial applications (including as a risk management tool in the banking industry; see Gropp et al., 2006). Second, to the best of our knowledge, this paper offers the first assessment of the risk effects of mergers on European bidders. Europe offers a particularly suitable setting in which to examine the risk effects of bank consolidation. Owing to the established practice of universal banking in a number of European countries, banks in Europe have been in a position to employ M&A to engage in activity diversification to a degree which has only been possible for US banks following the passing of the Gramm-Leach-Bliley Act in 1999. Further, in the absence of synchronized business cycles across EU member states, cross-border mergers in European banking may offer potentially large diversification benefits. These diversification benefits are further underpinned by a number of policy initiatives aimed at promoting the cross-border consolidation of banks which have substantially lowered the entry barriers for banks when engaging in geographical diversification (see Hernando et al., 2009).

Third, we contribute to the literature on the performance of bank M&A. The lack of empirical work that reports either positive wealth effects for bidding bank shareholders or performance improvements surrounding European bank M&A (see Campa and Hernando, 2006; Beitel et al., 2004) continues to raise questions as to who benefits from bank consolidation. The default risk implications of bank M&A are important for shareholders to understand. In the event of institutional failure and a bailout by regulators, bank shareholders unlike other creditor groups tend not to be shielded from substantial wealth losses. On the other hand, given the call option properties of equity which limit the downside risk for investors shareholders may benefit from risk-inducing mergers, because increases in the riskiness of the financial institution expose them to potentially large gains.

The rest of the paper proceeds as follows. The next section describes the sample of European bank M&A and explains the methodology we employ to gauge changes in acquirer default risk associated with M&A. Section 3 describes the default risk effects by acquisition type, and Section 4 identifies some of the drivers of default risk in a multivariate setting. Section 5 concludes.

2 Data and Methodology

2.1 Merger Sample

The sample of bank M&A is obtained from Thomson Financial (SDC Platinum). The selected mergers are announced and completed between 1992 and 2007 and involve bidders located in the European Union (EU-15), Norway and Switzerland. Bidding firms are commercial banks, bank holding companies and credit institutions, while targets may also be insurance companies (life and accident), mortgage bankers, as well as security brokers. Further, bidding banks are listed with equity returns available on Datastream and accounting data on Worldscope.

From an initial sample of 197 bank mergers, we drop deals due to one of the following reasons: In order to avoid confounding events, there need to be at least 180 trading days between separate merger announcements and not more than one deal pending until 180 days following completion of a deal by the same bank. As a result of this criterion, we lose 54 deals. We then verified the deal characteristics from SDC (announcement date, deal value) against news articles from various sources on LexisNexis. Inconsistencies between the data obtained from Thomson Financial and the press coverage of individual transactions were corrected or, if left unresolved, deals were omitted from our sample. Uncertainty over deal characteristics led to the omission of 9 deals. Finally, while none of the remaining banks are failing banks, we ensured our sample did not contain mergers where the target was a failing bank as indicated by either SDC or the press coverage surrounding a deal.

We do not stipulate a minimum size requirement. This is because we aim to examine the risk effects of the entire population of European bank mergers for which market and accounting data are available. Further, the vast majority of deals we include in our sample are sufficiently large to expect a measurable impact on the riskiness of the acquiring institution. In our sample, average relative size (measured as the ratio of deal value to the market value of the bidder) stands at 44%. However, to ensure our results are not sensitive to the relative size of a merger, we perform the analysis using minimum relative size requirements of 5% (which reduces the sample size n to 101) and 10% (n=87). The results of our analysis are invariant to the imposition of these relative size requirements. Both the univariate tests and regression models yield qualitatively identical results

to those reported below. We return to this in the robustness section.

[Table 1 near here]

The resulting dataset is described in Table 1. The sample consists of 134 acquisitions with bidders mainly operating in Italy (30), the UK (16) and Spain (14). In addition, the majority of the sampled deals (70) was announced over the period 1997-2001. It is worth emphasizing that the consolidation of bank assets in a number of European economies has chiefly involved non-listed public sector and cooperative institutions (Hernando et al., 2009) which face increasing pressures to consolidate as a result of declines in government ownership or the phasing out of public guarantees of their liabilities.

2.2 Methodology: Merger-related Changes in Default Risk

To estimate merger-related changes in the default risk of bidding banks, we apply the Merton distance to default (DD) model as in Akhigbe et al. (2007) and Gropp et al. (2006). Default risk is measured as the number of standard deviations that the market value of bank assets are above default point (the point where the market value of assets is less than the book value of total liabilities). Formally, DD on day t is expressed as:

$$DD_t = \frac{\ln\left(V_{A,t}/L_t\right) + \left(r_f - 0.5\sigma_{A,t}^2\right)T}{\sigma_{A,t}T}, \tag{1}$$

where $V_{A,t}$ is the market value of assets, L_t is the book value of total liabilities, r_f is the risk-free rate (proxied by the yield on two-year German government bonds), $\sigma_{A,t}$ is the annualized asset volatility at t, and T is the time to maturity (conventionally set to 1 year).

The computation of DD_t requires estimates of $V_{A,t}$ and $\sigma_{A,t}$ neither of which is directly observable. Following Akhigbe et al. (2007), Vassalou and Xing (2004) and Hillegeist et al. (2004), we infer the values of $V_{A,t}$ and $\sigma_{A,t}$ through an iterative process based on the Black-Scholes-Merton pricing model. Specifically, we express the market value of a firm's equity ($V_{E,t}$) as a function of the asset value by solving the following system of nonlinear equations:

$$V_{E,t} = V_{A,t}N(d_{1,t}) - X_t e^{r_f T}N(d_{2,t}) \tag{2}$$

$$\sigma_{E,t} = \frac{V_{A,t} e^{-T} N(d_{1,t}) \sigma_{A,t}}{V_E} \tag{3}$$

Equation (2) defines $V_{E,t}$ as a call option on the market value of the bidder's total assets, with $d_{1,t} = \frac{\ln\left(V_{A,t}/L_t\right) + \left(r_f + 0.5\sigma^2_{A,t}\right)T}{\sigma_{A,t}T}$ and $d_{2,t} = d_{1,t} - \sigma_{A,t}\sqrt{T}$. Equation (3) is the optimal hedge equation that relates the standard deviation of a bidder's equity value to the standard deviation of the value of total assets (both on an annualized basis).

To solve this system of equations, we employ as starting values for $\sigma_{A,t}$ the historical volatility of equity (computed daily on the basis of a 90-trading day rolling window) multiplied by the ratio of the market value of equity and the sum of the market value of equity and the book value of total liabilities, i.e. $\sigma_{A,t} = \sigma_{E,t} V_{E,t}/(V_{E,t} + L_t)$. A Newton search algorithm identifies the daily values of $V_{A,t}$ and $\sigma_{A,t}$ in an iterative process which we then employ to compute DD_t as in (1).

The merger-related change in bidder distance to default is the difference in mean DD before the merger (over a-180 days to a-11 days relative to the merger announcement date a) and mean DD after completion (over c+11 days to c+180 days following the completion date c). We choose this time window to reduce the level of noise inherent in DD and to ensure that our default risk predictions are based on accounting data that relate to the post-merger period.

We eliminate general industry and time trends in risk by computing a daily default risk index for each banking sector. For every deal, we compute a DD market index as the value-weighted DD of all banks listed on Datastream in the bidder's country which are not involved in M&A during the merger announcement and effective window.[3] We then subtract changes between the pre-merger and post-merger value in the market default index from changes in DD that acquirers realize over the same time period. The industry-adjusted change in distance to default ($\Delta IADD$) for bidding

[3]Following the application of these index criteria, the number of constituent banks in Finland, Austria, and Luxembourg declined substantially, rising concerns about the ability of our index to accurately capture banking sector risk in these countries. As a result, we aggregate some countries based on their geographic proximity. We create a Scandinavian banking sector default risk index (Finland, Norway & Sweden), a Benelux index (Luxembourg, Belgium & The Netherlands), and a German-Austrian index.

banks that is due to M&A can, thus, be expressed as:

$$\begin{aligned} \Delta IADD &= \overline{DD}_{(c+11;c+180)} - \overline{DD}_{(a-180;a-11)} - \left(\overline{DD}_{index,(c+11;c+180)} - \overline{DD}_{index,(a-180;a-11)}\right) \\ &= \Delta DD_{bidder} - \Delta DD_{index} \end{aligned} \tag{4}$$

3 Bank Mergers and Bidder Default Risk

3.1 Default Risk Changes by Deal Type

Bank mergers offer opportunities to realize size-related diversification gains through risk pooling as long as the asset returns of the banks involved in M&A are less than perfectly correlated (Emmons et al., 2004; Craig and Santos, 1997). To the extent that European bank consolidation enhances profitability through increased market power in the post-merger period as well as changes in the management of the assets of the combined institution, M&A may lower the default risk of bidding banks even further. In this section, we examine the default risk implications of European bank M&A in general as well as for specific types of deals. Overall, the results we present below are not consistent with bank M&A generating measurable default risk effects.

Table 2 reports the pre- and post-merger values for industry-adjusted distance to default (IADD) based on our sample of 134 bank mergers. The results show that before M&A European bidding banks are riskier than their industry peers. Mean (median) industry-adjusted DD in the pre-merger period is -0.110 (-0.288) and median IADD is statistically different from zero (at the 1%-level). To analyze whether mergers impact default risk, we test if the mean (median) merger-related change in IADD is equal to zero. Although half the number of deals generate an increase in industry-adjusted DD (i.e. lower default risk), Table 2 shows that mergers do not produce a statistically significant reduction in the riskiness of acquiring banks. Consequently, distance to default on average neither increases nor decreases in the post-merger period.

[Table 2 near here]

Next, we test if the risk effects of bank mergers vary by the type of deal undertaken. The potential for merger-related risk reductions is particularly pronounced for either geographically- or activity-diversifying mergers, because both deal types have the potential to substantially lower the

volatility of bank profits (Estrella, 2001; Boyd et al., 1993). On the other hand, diversifying mergers may lead to increased organizational complexity and/or significant changes in post-merger strategy which may thwart bidders from realizing risk benefits as a result of M&A.

Table 3 reports the distance to default effects of deals that can be classified as either cross-border or cross-industry (defined as deals where acquirer and the target do not share the same two-digit SIC code) compared with deals that are domestic or activity-focusing. Panel A of Table 3 focuses on geographic diversification, while Panel B analyzes the effect of product diversification on IADD. The results offer further evidence that European bank mergers do not effect on the acquirer's distance to default. While a majority of bidders exhibits a decline in industry-adjusted risk following diversifying mergers, the differences are not statistically significant. Regardless of the increased potential for risk diversification exhibited by cross-border and cross-industry bank mergers, the mean (median) change in IADD is not statistically different from zero for either diversifying or focusing deals.

[Table 3 near here]

Finally, we examine if supervisory regimes influence the risk effects of bank M&A. Under weaker supervisory regimes, banks may increase their risk-taking via M&A in order to shift the risk of default to regulators (Amihud et al. 2002). This way, bidding banks could manage to extract economic benefits from regulatory guarantees through implicit or explicit bank bailout policies (Benston et al. 1995). More stringent bank regulators, by contrast, will be able to contain risk-taking in the context of bank mergers. Consistent with this, Buch and DeLong (2008) show that bidding bank shareholders that operate under a strict bank regulatory regime experience a reduction in the variance of equity returns following cross-border bank mergers.

To test for the effect of bank regulation on default risk, we employ the index of supervisory strength from the Barth et al. (2004) database.[4] Higher values indicate environments in which regulators possess more powers to take actions against undesirable behavior by banks. Panel C of

[4]The index measures bank supervisory strength as the equal-weighted sum (incl. sub-questions) of the following questions (yes=1; no=0): (1) Does the supervisory agency have the right to meet with external auditors to discuss reports without the approval of the bank? (2) Are the auditors required to communicate misconduct by

Table 3 classifies regulatory regimes as having high (low) supervisory power for index values above (below) the sample median. The results show that the strength of the acquirer's regulator does not impact the riskiness of bank acquisitions. Stricter regulatory regimes are, thus, unable to prevent risk-taking in M&A. It is interesting to note, however, that bidding banks in the low supervisory power group exhibit above-industry levels of risk as indicated by negative IADD values in the pre-merger period (median highly significant), while the same is not true for the subset of banks in the high supervisory power group. This may be interpreted as an indication that the industry-adjusted risk profile of bidding banks varies with the ability of bank supervisors to curb risky behavior.

3.2 Pre-merger Risk and Merger-related Changes in Default Risk

Next, we examine whether the default risk exhibited by bidding banks prior to a deal determines the risk implications of M&A. Our rationale for expecting that the default risk implications of bank M&A vary with the level of pre-merger risk is based on Acharya et al. (2006) and Brewer (1989) who report that high-risk banks benefit disproportionately from diversification.

Table 4 ranks bidding banks into quartile portfolios according to their pre-merger IADD. The percentage of bidding banks with a positive change in IADD (i.e. that experience a reduction in default risk via M&A) declines rapidly across risk quartiles from 62% for high-risk banks (Q1) to 27% for low-risk banks (Q4). Critically, while merger-related changes in IADD are positive in Q1 (not statistically significant at customary levels), changes in IADD are negative in Q4 (significant

managers/directors to the supervisory agency? (3) Can legal action against external auditors be taken by supervisors for negligence? (4) Can supervisors force banks to change internal organizational structure? (5) Are off-balance sheet items disclosed to supervisors? (6) Can the supervisory agency order directors/management to constitute provisions to cover actual/potential losses? (7) Can the supervisory agency suspend director's decision to distribute: a) Dividends? b) Bonuses? c) Management fees? (8) Can the supervisory agency supercede bank shareholder rights and declare a bank insolvent? (9) Does banking law allow supervisory agency to suspend some or all ownership rights of a problem bank? (10) Regarding bank restructuring and reorganization, can the supervisory agency or any other government agency do the following: a) suspend shareholder rights? b) remove and replace management? c) Remove and replace directors? We obtain updated values on regulatory variables from the Worldbank website (http://go.worldbank.org/SNUSW978P0) and construct the index such that we use the prevailing index value in the bidding bank country during the year of the acquisition.

below 5% according to both the t-test and the z-test). This indicates that the least risky banks experience an increase in default risk as a result of M&A. It could, therefore, be argued that bank mergers cause low-risk banks to lose part of their risk advantage vis-à-vis national banking sectors.

[Table 4 near here]

The result that low-risk banks experience a deterioration in default risk could be due to it being unlikely that low-risk institutions realize further diversification benefits through mergers. The complexity of deals and difficulties in achieving sustainable gains from M&A are well-documented (see Hughes et al., 1999). Also, changes in post-M&A strategy may cause a risk increase, for example if the acquiring bank expands its loan book (Akhavein et al., 1997). However, our results on pre-merger risk and deal-induced changes in IADD could equally be consistent with explanations that emphasize either the diversification benefits or the regulatory incentives inherent in M&A. Diversification benefits should be particularly associated with cross-border and activity-diversifying mergers in the high-risk quartile (and less so in the low-risk group). By contrast, if regulatory strength across the EU has an impact on the risk effects of M&A, we would expect that the prospect of regulatory intervention is highest for the riskiest institutions (see Elyasiani and Jia, 2008) and that regulators are particularly effective in curbing risk-taking through mergers for this group of banks (and less so for the low-risk group).

Tables 5 and 6 analyze the diversification hypothesis and the regulatory influence hypothesis, respectively. Panel A of Table 5 focuses on the risk effects of domestic and cross-border bank mergers for the high- and low-risk quartile of banks.[5] The results show there is no statistically significant risk effect on bidding banks from cross-border mergers for the riskiest institutions. For low-risk institutions, we observe an increase in default risk (i.e. a reduction in IADD) following cross-border deals (t- and z-statistic are significant 5% and 10%, respectively). In Panel B, we observe very similar results for diversification on the basis of the activities that merging firms engage in. In the

[5] While we examine the risk effects of diversification for each risk quartile, we only report the results for the lowest and highest risk-quartile in order to conserve space. We do not find statistically significant differences between focusing and diversifying mergers other than those reported in Table 5 and thereafter.

group of high-risk banks, by contrast, we find only weak evidence that product diversification lowers default risk (rank statistic significant at 10%-level). Thus, we observe that diversification (in terms of both geography and activities) is risk-neutral for risky banks, but generates an increase in default risk for the portfolio of the least risky institutions.

[Table 5 & Table 6 near here]

Generally, our results are critical of the diversification potential of bank mergers. This is very much in the spirit of a wider literature which does not report gains from US bank mergers (Shaffer, 1994; Akhavein et al., 1997). Consistent with this, most studies that examine the risk effects of income diversification on European banks have not found any evidence that diversification lowers bank risk (Baele et al., 2007; Lepetit et al., 2008; Mercieca et al., 2007). Wagner (2008) argues that by increasing homogeneity amongst financial institutions, diversification limits their ability to share risk, thereby, increasing the likelihood of a systemic crisis.

Table 6 reports IADD for high-risk and low-risk banks by supervisory strength in the bidder's country. The results confirm the regulatory hypothesis only for low-risk banks which increase their default risk when regulatory power is low. By contrast, the M&A risk effects for high-risk institutions are not affected by the power of the supervisory regime. This shows bank regulators are unable to contain risk-taking under regimes with fewer disciplinary powers (Buch and DeLong 2008). However, since merger-related risk-taking under weak regimes is confined to the low-risk group, we do not interpret this finding as consistent with banks exploiting weaker regimes to shift risk onto regulators. Rather, it seems more likely that the least risky banks attract relatively less scrutiny under a weaker regulatory regime.

In sum, we find that the risk effects produced by mergers partly depend on pre-merger risk. We observe that the most risky banks do not benefit from M&A, while the least risky experience an increase in default risk following a deal. Further, the merger-related increase in risk for the least risky banks is driven by cross-border and activity-diversifying mergers. Also, we show that risk-taking via M&A amongst the group of least risky banks is prevalent in weaker regulatory environments.

So far, our analysis considers pre-merger risk, diversification, and the regulatory environment.

However, it is conceivable that our main result above—the deterioration in default risk for the least risky banks following M&A—is linked to specific strategies or pre-merger characteristics of the acquirer. For this reason, the following section examines changes in industry-adjusted distance to default (ΔIADD) for European bank mergers in a multivariate setting.

4 The Determinants of Changes in Default Risk

We assess how merger-related risk changes are affected by deal characteristics and pre-merger fundamentals of the acquirer. Our model, estimated via OLS with robust standard errors, assumes the following specification:

$$\Delta IADD_i = \alpha_0 + \gamma^{'}\mathbf{DC}_i + \theta^{'}\mathbf{AC}_{i.t-1} + \varepsilon_i \tag{5}$$

where:

- $\Delta IADD_i$ is the merger-related change in industry-adjusted distance to default (see Section 2);
- $\mathbf{DC}_i$ is a $(k\times1)$ vector of merger characteristics, and
- $\mathbf{AC}_{i,t-1}$ is a $(j\times1)$ vector of acquiring bank characteristics at the end of the fiscal year before the announcement of the merger

Among other variables, the vector of deal characteristics controls for the method of payment, the status of the target bank, and deal size. The payment method is captured by a dummy variable which equals one if the deal is fully paid for in cash and zero otherwise (CASHONLY). Furfine and Rosen (2009) suggest that fully cash-financed mergers are likely to increase bidder risk, because bidders are substituting safe liquid assets with the (more risky) balance sheet of the target. Further, we consider the status of the target by distinguishing via a dummy variable between publicly-listed and private target firms (LISTED). We expect bank mergers involving listed targets to produce positive risk effects, because listed firms are likely to be larger and, thus, more diversified than private targets. Also, the increased disclosure requirements pertaining to public firms facilitate effective due diligence by bidding banks—with positive implications for the bidder's risk assessment capabilities.

Deal value is measured by the logarithmic transformation of the US dollar value of acquisitions (LDEALV). Deal size can affect the risk profile of the acquirer in several ways. Larger deals may produce more diversification benefits and reduce the default risk of the acquiring bank. However, larger mergers are also more complex to integrate into the context of the bidding bank and may lead to institutions which are organizationally more complex (Knapp et al., 2005). In the immediate aftermath of a deal, large mergers may, therefore, cause an increase in default risk. Since deal values which are small in absolute terms may still yield similar type risk effects than large deals for small acquirers, we include a measure of relative size as the ratio of deal value to the market value of the acquirer's equity at the end of one year before the deal announcement (RELSIZE) in the regressions.

Echoing the univariate tests on the diversification effects of bank mergers above, we capture if deals entail geographic diversification (cross-border versus domestic mergers, CROSSB) or activity diversification (focusing versus diversifying mergers, CONGLOMERATE). Also, we test if highly-specialized mergers which are both geographically and activity-focusing affect our default risk measure (DOMESTICFOCUS).

Moving on to the vector of acquiring bank characteristics, we consider measures of pre-merger performance and size. Some of these variables are related to agency explanations of M&A which stress potential conflicts between managers and shareholders as regards the deployment of corporate resources and the riskiness of the institution (Jensen and Meckling, 1976). For example, declining market performance can be interpreted as an indicator that managers are entrenched and may act against the interests of shareholders. We measure pre-merger market performance (PREMERGER-PERF) using industry-adjusted buy and hold returns on the bidding bank's equity over a period from -180 to -11 days relative to the deal announcement. Accounting performance is measured by ROA (pre-tax profits scaled by assets). Further, the market-to-book ratio (MTBV) can be used as a proxy for executive hubris which we expect to be negatively associated with merger-related changes in distance to default. By contrast, Keeley (1990) argues that more valuable banks face fewer incentives to engage in risky projects, because valuable charters cannot be sold in the event of default.

Berger and Bonnacorsi di Patti (2006) show that leverage reduces agency cost in banking. Leverage increases the risk of liquidation (with the prospect of pay losses for executives) as well as pressures to generate cash flows sufficiently high to cover interest payments. Consequently, managers at banks with low leverage may be more likely to commit free cash flows to risky projects (mergers) which increase their pay as well as the likelihood of institutional default. We control for the level of bidder pre-merger leverage via the equity-to-assets ratio (EQUITY).[6]

To capture the impact of management quality on the risk effects of mergers, we also include operating efficiency in the model, measured by the ratio of operating costs to total assets (OPCOSTS). Further, we expect a negative influence of acquirer size—measured as the log transformation of total bank assets (SIZE)—on merger-related changes in default risk. If the diversification benefits of mergers decline with bidder size, large banks face incentives to increase risk through M&A and to extract too-big-to-fail benefits from regulators (see John et al., 1991; Benston et al., 1995).

[Table 7 near here]

To assess the robustness of the univariate tests above, we control for the pre-merger risk profile of the acquiring bank. We construct a dummy that identifies low- (high-) risk bidders. This variables equals one if the bidder is located in the highest (lowest) pre-merger DD quartile. Further, to evaluate whether the risk implications of a deal explain the expected performance gains accruing from a bank merger, we include the cumulative abnormal returns (CAR) from -11 to +1 days relative to the merger announcement date as in Amihud et al. (2002) and Buch and DeLong (2008). Market model parameters are estimated using 110-day daily return observations starting from 120 days to 11 days before the acquisition announcement date supplied by Thomson Financial. We expect a CAR to exert a negative impact on merger-related changes in default risk. This is because increases in the risk of the acquiring bank should generate higher expected shareholder returns. Finally, we control for the influence of country characteristics on the risk effect of mergers by including in the

[6]EQUITY correlates highly with total assets (r=-.67). To reduce the effects of multicollinearity between capital and size in our regressions, we regress EQUITY on total assets and enter the residuals from this estimation as an explanatory variable into our regression. The estimated coefficient, therefore, measures the effect of leverage after controlling for size.

regression model the real GDP growth rate (RGDPG) and an asset-based Herfindhal index (HH) of national banking market concentration.

An overview of our variables and summary statistics are provided in Table 7.

4.1 The Influence of Deal and Acquirer Characteristics

Table 8 reports the results of the regressions on merger-related changes in industry-adjusted distance to default. The results show that various bidding bank characteristics drive merger-generated changes in distance to default. We also confirm two of our main results above: (i) low-risk banks increase their default risk after a merger, and (ii) diversification gains for European bidding banks do not appear to materialize.

Deal value exerts a negative impact on the risk effects of M&A (significant at the 5%-level). This shows that large bank mergers pose organizational and procedural hurdles in the post-merger integration process that may thwart merger benefits from materializing (Knapp et al., 2005). This is also consistent with banks facing incentives to use mergers to become too big to fail in an attempt to extract benefits from regulators.[7] Further, the negative relationship between cost efficiency and merger-induced changes in IADD (at 5%-level of significance) can be explained by the difficulties that inefficient banks face in successfully completing a merger. If we interpret cost efficiency as a proxy for managerial ability, this result implies that poorly-managed banks are less likely to select acquisition targets that lower default risk.

[Table 8 near here]

In some of the model specifications, we observe a positive effect of the equity-to-asset ratio on changes in default risk. Thus, more highly-capitalized banks tend to realize higher risk reduction

[7] In constrast to expectations, deal size and relative size are far from being perfectly correlated (r=.378). Therefore, both variables offer different information on deal charactersitics. Furthermore, VIF tests on the estimated models suggest that there is no evidence of multicollinearity in the regressions when the two variables are simultaneously included. However, as a further check, we re-estimate the main models by including each size variable separately. We continue to observe that the log of deal size enters the regression with a negative and significant coefficient, while the low-risk dummy is significant in all specifications.

benefits from mergers. This result points to the importance of capital requirement regulations in promoting a sound banking industry. Further, bank mergers which are completed against the background of positive economic growth are linked to post-M&A risk reductions. While periods of economic growth may be accompanied by excessive risk-taking, GDP growth is also likely to increase the value of bidding bank assets, thereby, reducing the probability of default

The regression results in Table 8 confirm a number of findings in the univariate analysis. For instance, there are no risk diversification benefits from cross-border or activity diversifying mergers (neither CROSSB nor CONGL enter the regressions at customary levels of significance). Also in line with the univariate analysis, low-risk banks experience a statistically significant increase in default risk following M&A. The dummy variable indicating low pre-merger risk enters all model specifications with a negative sign (significant at 5% in all specifications without interaction effects). Consequently, the effect which the pre-merger risk of the acquiring bank has on merger-induced risk changes in the group of low-risk banks is not contingent on specific merger strategies or financial characteristics prevalent in this group of institutions.

We further investigate the interaction between pre-merger risk and diversification gains and find additional confirmation of our univariate results. Specifically, we add interaction terms between the LOWRISK dummy and diversifying mergers (CROSSB and CONGL dummies) to the specifications and we estimate the effect of the low-risk dummy on IADD for these diversifying deals (Panel B of Table 8). We reach the same conclusion as in the univariate analysis: When low-risk banks are involved in either geographically or product diversifying mergers, changes in IADD are highly significant and negative. By contrast, mergers that are simultaneously domestic and focusing are risk neutral. This confims that increases in default risk following bank mergers are particularly pronounced for the low-risk group of banks engaging in diversifying deals.

4.2 The Influence of Supervisory Power

We add the supervisory power index (SUPOWER) to the regressions to examine whether regulatory incentives motivate bank risk-taking in mergers in a multivariate framework. The results, reported in Columns (1) to (4) of Table 9, show that the coefficient on SUPOWER is not significant at

customary levels of significance. Consequently, supervisors do not affect risk-taking in mergers for the entire sample.

The results in the univariate tests above indicate that deal-induced increases in risk are strongest under weak regulatory regimes. In Columns (5) to (8), we consider the interaction between SUPOWER and LOWRISK as well as between a dummy variable which takes the value of 1 if SUPOWER in the acquiring bank's country is above the sample median, and zero otherwise (DSUPOWER). In Panel B of Table 9, we compute the marginal effect of LOWRISK on changes in IADD for different supervisory strengths. The marginal effects can be interpreted as measuring the change in IADD for low-risk banks under a given supervisory regime. As SUPOWER increases, we expect the incentive for risk-taking should be reduced.

[Table 9 near here]

Our results confirm this expectation. When the supervisory power is high, the risk effect of mergers on low-risk bidders is not significantly different from the risk effect of M&A on the rest of the sample. Different risk effects of M&A are only observable under low and median supervisory powers where low-risk banks see an increase in their risk of default post-M&A. Therefore, we continue to observe that low-risk banks increase their default risk through M&A under relatively weak supervisory regimes.

4.3 Robustness

We conducted several tests to evaluate the robustness of our results. First, we assess the stability of our results when we impose a minimum value for RELSIZE. Although our sample includes the largest deals in Europe, it also has a few deals where the target appears relatively small compared to the bidder. Therefore, we re-run the analysis after imposing minimum relative size requirements of 5% (which reduces the sample size n to 101) and 10% (n=87). The results for these sub-samples confirm our main findings and demonstrate that our findings are invariant to the imposition of a minimum size criterion. We still observe a negative and significant risk effect of mergers for low-risk banks, especially when the supervisory regime is weak. We also continue to observe that diversifying

deals increase default risk for the group of the least risky acquirers. Further, the regression results are qualitatively unchanged.

Second, the risk effects of M&A may be partly determined by target bank characteristics beyond those that we have already controlled for in our analysis (e.g. via target status or the degree of activity diversification). We test whether target characteristics such as performance, size, capital adequacy, and operating efficiency explain the risk effects of M&A on bidding banks. None of these variables enter the regressions with coefficients that are statistically significant at customary levels. Furthermore, albeit not significant at conventional levels, the coefficients on a number of variables (size, ROA, operating efficiency) exhibit the expected sign. When we extend the model to control for acquiring bank characteristics, we continue to observe a significant negative coefficient for the low-risk dummy and for the acquiring size. Although we recognize the limitations of this analysis, given the decline in sample size (n=60), we argue that these results show that our main conclusions are robust to the inclusion of target bank characteristics.

Third, the risk effects that mergers produce for low-risk banks compared with the rest of the sample may result from risk transfers between target and acquiring banks. We analyze whether low-risk banks select targets which have a different risk profiles compared with the rest of the sample. For subsets of targets that were acquired by low-risk bidders and by other bidders, we compare several target accounting ratios which are likely to capture the risk profile (ROA, leverage, cost efficiency and size). However, we do not find evidence that the targets acquired by low-risk banks differ with respect to their risk profile from the targets acquired by other bidders.

Finally, some studies have demonstrated the importance of the single currency on the European banking industry. For example, Ekkayokkaya et al. (2009) show that the value effects of bidding bank shareholders have fallen since the establishment of European Monetary Union (EMU). Similarly, Haq and Heaney (2009) point out that the euro has caused a decline in banking risk in adopting countries and in countries neighboring EMU members. Since our analysis covers a sample period which partly coincides with EMU, we test if the adoption of the euro impacts the risk effects produced by bank mergers. We introduce a dummy variable that takes the value of 1 for mergers announced after 1999 (and zero otherwise). The variable enters the regression model with a

negative coefficient showing that EMU has decreased IADD (not significant at conventional levels), while leaving the findings discussed in the previous section unaffected. Controlling for euro effects, therefore, does not modify our findings.

5 Conclusions

Sound financial intermediation relies on banks' ability to manage risks effectively. The default of banking firms poses a difficult trade-off for policymakers between the negative externalities associated with institutional failures and costly government bailouts. Over past decades, repeated bank merger waves have raised concerns among bank stakeholders as regards the risk implications of financial consolidation on individual banks and on the banking system as a whole.

This paper analyzes the impact of bank mergers on the default risk of a sample of European bidders. We show that, on average, M&A does not modify the risk profile of acquiring banks. Furthermore, we do not find any evidence of a risk reduction via cross-border or activity-diversifying M&A. However, the group of least risky banks before M&A experiences an increase in default risk after completion of a deal. This risk increase is driven by diversifying deals (both cross-border and activity diversifying deals) and is more prevalent under weak supervisory regimes. We confirm these results in a multivariate setting where we control for a set of other possible determinants of the risk effects of M&A.

Overall, our results convey a critical view of the risk-reduction potential of bank M&A. European bank mergers, at best, are risk neutral, yet offer substantial scope for increases in the likelihood of default. Our finding that merger-related risk increases are particularly large for cross-border and activity diversifying deals, is consistent with a host of theoretical and empirical studies which doubt that viable diversification gains and risk benefits can be realized through bank consolidation. Further, our finding that deal size exerts a negative influence on industry-adjusted distance to default raises concerns about the risk implications of banking mega-mergers on banking sector stability.

If risk reductions tend not to materialize, but there is a pronounced possibility that the acquiring bank exhibits a higher default probability post-M&A, European policy makers should consider the costs and benefits of bank consolidation carefully. While our study concentrates on

acquiring bank risk, the risk implications of M&A for the wider banking sector and economy may be less negative than our results suggest. From a supervisory point of view, increases in risk following the completion of a merger might be justified if the deal involved a target which was substantially more risky than the acquirer (and which in the absence of the deal may well have failed). In this context, the effects of M&A on systemic stability, particularly of deals which lead to more complex banking organizations and deals which increase market concentration, remain unclear. Future research into the risk implications of bank mergers should, hence, focus on the marginal contribution of acquiring banks to systemic stability before and after M&A (see for example, Adrian and Brunnermeier, 2009).

While we point out a number of drivers of merger-related changes in default risk, future research should further understand the bank-specific drivers of risk-taking in the context of mergers. For instance, it would be valuable to assess the impact of executive pay on the risk implications of M&A. Outside the banking literature, Furfine and Rosen (2009) assess the effect of mergers on the acquirer's default risk. The authors identify executive remuneration (higher risk increases occur when CEOs have a higher share of option-based compensation) and the level of asymmetric information (expressed by the value of idiosyncratic volatility) as drivers of merger-related changes in default risk.

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Table 1: Overview of M&A Sample

Panel A: Distribution of M&A by year

	Number of Mergers		Total Value		Average Value
	n	%	Mill USD	%	Mill USD
1992	3	2.24	417.33	0.08	139.11
1993	2	1.49	388.37	0.07	194.18
1994	4	2.99	6,780.94	1.22	1,695.23
1995	8	5.97	4,675.02	0.84	584.38
1996	8	5.97	8,123.31	1.47	1,015.41
1997	13	9.70	71,524.06	12.91	5,501.85
1998	13	9.70	63,687.18	11.50	4,899.01
1999	17	12.69	120,615.57	21.77	7,095.03
2000	16	11.94	61,570.94	11.12	3,848.18
2001	11	8.21	45,150.49	8.15	4,104.59
2002	5	3.73	2,912.14	0.53	582.43
2003	3	2.24	4,848.20	0.88	1,616.07
2004	4	2.99	24,473.13	4.42	6,118.28
2005	9	6.72	35,994.10	6.50	3,999.34
2006	12	8.96	62,154.68	11.22	5,179.56
2007	6	4.48	40,620.48	7.33	6,770.08
Total	134	100.00	553,935.94	100.00	

Panel B: Geographic Distribution

Acquirer nation	Target nation																	
	AU	BE	DE	FI	FR	GE	GR	IR	IT	NE	NO	PT	SP	SW	ST	UK	Others	Total
Austria (AU)	1																4	5
Belgium (BE)		2								2								4
Denmark (DE)			3								1							4
Finland (FI)				2														2
France (FR)					5				1								4	10
Germany (GE)	2	1			1	4											3	11
Greece (GR)							5										4	9
Ireland (IR)								1								1		2
Italy (IT)						1			28								1	30
Luxembourg													2					2
Netherlands (NE)		1							1	2							4	8
Norway (NO)											3							3
Portugal (PT)												5					1	6
Spain (SP)												1	6			1	6	14
Sweden (SW)				1										2			1	4
Switzerland (ST)															3		1	4
United Kingdom (UK)					1											7	8	16
Total	3	4	3	3	7	5	5	1	30	4	4	6	8	2	3	9	37	134

Deal values are in constant 2007-USD terms based on the Consumer Price Index (All Urban Consumers).

Table 2: Bank Mergers and Industry-Adjusted Distance to Default

The table reports mean (median) industry-adjusted distance to default (IADD) for a sample of acquiring banks. Distance to default before the merger is computed as the average of the distance to default over the period from -180 day to -11 days relative to the announcement date (a), while the distance to default after the merger is computed as the average distance to default over the period from +11 days to +180 days after the effective date (c). The change in the industry-adjusted distance to default is the difference between the post-effective date and the pre-announcement period IADD, winsorized at the 1%-level. The *t*-test (rank-test) evaluates if the mean (median), IADD and ΔIADD are equal to zero.

	N	**Mean (t-stat)**	**Median (z-stat)**	**ΔIADD>0**	
				N	**%**
IADD: Pre-Merger (a-180,a -11)	134	-0.110	-0.288***		
		(-0.759)	(-2.668)		
IADD: Post- Merger (c+11, c+180)	134	-0.174	-0.321***		
		(-1.144)	(-3.235)		
ΔIADD	134	-0.086	-0.005	67	50.0
		(-0.698)	(-0.567)		

***(**;*) denotes significance at 1% (5%; 10%)

Table 3: Bank M&A on the Industry-Adjusted Distance to Default, by Deal Type

Panel A reports the sample mean (median) of the industry-adjusted distance to default (IADD) for domestic and cross border deals. Panel B reports the sample mean (median) of the same risk measures computed for focusing and diversified mergers. A merger is defined as product diversifying if bidder and target do not share the same two-digit SIC code. Panel C summarizes the same statistics for mergers realized in high and low supervisory power regimes, identified on the basis of the Supervisory Power Index from Barth et al. (2004). For each bank, distance to default before the merger is computed as the average of the distance to default over the period from -180 day to -11 days from the announcement (a), while the distance to default after the merger is computed as the average of the distance to default over the period from +11 days to +180 days after the effective date (c). Changes in the industry-adjusted distance to default is the difference between the post-effective date and pre-announcement period IADD, winsorized at the 1%-level. The *t*-test (rank-test) evaluates if the mean (median) IADD and ΔIADD are equal to zero.

	N	Mean (t-stat)	Median (z-stat)	ΔIADD>0 (%)	N	Mean (t-stat)	Median (z-stat)	ΔIADD>0 (%)
Panel A: Geographic diversification		**Domestic**				**Cross-Border**		
IADD: Pre-Merger (a-180, a-11)	79	0.036	-0.202		55	-0.318	-0.434***	
		(0.176)	(-1.549)			(-1.636)	(-2.296)	
IADD: Post- Merger (c+11, c+180)	79	0.026	-0.227*		55	0.460***	-0.537***	
		(0.113)	(-1.789)			(-2.882)	(-2.882)	
ΔIADD	79	-0.047	-0.038	48.1	55	-0.142	-0.067	52.7
		(-0.271)	(-0.420)			(-0.841)	(-0.411)	
Panel B: Product diversification		**Focusing**				**Diversifying**		
IADD: Pre-Merger (a-180,a -11)	101	0.012	-0.290**		33	-0.480*	-0.286	
		(0.067)	(-2.265)			(-1.947)	(-1.599)	
IADD: Post- Merger (c+11,c +180)	101	-0.056	-0.302**		33	-0.535**	-0.419**	
		(-0.297)	(-2.414)			(-2.432)	(-2.260)	
ΔIADD	101	-0.078	0.013	50.5	33	-0.110	-0.023	48.5
		(-0.549)	(-0.584)			(-0.439)	(-0.116)	
Panel C: Supervisory Power		**High Supervisory Power**				**Low Supervisory Power**		
IADD: Pre-Merger (a-180, a-11)	56	-0.066	-0.040		76	-0.147	-0.474**	
		(-0.325)	(-0.889)			(-0.710)	(-2.397)	
IADD: Post- Merger (c+11, c+180)	56	0.046	-0.180		76	-0.354*	-0.409***	
		(0.194)	(-0.710)			(-1.750)	(-3.909)	
ΔIADD	56	0.045	0.063	53.6	76	-0.197	-0.055	47.4
		(0.225)	(-0.139)			(-1.244)	(-0.953)	

***(**;*) denotes significance at 1% (5%; 10%)

Table 4 Merger-related Changes in Industry-Adjusted Distance to Default, by Default Risk Quartiles

This table reports mean (median) of industry-adjusted distance to default (IADD) for a sample of acquiring banks by pre-merger distance to default quartiles. Distance to default before the merger is computed as the average of the distance to default over the period from -180 day to -11 days from the announcement (a), while distance to default after the merger is computed as the average of the distance to default over the period from +11 days to +180 days after the effective date (c). Changes in industry-adjusted distance to default is the difference between the post-effective date and pre-event period IADD, winsorized at the 1%-level. The *t*-test (rank-test) evaluates if the mean (median) IADD and ΔIADD are equal to zero.

Industry-Adjusted Distance to Default Quartiles		**N**	**Mean (t-stat)**	**Median (z-stat)**	**ΔIADD>0 (%)**
Q1 LOW distance default (High-risk)	IADD: Pre-Merger (a-180, a-11)	34	-1.719***	-1.534***	
			(-13.028)	(-5.086)	
	IADD: Post- Merger (c+11, c+180)	34	-1.448***	-1.260***	
			(-8,576)	(-5.018)	
	ΔIADD	34	0.217	0.290	61.8
			(0.988)	(1.410)	
Q2	IADD: Pre-Merger (a-180,a -11)	33	-0.604***	-0.522***	
			(-18.126)	(-5.012)	
	IADD: Post- Merger (c+11, c+180)	33	-0.390*	-0.379***	
			(-1.929)	(-3.332)	
	ΔIADD	33	0.187	0.190	60.6
			(0.971)	(0.652)	
Q3	IADD: Pre-Merger (a-180, a-11)	34	0.044	0.072	
			(1.353)	(1.308)	
	IADD: Post- Merger (c+11, c+180)	34	0.045	0.060	
			(0.291)	(0.248)	
	ΔIADD	34	0.000	-0.001	50.0
			(0.006)	(-0.145)	
Q4 HIGH distance to default (Low-risk)	IADD: Pre-Merger (a-180, a-11)	33	1.885***	1.062***	
			(5.562)	(5.012)	
	IADD: Post- Merger (c+11, c+180)	33	1.130**	0.466**	
			(2.639)	(2.314)	
	ΔIADD	33	-0.761**	-0.788***	27.3
			(-2.158)	(-2.636)	

***(**;*) denotes significance at 1% (5%; 10%)

Table 5: Risk Classes, Diversification and Changes in Industry-Adjusted Distance to Default

Panel A reports mean (median) of the industry-adjusted distance to default (IADD) for domestic and cross border deals involving high- and low-risk banks on the basis of their pre-merger distance to default. High- (Low-)risk banks are located in the first (fourth) DD quartile from -180 day to -11 days relative to the announcement date. Panel B reports the sample mean (median) of the same risk measures for activity-focusing and diversifying mergers. A merger is defined as diversified if the bidder and the target do not share the same two-digit SIC code. Distance to default before the merger is computed as the average distance to default over the period -180 day to -11 days from the announcement (a), while distance to default after the merger is computed as the average of distance to default over the period from +11 days to +180 days after the effective date (c). Changes in the industry-adjusted distance to default is the difference in IADD between the post-effective date and pre-announcement period , winsorized at the 1%-level. The *t*-test (rank-test) evaluates if the mean (median) IADD and ΔIADD are equal to zero.

		N	Mean (t-stat)	Median (z-stat)	IADD>0 (%)	N	Mean (t-stat)	Median (z-stat)	IADD>0 (%)
Panel A: Geographic Diversification			**Domestic**				**Cross-Border**		
High-risk banks	IADD: Pre-Merger (a-180, a-11)	18	-1.640***	-1.270***		16	-1.807***	-1.688***	
			(-8.571)	(-3.724)			(-9.856)	(-3.516)	
	IADD: Post-Merger (c+11, c+180)	18	-1.404***	-1.167***		16	-1.500	-1.348***	
			(-4.966)	(-3.550)			(-8.512)	(-3.516)	
	ΔIADD	18	0.132	0.150	55.6	16	0.311	0.336	68.8
			(0.364)	(0.588)			(1.329)	(1.344)	
Low-risk banks	IADD: Pre-Merger (a-180, a-11)	18	2.387***	1.333***		15	1.282***	0.789***	
			(4.572)	(3.724)			(3.519)	(3.408)	
	IADD: Post-Merger (c+11, c+180)	18	1.795**	0.661**		15	0.332	0.426	
			(2.523)	(2.069)			(1.043)	(1.022)	
	ΔIADD	18	-0.604	-0.730*	27.8	15	-0.949**	-0.788*	26.7
			(-1.115)	(-1.677)			(-2.160)	(-1.931)	
Panel B: Product Diversification			**Focusing**				**Diversifying**		
High-risk banks	IADD: Pre-Merger (a-180, a-11)	23	-1.539***	-1.361***		11	-2.095***	-1.804***	
			(-11.649)	(-4.197)			(-7.585)	(-2.934)	
	IADD: Post-Merger (c+11, c+180)	23	-1.424***	-1.252***		11	-1.497***	-1.268	
			(-7.702)	(-4.136)			(-4.104)	(-2.847)	
	ΔIADD	23	0.115	0.013	52.2	11	0.429	0.473*	81.8
			(0.521)	(0.547)			(0.842)	(1.867)	
Low-risk banks	IADD: Pre-Merger (a-180, a-11)	24	2.170***	1.141***		9	1.124***	1.062***	
			(4.815)	(4.286)			(6.726)	(2.666)	
	IADD: Post Merger (c+11, c+180)	24	1.564***	0.903**		9	-0.026	0.134	
			(2.828)	(2.457)			(-0.077)	(0.415)	
	ΔIADD	24	-0.615	-0.787*	33.3	9	-1.151**	-0.953**	11.1
			(-1.340)	(-1.714)			(-2.680)	(-2.429)	

***(**;*) denotes significance at 1% (5%; 10%)

Table 6: Risk Classes, Supervisory Power and Changes in Industry-Adjusted Distance to Default

This table reports the sample mean (median) of the industry-adjusted distance to default (IADD) for a sample of acquiring banks, computed for the period before the announcement of the merger and for the period after the effective date for high or low-risk bidders in high and low supervisory power regimes. The regulatory system is identified on the basis of the Supervisory Power Index from Barth et al. (2004). Distance to default before the merger is computed as the average distance to default over the period from -180 day to -11 days from the announcement (a), while distance to default after the merger is computed as the average of distance to default over the period from +11 days to +180 days after the effective date (c) of the merger. These measures are then industry- adjusted as described in section 2.2. The change in the industry-adjusted distance to default is the difference between the post-effective date and pre-announcement period IADD, winsorized at the 1%-level. The t-test (sign-test) evaluates the null hypothesis that the mean (median), IADD- Pre-Merger, IADD- Post-Merger and ΔIADD are equal to zero.

		N	**Mean (t-stat)**	**Median (z-stat)**	**IADD>0 (%)**	**N**	**Mean (t-stat)**	**Median (z-stat)**	**IADD>0 (%)**
		High Supervisory Power				**Low Supervisory Power**			
	IADD: Pre-Merger (a-180, a-11)	9	-2.126***	-1.976***		25	-1.572***	-1.286***	
High-risk			(-7.502)	(-2.666)			(-11.250)	(-4.372)	
banks	IADD: Post-Merger (c+11,c+180)	9	-1.784***	-1.570***		25	-1.326***	-1.167***	
			(-5.549)	(-2.666)			(-6.754)	(-4.265)	
	ΔIADD	9	0.032	0.707	66.7	25	0.283	0.287	60.0
			(0.057)	(0.652)			(1.245)	(1.224)	
	IADD: Pre-Merger (a-180, a-11)	14	1.546***	0.831***		18	2.205***	1.333***	
Low-risk			(3.286)	(3.296)			(4.411)	(3.724)	
Banks	IADD: Post-Merger (c+11,c+180)	14	1.302**	1.168**		18	1.022	0.222	
			(2.322)	(2.291)			(1.536)	(0.980)	
	ΔIADD	14	-0.245	-0.609	42.9	18	-1.194**	-0.898***	16.7
			(-0.440)	(-0.847)			(-2.540)	(-2.766)	

***(**;*) denotes significance at 1% (5%; 10%)

Table 7 Summary Statistics

This table reports summary statistics for the measures of default risk, deal characteristics, acquirer characteristics, the regulatory environment and country control variables. The sample consists of 134 mergers announced over the period from 1992 to 2007 involving bidders in the European Union, Norway and Switzerland. All variables, apart from SUPOWER, are winsorized at the 1%-level.

		Definition	N	Mean	Median	Std.Dev.	5 Pctile	95 Pctile
Risk measures	IADD: Pre-Merger (-180,-11)	Pre-merger industry-adjusted distance to default	134	-0.110	-0.288	1.671	-2.261	2.824
	IADD: Post-Merger (+11,+180)	Post-merger industry-adjusted distance to default	134	-0.174	-0.321	1.756	-2.266	2.831
	ΔIADD	Change in industry-adjusted distance to default	134	-0.086	-0.005	1.429	-2.346	1.652
Deal characteristics	CASHONLY	Equals 1 if the deal is completely cash-financed (zero otherwise)	134	0.209	0.000	0.408	0.000	1.000
	LISTED	Equals 1 if the target is a listed company (zero otherwise)	134	0.515	1.000	0.502	0.000	1.000
	LDEALV	Log of the deal value in million USD	134	6.761	6.645	1.830	3.892	9.609
	RELSIZE	Ratio of the deal value to the acquirer's market value (one year before announcement)	134	44.415	20.387	69.342	0.363	153.127
	CROSSB	Equals 1 for cross-border mergers (zero otherwise)	134	0.410	0.000	0.494	0.000	1.000
	CONGL	Equals 1 if the acquirer and the target do not share the same two digit SIC code (zero otherwise)	134	0.246	0.000	0.432	0.000	1.000
	DOMESTICFOCUS	Equals 1 for mergers that are both domestic and focus (zero otherwise)	134	0.448	0.000	0.499	0.000	1.000
Acquirer Characteristics	PREMERGERPERF	Buy and hold abnormal returns from -180 day to -11 days relative to the merger announcement (%)	134	-4.590	-4.140	20.590	-33.845	30.492
	ROA	Pre-tax profits over total assets (%)	131	1.027	0.971	0.751	0.048	2.048
	MTBV	Market to book ratio	132	2.214	2.072	1.143	0.791	4.841
	EQUITY	Book value of common equity to total assets, orthogonalized with respect to total assets (%)	134	0.000	-0.260	2.111	-2.959	3.863
	OPCOSTS	Total operating costs over total assets (%)	130	6.961	6.650	2.153	3.925	10.433
	SIZE	Log of bidder total assets (thousands of USD)	134	18.076	18.206	1.700	14.629	20.338
	TOTAL ASSETS	Bidder total assets (USD millions)	134	232,754.9	104,981.1	305,907.8	3,149.032	816,735.1
	LOWRISK	Equals 1 if the bidder is located in the lowest pre-merger risk quartile (zero otherwise)	134	0.246	0.000	0.432	0.000	1.000
	HIGHRISK	Equals 1 if the bank is in the highest pre-merger risk quartile (zero otherwise)	134	0.254	0.000	0.437	0.000	1.000
	CAR (-10, +1)	Cumulative abnormal return between -10 days to +1 day relative the merger announcement	134	0.726	0.657	6.862	-9.677	13.721
Regulatory environment	SUPOWER	Measures the extent to which the supervisory environment is sensitive to bank risk-taking, the breadth of disciplinary powers available to regulators, and how well these powers are enforced. *Source*: Barth et al. (2001)	132	8.985	9.000	2.389	6.000	13.000
Country controls	RGDPG	Real GDP growth rate (%)	134	2.754	2.795	1.399	0.715	4.746
	HH	Asset-based Herfindhal Index	134	0.098	0.088	0.060	0.030	0.231

Table 8: Changes in Industry-adjusted Distance to Default: Deal and Acquirer Characteristics

The dependent variable is the change in the industry-adjusted distance to default. The model is estimated via OLS with robust standard errors; *t*-statistics are in parentheses. **Deal characteristics** include a dummy indicating if the merger is fully paid by cash (CASHONLY), a dummy indicating the target is a listed company (LISTED), the log of the deal value (LDLV), the ratio of deal value to the bidder's market value of equity (RELSIZE), a dummy which is equal to 1 for cross-border mergers (CROSSB), a dummy which is equal to 1 if the bidder and the target do not share the same two digit SIC code (CONGLOMERATE) and a dummy equal to 1 if the merger is both domestic and focus (DOMESTICFOCUS). **Acquirer characteristics** include the buy and hold return for the period from -180 to -11 before the announcement net of the same return computed for the market index (PREMERGERPERF), the ratio between pre-tax profit and total assets (ROA)**,** the market-to-book ratio (MTBV), the equity to assets ratio before the merger, orthogolized respect to size (EQUITY), the ratio of operating costs to total assets (OPCOSTS), the log of the bidder total assets at the end of the year before the announcement (SIZE), a dummy equal to 1 if the bidder is in the last quartile of the distribution of pre-merger industry-adjusted distance to default (LOWRISK), a dummy equal to 1 if the bidder is in the first quartile of the distribution of pre-merger industry-adjusted distance to default (HIGHRISK), the cumulative abnormal returns from -10 to + 1 day relative to the announcement date computed from a market model estimated over -120 to -11 days before the announcement (CAR (-10+1)). Other control variables include the real GDP growth rate (RGDPG) and an asset-based Herfindhal index of banking market concentration (HH). **Panel B** shows the marginal effects of LOWRISK on IADD when CONGL (CROSSB, DOMSTICFOCUS) is equal to 1.

PANEL A	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
CASHONLY	-0.042	-0.039	0.055	0.075	0.051	0.072	0.043	0.139	0.058
	(0.13)	(0.12)	(0.15)	(0.22)	(0.14)	(0.20)	(0.11)	(0.41)	(0.17)
LISTED	0.494*	0.495*	0.415	0.423	0.434	0.445*	0.407	0.483*	0.429
	(1.76)	(1.76)	(1.53)	(1.56)	(1.62)	(1.66)	(1.50)	(1.74)	(1.60)
LDEALV	**-0.179****	**-0.171****	**-0.322*****	**-0.310*****	**-0.318****	**-0.306*****	**-0.318*****	**-0.319*****	**-0.286*****
	(2.20)	**(2.16)**	**(2.64)**	**(2.86)**	**(2.62)**	**(2.83)**	**(2.75)**	**(2.63)**	**(2.88)**
RELSIZE	0.001	-0.020	0.222	0.204	0.223	0.206	0.222	0.211	0.193
	(0.00)	(0.12)	(1.00)	(1.01)	(1.04)	(1.06)	(1.00)	(0.87)	(0.90)
CROSSB	-0.160		-0.471		-0.486		-0.429	-0.557	
	(0.56)		(1.05)		(1.08)		(1.02)	(1.24)	
CONGL	0.052		0.022		0.004		0.020	0.326	
	(0.20)		(0.07)		(0.01)		(0.06)	(0.96)	
DOMESTICFOCUS		0.251		0.573		0.596			0.346
		(0.91)		(1.50)		(1.57)			(0.96)
PREMERGERPERF			-0.408	-0.232	-0.440	-0.263	-0.409	-0.406	-0.224
			(0.52)	(0.31)	(0.55)	(0.34)	(0.52)	(0.53)	(0.30)
ROA			-33.861	-38.846	-31.147	-35.893	-33.407	-32.014	-34.702
			(1.39)	(1.51)	(1.24)	(1.36)	(1.36)	(1.33)	(1.33)
MTBV			0.188	0.187	0.162	0.157	0.187	0.183	0.167
			(0.86)	(0.87)	(0.73)	(0.72)	(0.87)	(0.88)	(0.84)
EQUITY			11.410	**12.417***	10.924	11.822	10.940	**13.217***	11.043
			(1.50)	**(1.68)**	(1.41)	(1.56)	(1.44)	**(1.72)**	(1.46)
OPCOSTS			**-16.659****	**-17.329****	**-17.314****	**-18.072****	**-16.838****	**-16.380****	**-17.240****
			(2.22)	**(2.27)**	**(2.26)**	**(2.32)**	**(2.15)**	**(2.22)**	**(2.34)**
SIZE			-0.038	-0.042	-0.034	-0.038	-0.040	-0.027	-0.044
			(0.29)	(0.34)	(0.26)	(0.31)	(0.30)	(0.21)	(0.36)
LOWRISK	**-1.002****	**-0.975****	**-1.011****	**-0.938****	**-0.933****	**-0.852****	-0.953	-0.677	**-1.269*****
	(2.59)	**(2.54)**	**(2.47)**	**(2.33)**	**(2.28)**	**(2.14)**	(1.56)	(1.33)	**(3.25)**
HIGHRISK					0.266	0.294			
					(0.89)	(1.00)			
CAR (-10, +1)			-0.820	-0.967	-0.559	-0.687	-0.792	-1.194	-1.151
			(0.45)	(0.56)	(0.31)	(0.40)	(0.43)	(0.62)	(0.65)
RGDPG			**23.943***	**22.865***	**26.276***	**25.473***	**23.731***	**25.227****	**23.153***
			(1.82)	**(1.86)**	**(1.92)**	**(2.00)**	**(1.78)**	**(1.99)**	**(1.92)**
HH			-1.379	-0.557	-1.635	-0.849	-1.379	-1.502	-0.621
			(0.58)	(0.23)	(0.71)	(0.36)	(0.58)	(0.66)	(0.26)
LOWRISK							-0.129		
×CROSSB							(0.18)		
LOWRISK								**-1.177***	
×CONGL								**(1.67)**	
LOWRISK									0.882
×DOMESTICFOCUS									(1.17)
Constant	1.177**	0.962*	3.450	3.036	3.308	2.864	3.463	3.101	3.035
	(2.05)	(1.86)	(1.37)	(1.18)	(1.30)	(1.12)	(1.36)	(1.29)	(1.18)
Obs.	134	134	130	130	130	130	130	130	130
Adjusted R^2	0.063	0.075	0.094	0.111	0.091	0.110	0.086	0.110	0.120

PANEL B	**Marginal effects**		
	Model 7	Model 8	Model 9
LOWRISK + LOWRISK× CROSSB	**-1.082****		
	(-2.33)		
LOWRISK + LOWRISK× CONGL		**-1.854*****	
		(-3.66)	
LOWRISK + LOWRISK× DOMESTICFOCUS			-0.387
			(-0.54)

***(**;*) denotes significance at 1% (5%; 10%)

Table 9: Changes in Industry-adjusted Distance to Default: The Regulatory Environment

The dependent variable is the change in the industry-adjusted distance to default. The model is estimated via OLS with robust standard errors; t-statistics are in parentheses. **Deal characteristics** include a dummy indicating if merger is fully paid by cash (CASHONLY), a dummy indicating the target is a listed company (LISTED), the log of the deal value (LDLV), the ratio of deal value to the bidder's market value of equity (RELSIZE), a dummy which is equal to 1 for cross-border mergers (CROSSB), a dummy which is equal to 1 if the bidder and the target do not share the same two digit SIC code (CONGLOMERATE) and a dummy equal to 1 if the merger is both domestic and focus (DOMESTICFOCUS). **Acquirer characteristics** include the buy and hold return for the period from -180 to -11 before the announcement net of the same return computed for the market index (PREMERGERPERF), the ratio between pre-tax profit and total assets (ROA)**,** the market-to-book ratio (MTBV), the equity to assets ratio before the merger, orthogolized respect to size (EQUITY), the ratio of operating costs to total assets (OPCOSTS), the log of the bidder total assets at the end of the year before the announcement (SIZE), a dummy equal to 1 if the bidder is in the last quartile of the distribution of pre-merger industry-adjusted distance to default (LOWRISK), a dummy equal to 1 if the bidder is in the first quartile of the distribution of pre-merger industry-adjusted distance to default (HIGHRISK), the cumulative abnormal returns from -10 to + 1 day relative to the announcement date computed from a market model estimated over -120 to -11 days before the announcement (CAR (-10+1)). Other control variables include the real GDP growth rate (RGDPG) and an asset-based Herfindhal index of banking market concentration (HH). **The regulatory environment** is described through an index of the power of Supervisory Authorities in the bidder's country from the WorldBank database on bank regulation and supervision (SUPOWER) . This index measures the degree to which the supervisory authority has the power to take specific actions against banks. DSUPOWER is a dummy which equals 1 if SUPOWER is above the sample median. **Panel B** shows the marginal effects of LOWRISK on IADD in three supervisory regimes: low (minimum value), median and high. (maximum value).

Panel A	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
CASHONLY	0.037	0.064	0.089	0.115	0.052	0.080	0.138	0.155
	(0.11)	(0.19)	(0.25)	(0.34)	(0.15)	(0.24)	(0.39)	(0.46)
LISTED	0.430	0.418	0.412	0.399	0.432	0.420	0.387	0.375
	(1.54)	(1.51)	(1.44)	(1.42)	(1.55)	(1.52)	(1.34)	(1.32)
LDEALV	**-0.323*** **	**-0.310*** **	**-0.314*** **	**-0.296*** **	**-0.321** **	**-0.308*** **	**-0.289** **	**-0.272** **
	(2.65)	**(2.87)**	**(2.67)**	**(2.85)**	**(2.62)**	**(2.83)**	**(2.44)**	**(2.56)**
RELSIZE	0.241	0.216	0.231	0.205	0.238	0.213	0.233	0.208
	(1.02)	(1.00)	(1.02)	(1.00)	(1.04)	(1.02)	(1.02)	(1.01)
CROSSB	-0.486		-0.546		-0.478		-0.526	
	(1.04)		(1.19)		(1.04)		(1.19)	
CONGL	0.030		0.053		0.028		0.103	
	(0.09)		(0.17)		(0.09)		(0.33)	
DOMESTICFOCUS		0.606		0.647		0.591		0.595
		(1.50)		(1.62)		(1.47)		(1.51)
PREMERGERPERF	-0.436	-0.261	-0.462	-0.272	-0.407	-0.234	-0.496	-0.306
	(0.55)	(0.34)	(0.60)	(0.37)	(0.52)	(0.31)	(0.65)	(0.41)
ROA	-29.725	-35.594	-31.223	-37.431	-30.976	-36.825	-32.031	-38.116
	(1.20)	(1.38)	(1.26)	(1.43)	(1.26)	(1.43)	(1.32)	(1.48)
MTBV	0.154	0.155	0.149	0.150	0.161	0.163	0.147	0.150
	(0.69)	(0.69)	(0.72)	(0.71)	(0.69)	(0.70)	(0.68)	(0.68)
EQUITY	11.137	12.386	**14.450***	**15.705** **	10.842	12.026	**14.260***	15.353**
	(1.44)	(1.65)	**(1.84)**	**(2.08)**	(1.39)	(1.60)	**(1.87)**	(2.11)
OPCOSTS	**-16.720** **	**-17.527** **	**-17.142** **	**-17.990** **	**-16.125** **	**-16.869** **	**-16.445** **	**-17.189** **
	(2.19)	**(2.25)**	**(2.20)**	**(2.26)**	**(2.08)**	**(2.13)**	**(2.07)**	**(2.11)**
SIZE	-0.032	-0.034	-0.040	-0.046	-0.028	-0.030	-0.051	-0.057
	(0.24)	(0.28)	(0.32)	(0.39)	(0.21)	(0.24)	(0.41)	(0.47)
LOWRISK	**-1.030** **	**-0.967** **	**-2.737***	**-2.629***	**-1.017** **	**-0.954** **	**-1.524*** **	**-1.414*** **
	(2.50)	**(2.40)**	**(1.89)**	**(1.87)**	**(2.44)**	**(2.34)**	**(3.18)**	**(3.05)**
CAR (-10, +1)	-0.754	-0.817	-0.696	-0.747	-0.761	-0.824	-0.413	-0.471
	(0.39)	(0.45)	(0.37)	(0.42)	(0.40)	(0.46)	(0.21)	(0.26)
RGDPG	**24.028***	**22.604***	**23.405***	**21.721***	**24.195***	**22.813***	**24.843** **	**22.966** **
	(1.82)	**(1.85)**	**(1.82)**	**(1.86)**	**(1.85)**	**(1.87)**	**(2.03)**	**(2.04)**
HH	-1.971	-1.116	-1.791	-0.859	-1.656	-0.795	-1.971	-0.971
	(0.81)	(0.44)	(0.75)	(0.34)	(0.69)	(0.32)	(0.84)	(0.40)
SUPOWER	0.045	0.049	-0.009	-0.004				
	(0.58)	(0.66)	(0.11)	(0.05)				
SUPOWER			0.192	0.188				
×LOWIRSK			(1.19)	(1.20)				
DSUPOWER					0.161	0.172	-0.120	-0.087
					(0.54)	(0.58)	(0.38)	(0.28)
DSUPOWER							**1.231***	1.124
×LOWIRSK							**(1.74)**	(1.63)
Constant	3.022	2.541	3.681	3.197	3.188	2.743	3.592	3.170
	(1.16)	(0.94)	(1.45)	(1.20)	(1.25)	(1.04)	(1.48)	(1.24)
Obs.	128	128	128	128	128	128	128	128
Adjusted R^2	0.089	0.107	0.102	0.120	0.087	0.105	0.111	0.123

Panel B	**Marginal effects**			
	Model 3	Model 4	Model 7	Model 8
Low supervisory power	**-1.775** **	**-1.690** **	**-1.524*** **	**-1.414*** **
	(-2.51)	**(-2.46)**	**(3.18)**	**(3.05)**
Median supervisory power	**-1.006** **	**-0.940** **		
	(-2.52)	**(-2.40)**		
High supervisory power	-0.045	-0.001	-0.293	-0.289
	(-0.05)	(-0.00)	(-0.50)	(-0.49)

***(**;*) denotes significance at 1% (5%; 10%)