



# Systemic risk and bank consolidation: International evidence <sup>☆</sup>



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## ABSTRACT

This paper analyzes the systemic risk effects of bank mergers to test the “concentration-fragility” hypothesis. We use the marginal expected shortfall as well as the lower tail dependence between a bank’s stock returns and a relevant bank sector index to capture the merger-related change in an acquirer’s contribution to systemic risk. In our empirical analysis of a dataset of international domestic and cross-border mergers, we find clear evidence for a significant increase in the merging banks’, the combined banks’ as well as their competitors’ contribution to systemic risk following mergers, thus confirming the “concentration-fragility” hypothesis.

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## 1. Introduction

Do mergers among banks add to the instability of the financial system? And if yes, why? On the one hand, bank mergers could stabilize an individual bank as well as decrease systemic risk because

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consolidation can lead to an increase in the diversification of the company’s assets and loan portfolio and consequently higher capital buffers.<sup>3</sup> On the other hand, diversification could reduce an institution’s individual probability of failure while at the same time making a systemic crisis more likely. Wagner (2010) finds in his theoretical work that although diversification reduces the risk exposure of individual institutions, the financial system could get more fragile as individual risks are simply reallocated (and not eliminated) across the system. Furthermore, this reallocation of risks causes individual institutions to be exposed to similar risks. More precisely, Wagner (2010) argues that both geographical and functional diversification can expose banks to similar risks making it more likely for systemic shocks at individual institutions to be transmitted to the whole system.

Also, bank mergers could be motivated by regulatory incentives, thus creating an increase in the default risk of the bidding bank (see Vallascas and Hagendorff, 2011). Because consolidated banks usually become more similar, the entire financial system could also

<sup>3</sup> The Group of Ten (2001) defines systemic financial risk as the risk that an exogenous shock will trigger a loss of economic value in a substantial portion of a financial system causing significant adverse effects on the real economy. We adopt this view which is also shared by, e.g., Adrian and Brunnermeier (2010).

become more vulnerable to idiosyncratic or macroeconomic shocks (see [De Nicolò and Kwast, 2002](#)). Similarly, banks could be inclined to merge simply to become too big to fail, thus increasing their contribution to systemic risk (see, e.g., [Berger, 2000](#)). In this paper, we investigate whether bank mergers increase the contribution of both acquirers and competitors to systemic risk. We find that bank mergers around the globe coincide with statistically and economically significant increases in the contribution of acquirers, targets and their competitors to financial instability. We strongly reject the charter value hypothesis and support the notion that the hubris of bank managers, the existence of government-owned banks as well as the existence of an explicit permanent deposit insurance fund amplify the destabilizing effect of bank consolidation on the financial sector.

The on-going consolidation in banking has been a distinctive feature of the financial industry over the past decades (see, e.g., [European Central Bank, 2000](#); [OECD, 2000](#); [Group of Ten, 2001](#)). The theoretical as well as the empirical literature regarding the effects of bank mergers on systemic risk, however, are inconclusive.

On the one hand, several authors have argued that consolidation in banking leads to decreases in idiosyncratic bank risk and could improve the overall stability of the financial system. The advocates of the so-called “concentration-stability” hypothesis argue that consolidation in banking coincides with a decrease in the individual acquiring banks’ risk and, consequently, a decrease in systemic risk. A theoretical motivation for this hypothesis is presented by [Allen and Gale \(2000, 2004\)](#), who argue that monopolistic banks can provide higher capital buffers that can serve as a cushion against external shocks to the financial system. Other studies by [Keeley \(1990\)](#) and [Matutes and Vives \(2000\)](#) stress the notion that an increased charter value can prevent the banks’ managers from excessively taking risks and thus deteriorating the banks’ asset quality (see also [Besanko and Thakor, 1993](#)). Furthermore, credit rationing in the form of dealing more qualitative credit investments (see [Boot and Thakor, 2000](#)), better loan portfolio diversification (see [Diamond, 1984](#)) as well as lower costs for the monitoring of their competitors (see [Allen and Gale, 2000](#)) can lead to improved financial soundness for the individual institutions and the financial system itself. Additionally, the supervision and regulation of more consolidated financial systems could be easier and more effective due to the reduced number of market participants, thus leading to a decrease in systemic risk.

On the other hand, several studies cite arguments in support of the so-called “concentration-fragility” hypothesis which predicts bank mergers cause an increase in overall systemic risk (see, e.g., [Winton, 2000](#); [Kane, 2000](#); [Campa and Hernando, 2008](#); [Carbo-Valverde and Kane, 2008](#); [Uhde and Heimeshoff, 2009](#)). First, a bank’s desire to merge and become too big to fail should clearly increase systemic risk because the bank’s individual risk is socialized in the event of the bank’s default. Even more importantly, the existence of public safety net guarantees could also lead to a moral hazard problem that tempts bank managers to invest at too high a risk. Moreover, the decrease in the costs for monitoring competitors could be exceeded by the increase in the monitoring problems regarding the customer base and the operating cost structure of the target, thus increasing the individual default and systemic risk. This problem is even more severe for cross-border mergers, especially in the case of regulatory arbitrage. Financial institutions could be inclined to change the geographic location of their activities, thus shifting their poorly monitored risk to the taxpayers in other countries. As a result, regulatory arbitrage could increase the overall fragility of the financial system, which can be traced back to an increase in the individual banks’ default and systemic risk. A similar argument is brought forward by [Caminal and Matutes \(2002\)](#), who show that monopolistic banks are more likely to originate risky loans that can destabilize the entire financial

system. Similarly, the collusion of banks in the aftermath of bank mergers could further destabilize the financial system as joint defaults of customers become more likely (see [Boyd and De Nicolò, 2006](#)). Further results by [De Nicolò et al. \(2004\)](#) underline this “concentration-fragility” hypothesis by presenting empirical evidence for a positive relationship between concentration and banking system fragility using the Z-score methodology. The results by [Carbo-Valverde et al. \(2012\)](#) even suggest that European bank mergers between 1993 and 2004 were primarily driven by the bidders’ wish to shift risk onto the EU safety nets. Further studies by [Schaeck et al. \(2009\)](#) and [Schaeck and Čihák \(2010\)](#) confirm the “concentration-fragility” view as more competitive banking systems are shown to be less prone to systemic crises. In the context of non-financial companies, [Furfine and Rosen \(2011\)](#) even find that mergers always lead to increases in the merging firms’ default risk. However, contrasting results are found for banks by [Beck et al. \(2006a,b\)](#) who find that more concentrated banking systems exhibit less systemic risks. In summary, both the theoretical and the empirical literature are unclear on the effects of consolidation in banking on systemic risk.

We empirically test the above two hypotheses against each other and find evidence that strongly supports the “concentration-fragility” view. We measure an individual bank’s contribution to systemic risk by using the marginal expected shortfall (MES) methodology by [Acharya et al., 2010](#). Moreover, we propose a novel measure of extreme systemic risk, which captures the lower tail dependence (LTD) of an individual bank with respect to a bank sector index (in other words, the bank’s and the sector’s joint probability to crash together) and find comparable results for the two measures of systemic risk.<sup>4</sup> Using a sample of 440 international domestic and cross-border bank mergers that took place between 1991 and 2009, we show that bank mergers coincide with statistically and economically significant increases in the contribution of the acquirer to the systemic risk of the financial sector. This result holds regardless of what measure we use for estimating systemic risk and across our full sample.

It could be argued that the increase in the contribution of the acquirer to systemic risk we find is caused mechanically by the merger-related increase in the acquirer’s size. For example, while the acquirer becomes more systemically relevant, the combined contribution of the acquirer and the target could still decrease due to diversification effects. We find that this is not the case. Analyzing the systemic risk effects of the combined firms, our results show that the contribution of the combined firm to systemic risk is indeed significantly larger after the merger than the sum of the acquirer’s and target’s individual pre-merger contributions. Although our results show that the combined firm’s contribution to systemic risk increases on average, it could still be argued that overall financial stability improves, e.g., due to a decreased level of competition. To this end, we further compute the average changes in the MES of the merging banks’ competitors. Again, our results are in strong support of the “concentration-fragility” hypothesis as we find both economically and statistically significant increases in the competitors’ contribution to systemic risk after bank mergers.

Our main result holds up in a variety of robustness checks. Most importantly, we construct a control group of non-merging banks by matching merging banks with a competitor based on the banks’ total assets as well as their market-to-book values and check

<sup>4</sup> Since the recent financial crisis, several measures of systemic risk have been proposed in the literature. Other competing measures of systemic risk include the Systemic Risk Indicator by [Huang et al. \(2011\)](#), which is based on credit default swap (CDS) prices, measures of systemic connectedness proposed by [Billio et al. \(2012\)](#), which are based on principal-components analysis and Granger causality as well as the  $\Delta\text{CoVaR}$  measure of [Adrian and Brunnermeier \(2010\)](#).

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