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Transatlantic systemic risk

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ABSTRACT

In this paper we study systemic risk for the US and Europe. We show that banks' exposures to common risk factors are crucial for systemic risk. We come to this conclusion by first showing that relations between US and European banks are smaller than within each region. We then show that European banks react more strongly to the onset of the financial crisis than US banks. Regarding the consequences of systemic risk, we show that dependence between the banking sector and a wide range of real sectors is limited. Our results imply that regulators and supervisors should address international bank dependencies arising from common risk factors, while recessions in real sectors due to bank defaults should be a secondary concern.

1. Introduction

Where does systemic risk come from, and how should we regulate it? The first, most commonly cited mechanism causing banks to default jointly is contagion: Banks can be connected with one another because of direct bilateral exposures, e.g., through interbank loans or derivatives transactions entailing counterparty risk. In this case, regulation must specify limits to the exposure one bank can have towards another to prevent one default from causing a meltdown of the entire banking system. Second, if banks hold similar portfolios, a common shock may simultaneously affect all banks and also lead to the joint default of multiple banks. Then, the main role of regulation is to ensure that there is sufficient variation across the portfolios of different banks, or at least variation in the sensitivities of the portfolio values towards joint risk factors.

Both of these channels for systemic risk, contagion and conditional independence, have been discussed in the literature on joint defaults (see, e.g., Lando and Nielsen, 2010; Longstaff, 2010). However, evidence on which type of systemic risk dominates in the banking system is extremely scarce for three reasons. First, information at the portfolio level is, if at all, only available to supervisory authorities. Second, even supervisors often do not have disaggregate information on mutual exposures at the international level. Hence, the only study differentiating between common shocks and bilateral exposures that we are aware of analyzes US data (Helwege, 2010). An international setting, however, is crucial because distinguishing between a common shock and one originating within an individual bank is almost impossible at the national level. Third, even if it were available, portfolio-level information may not sufficiently reflect interbank exposures. Given most banks' limited exposures[3] towards Lehman, it is unlikely that balance-sheet based measures of systemic risk could have quantified the resulting declines of bank stocks and defaults of numerous financial institutions.

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[3] While Bank of America filed a 5.3 bn USD claim against Lehman, followed by Goldman with 2.5 bn USD, Bloomberg estimated the aggregate exposure for European banks *and* insurers to lie below 7.3 bn USD shortly after Lehman filed for bankruptcy on September 15, 2008. "European Banks, Insurers Have $7.3 Billion Exposure to Lehman", Fabio Benedetti-Valentini and Elisa Martinuzzi, September 18, 2008.

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In this study, we explore whether systemic risk arises from common shocks or contagion in an international setting. We focus on the two largest integrated economic regions in the world, the United States of America and Europe, because each constitutes an integrated banking market with homogenous regulation and a single predominant currency. We avoid the issue of obtaining portfolio exposures or balance sheet information by using the prices of traded assets, and directly infer systemic risk by adapting the copula approach of Buehler and Prokopczuk (2010) to credit default swap (CDS) premia.

We explore the importance of common shocks vs. contagion for the banking sector in two steps. First, we document that connections between US and European banks are low compared to those within each region. Second, we show that the onset of the Subprime Mortgage Crisis increased systemic risk in Europe much more strongly than in the US. This effect strongly points at a prevalence of common shocks: An increase in subprime mortgage loan defaults in the US is a local shock (as, for that matter, the Lehman bankruptcy). Since the connection between US banks is stronger than between US and European banks, a transmission of this shock through contagion would imply that systemic risk should increase *less* strongly in Europe than it does in the US.

We then turn to the implications of banking risk for the real sector. During the recent financial crisis, banks received financial support under the troubled asset relief program (TARP), the European Financial Stability Facility (EFSF), and the European Financial Stabilisation Mechanism (EFSM) due to concerns about a recession arising from another bank's default. This concern was well-grounded in historical experience, even prior to the Lehman bankrupcty: As Reinhart and Rogoff show in a series of papers (Reinhart and Rogoff, 2009a,b,c), banking crises are regularly followed by a drop in equity prices, output, and employment levels since real-sector firms rely on banks as a source of external funding. We therefore determine how strongly banks and firms from a wide range of real sectors are connected, again by applying our copula approach to CDS premia for these firms. This allows us to base our analysis on a large range of firms besides banking and insurance, for which regulatory guidelines demand publication of balance sheet information at an extremely detailed level (see, e.g., Furfine, 2003; Wells, 2004; Gauthier et al., 2010).

Interestingly, we find that banks do not play a central role: Firms from a given real sector are more strongly connected to both firms from the same real sector and to firms from any other real sector than they are to banks. Only other banks and non-bank financial firms are more strongly connected to banks than to real-sector firms. At first sight, this result appears surprising, because of the established role of banks in supplying loans to the real sector. However, the importance of banks in this respect can vary substantially. For example, a large group of small banks on average provides more loans than a small group of large banks, and banks with a larger focus on investment banking provide fewer loans than banks with a strong focus on commercial banking (Altunbas et al., 2002; Jia, 2009). Most banks in our sample are large, international banks. Therefore, our results imply that the default of a single large real-sector firm is more likely to lead to a recession than the default of a large, international bank.

In addition to the differentiation between common shocks and contagion, our study contributes to several strands of literature. First, we extend the broad body of literature on systemic risk for financial institutions. Studies that compare banks to other financial institutions (see, e.g., Billio et al., 2010; Bosma et al., 2012) mostly find that systemic risk is highest for banks. Very few studies (see, e.g., Harmon et al., 2010; Muns and Bijlsma, 2011; Buehler and Prokopczuk, 2010) compare systemic risk in the banking sector to systemic risk for non-financial firms, and come to the same conclusion: systemic risk is highest in the banking sector. We extend this literature by showing that the interdependence between banks and non-banks is low, compared to systemic risk within and between real sectors.

Studies analyzing the determinants of systemic risk identify bank size, interbank loan ratio, and the bank's country of origin (Elsinger et al., 2006a), linkages at the asset level and mutual credit relations (Elsinger et al., 2006b), and the bank's default probability (Huang et al., 2012) at the individual level as significant factors. We contribute to this literature by showing that the link between non-banks and banks is higher in Europe than in the US. This is in line with the greater importance of banks as a source of external financing in Europe (see, e.g., Demirguc-Kunt and Levine, 1999; Dermine, 2002; Kwok and Tadesse, 2006).

From a macro perspective, Kaminsky and Reinhart (1999) argue that a typical banking crisis begins with a period of financial liberalization, leading to an economic boom and an overvaluation of the local currency, which leads to a recession and a reinforcing banking and currency crisis. Multiple studies have explored this mechanism empirically, and come to the conclusion that adverse economic conditions coincide with higher systemic risk (see, e.g., Buehler and Prokopczuk, 2010; Bartram et al., 2007), and regions differ significantly regarding their susceptibility to contagion (Bae et al., 2003). In contrast, Bosma et al. (2012) study global relations between financial firms, and find that systemic risk has uniformly decreased since the onset of the financial crisis. We contribute on this macro perspective by showing how the financial crisis has intensified systemic risk in the US and Europe.

Second, we contribute to the literature on international relations between financial firms. The global banking system has become more integrated within the last 30 years (Garratt et al., 2011) for a variety of reasons: In addition to the active interbank markets, banks have branched out from their domestic to foreign markets, and the liberalization of financial markets has led to the creation of new financial products. As a result, banks are exposed to similar risk factors globally. However, these global factors do not obliterate the importance of regional factors (Bartram et al., 2007). Consistent with evidence by Hartmann et al. (2006) for banks in different EMU countries, we find higher financial integration within the US and within Europe than between the two regions. We also document the evolution of these differences over time, and show that they drastically decrease during the financial crisis.

Last, our results have implications for the structure of international financial regulation. For example, Went (2010) discusses the implications of the new focus on systemic risk in the Basel III framework, and Hanson et al. (2011) develop a framework for macroprudential instead of microprudential regulation. Blackmore and Jeapes (2009) study the consequences of one global financial regulator compared to a multi-regulator approach under international guidelines. Our results have two implications for this body of literature. First, monitoring exposures towards common shocks at the international level is a central issue no less important than monitoring bilateral exposures. Second, bailouts for large international banks which are termed "too big to fail" are not necessary to avoid spillovers to the real sector if the bilateral exposures between these banks and smaller banks supplying the majority of loans are properly monitored.

The remainder of the paper is structured as follows: In Section 2, we give an overview over the CDS time series used to compute systemic risk. We motivate and develop our systemic risk measures in Section 3, and present the empirical results of our study in Section 4. Section 5 summarizes and concludes.