



# Cross-border interbank networks, banking risk and contagion<sup>☆</sup>



Lena Tonzer<sup>\*</sup>

European University Institute, Economics Department, Villa San Paolo, Via della Piazzuola 43, 50133 Florence, Italy

## ARTICLE INFO

### Article history:

Received 12 January 2014  
Received in revised form 10 May 2014  
Accepted 12 February 2015  
Available online 19 February 2015

### JEL classification:

F21  
F34  
F65  
G21  
O16

### Keywords:

Financial contagion  
Financial integration  
Banking networks

## ABSTRACT

Recent events have highlighted the role of cross-border linkages between banking systems in transmitting local developments across national borders. This paper analyzes whether international linkages in interbank markets affect the stability of interconnected banking systems and channel financial distress within a network consisting of banking systems of the main advanced countries for the period 1994–2012. Methodologically, I use a spatial modeling approach to test for spillovers in cross-border interbank markets. The results suggest that foreign exposures in banking play a significant role in channeling banking risk: I find that countries that are linked through foreign borrowing or lending positions to more stable banking systems abroad are significantly affected by positive spillover effects. From a policy point of view, this implies that in stable times, linkages in the banking system can be beneficial, while they have to be taken with caution in times of financial turmoil affecting the whole system.

© 2015 Elsevier B.V. All rights reserved.

## 1. Introduction

Banking has become more international over the last 20 years. This development can have beneficial effects, such as channeling financial resources to their most productive uses or improving consumption smoothing and risk-sharing possibilities. However, it also raises a broad range of questions (Agénor, 2003; Allen et al., 2011). Among others, do cross-border linkages in banking make countries more susceptible to contagion risk? Do interconnected systems facilitate the transmission of economic developments

across national borders? Understanding dynamics in intertwined banking systems is essential for the assessment of systemic risks in the financial system and the design of efficient regulatory answers.

From the related theoretical literature, it is well-known that the network topology has an important effect on the probability of contagion (Allen and Gale, 2000; Allen et al., 2012; Gai and Kapadia, 2010). Under this perspective, it seems surprising that the existing empirical literature is relatively scarce. For example, Minoiu and Reyes (2013) study characteristics of the network structure of the global banking network. They find that connectivity is relatively volatile. Interconnectedness decreases during and in the aftermath of systemic financial crises. Their focus is on descriptive statistics of network measures. The effect of characteristics of the network composition on stability is, however, rarely analyzed in the international banking literature. Thus, the aim of this analysis is to detect whether the internationalization of banking systems in the form of cross-linkages and the network they form affects contagion risk.<sup>1</sup>

The empirical part of the paper is related to different strands of literature. First, there is an increasing number of studies analyzing cross-border exposures in banking. On the one hand, various

<sup>☆</sup> I am grateful to Elena Carletti and Massimiliano Marcellino for continuous advice and encouragement. A special thanks goes to Claudia Buch for many valuable suggestions. I would also like to thank Söhnke M. Bartram, Sylvain Benoit, Peter Hansen, Marlene Karl, Michael Koetter, Katja Neugebauer, Marco Mazzoli, Gianni de Nicolò, Felix Noth, Bruno Parigi, Eleonora Patacchini, Christian Pierdzioch, Esteban Prieto, two anonymous referees and conference participants at the European University Institute, Otto von Guericke University of Magdeburg, Oesterreichische Nationalbank, Helmut Schmidt University and Università Politecnica delle Marche (MoFiR) for useful comments. Florian Huefner and Annika Bacher have provided efficient research assistance. Furthermore, I am thankful to the Bank for International Settlements for kindly providing data and to Sebastian Goerlich for his availability. All errors and inaccuracies are solely my own responsibility.

<sup>\*</sup> Present address: Halle Institute for Economic Research, Kleine Maerkerstrasse 8, 06180 Halle (Saale), Germany. Tel.: +49 345 7753 835.

E-mail address: [lena.tonzer@eui.eu](mailto:lena.tonzer@eui.eu)

<sup>1</sup> In this paper, contagion relates to the idea that events in one country spill over to another country through linkages in the banking sector. Thus, contagion and spillovers are used as synonyms.

papers analyze determinants of changes in cross-border exposures. However, they leave unclear whether these changes have an effect on the stability of the related country. For example, [Cetorelli and Goldberg \(2011\)](#) show that cross-border lending to emerging economies diminished during 2007–2009. This was mainly the case for foreign lending banks located in a country suffering an adverse liquidity shock. On the other hand, [Lane and Milesi-Ferretti \(2011\)](#) look at the effect of changes in financial linkages on economic stability. However, they do not consider whether these linkages change in response to developments in another, interlinked country. Additionally, there are studies that analyze factors that might cause banking crises or determine the stability of banks ([Beck et al., 2006](#); [Boyd et al., 2009](#)). These studies often ignore effects from international exposures of a banking system, and they tend to be based on bank-level data. In contrast, this paper analyzes the stability of banking systems using country-level data.

Second, studies such as [Upper and Worms \(2004\)](#) and [Degryse et al. \(2010\)](#) more closely match the basic idea of theoretical models.<sup>2</sup> In their setup, a bank/banking system suffers a shock that can be transmitted to other banks/banking systems through linkages among the individual entities. Relying on simulation techniques, [Degryse et al. \(2010\)](#) find that liquidity shocks specific to one entity can cause a breakdown of the whole financial system. These studies are, in most cases, based on aggregate balance sheet positions of banks. This is due to the lack of disaggregated data on exposures between banks. Mutual linkages are simulated under the assumption that total interbank positions are distributed equally across counterparties. This is a strong assumption that might drive the results. Additionally, these studies are often restricted to the analysis of contagion within one country and for one time period.

The third strand resolves the last mentioned problem and analyzes the transmission of shocks across countries using real data. A recent example is [Eickmeier et al. \(2011\)](#), who study the impact of US financial shocks on nine major advanced economies. Instead of imposing shocks and simulating their impact in simplified model frameworks, they obtain shocks from a Financial Condition Index. The resulting effects and the underlying transmission channels are analyzed in a FAVAR model. However, there is no specific focus on linkages among banking systems and their network structure.

This analysis, in turn, uses real data on bilateral cross-border exposures in banking to answer the following questions: Does the internationalization of banking systems in the form of cross-linkages have an effect on the stability of banking systems? If so, what role does the underlying network structure play? Methodologically, evaluating spillovers within a network is not straightforward, as intertwined network structures have to be taken into account. For example, think of changes in fundamentals in country A that have an effect on its banking system. If banks in country A maintain linkages to banks in country B, there can be a spillover to the banking system in country B. Furthermore, banks in country C, which are linked to the banking system in country B, may also be affected by direct changes in B and may be indirectly affected by the events taking place in country A.

This argument can be continued, and it indicates that a proper econometric modeling approach to banking stability faces the challenge of considering not only the effects of country-specific characteristics but also the possibility of spillovers from connected systems. To do exactly this, I make use of a spatial modeling approach similar to that of [Cohen-Cole et al. \(2011\)](#) or [Liedorp et al. \(2010\)](#). This econometric technique enables analysis of how banking stability in one country is affected by events in other countries

while accounting for interbank linkages among them. Effects stemming from changes in interbank asset or liability positions can be separated from spillovers arising from lending or borrowing to more or less stable banking systems. The empirical analysis is based on annual data for banking systems of the main advanced countries over the period 1994–2012.

The paper contributes to the existing literature in several ways. First, the analysis links the empirical estimation approach to the framework and results found in theoretical work such as [Allen and Gale \(2000\)](#). Second, the empirical strategy specifies a spatial model. This estimation method enables the study of spillovers of instabilities within a network, though it has rarely been used in the related literature. Third, I use data on bilateral cross-border banking exposures from the locational banking statistics of the Bank for International Settlements (BIS). This contrasts with most of the existing literature, which analyzes cross-border contagion relying on aggregate rather than bilateral exposures or focuses on international trade and stock market data ([Forbes and Rigobon, 2002](#); [Kali and Reyes, 2010](#)).

The results indicate that cross-border interbank linkages are indeed a significant channel of banking risk across countries. Both credit risk arising from foreign asset positions and exposures on the liability side of the balance sheet are decisive. Banking systems of countries that are linked to more stable counterparties seem to benefit from cross-border linkages. The paper is organized as follows. Section 2 gives the theoretical motivation behind the empirical analysis. In Section 3, the data used in the study are explained. The econometric approach is described in Section 4. In Section 5, I present the results and investigate their sensitivity. The final section concludes the paper.

## 2. Theoretical motivation

Theoretical network papers suggest that interconnections in the banking system create channels that can transmit shocks between different units ([Allen et al., 2009](#); [Allen and Babus, 2009](#)). A straightforward application of these concepts is provided by [Allen and Gale \(2000\)](#). Their basic idea is that overlapping claims connect different regions. This facilitates redistributing liquidity between regions and provides liquidity insurance. At the same time, excessive liquidity shocks can cause contagion through cross-holdings of deposits. An important result is that the probability of contagion depends on the degree of interconnectedness.

Although there was an increase in the theoretical literature on systemic risk and shock propagation in networks, a thorough understanding of how interactions in networks affect systemic stability is still missing ([European Central Bank, 2010](#); [Schweitzer et al., 2009](#)). This especially holds in empirical terms. This is mainly due to two reasons: first, the non-availability of disaggregated data, and second, a lack of appropriate empirical methods that account for time-varying network structures and systemic interactions between network nodes. This paper intends to advance in this direction. First, I derive key hypotheses about the relationship between cross-linkages in banking and the trade-off between risk-sharing possibilities and contagion risk. Second, the implications are tested in an empirical model.

**Hypothesis 1.** Interconnections in banking allow for improved risk-sharing possibilities among banking systems. At the same time, however, they can favor the spread of shocks through the banking system.

This hypothesis follows from the argument made by [Allen and Gale \(2000\)](#). In tranquil times, cross-linkages among banks enhance risk-sharing and liquidity allocation. In times of crisis, the spread of shocks across regions is facilitated. In the context of cross-border

<sup>2</sup> See also [Degryse and Nguyen \(2007\)](#), [Elsinger et al. \(2006\)](#) or [Upper \(2011\)](#).

Download English Version:

<https://daneshyari.com/en/article/999124>

Download Persian Version:

<https://daneshyari.com/article/999124>

[Daneshyari.com](https://daneshyari.com)