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# Does the bank risk concentration freeze the interbank system?



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### ABSTRACT

Probably, one test of the stability of the banking system is to evaluate how risky assets are distributed across banks' portfolios and the implications for the contagion via interbank relations. This paper explores theoretically a bank sector with risks concentration and the functioning of interbank markets. It employs a simple model where banks are exposed to both credit and liquidity risk that suddenly correlate over the business cycle. We show that risk concentration makes interbank market breakdowns more likely and welfare monotonically decreases in risk concentration.

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## 1. Introduction

A key feature of the 2007–2008 financial crisis has been the disruption and prolonged malfunctioning of interbank markets (see, e.g. [Acharya & Merrouche, 2013](#); [Afonso, Kovner, & Schoar, 2011](#); [Ciccarelli, Maddaloni, & Peydró, 2013](#); [Heider, Hoerova, & Holthausen, 2010](#)<sup>1</sup>) sometimes related to the interbank network structure ([Georg, 2013](#)<sup>2</sup>). This has come as a surprise to most observers, since interbank markets have been functioning smoothly historically, even in the face of severe stress episodes

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<sup>1</sup> [Ciccarelli et al. \(2013\)](#) find that financial intermediaries are extremely fragile in the EU. The ECB effectively partly substituted the interbank market and, in turn, induced a subsequent softening of lending conditions.

<sup>2</sup> [Georg \(2013\)](#) shows that networks with the central bank that intervene, solving market incompleteness, are more stable than random networks.

such as the LTCM failure (Furfine, 2000) and it attaches importance to policy interest rate for loan portfolio risk and bank liquidity as recent found in Giulioni (2015).

Theoretical research addressing why interbank markets may not function properly has provided explanations based on informational and market frictions such as: asymmetric information or market incompleteness (e.g. Acharya & Skeie, 2011; Flannery, 1996; Freixas & Jorge, 2008; Georg, 2013; Gale & Yorulmazer, 2012; Heider et al., 2010); information contagion where the poor performance of each bank conveys potential bad news about the common factor affecting loan returns (Acharya & Yorulmazer, 2008); market power (e.g. Acharya, Gromb, & Yorulmazer, 2012; Cai & Thakor, 2008); and malfunctioning secondary asset markets (e.g. Diamond & Rajan, 2005, 2008; Gorton & Huang, 2004, 2006).

Since the early 2000s, however, there has been increasing evidence of a positive relationship between measures of systemic risk in major banking systems and bank concentration.<sup>3</sup> This evidence raises the question of whether the correlation of risks possibly induced by higher bank risk concentration could have a significant impact on the functioning of interbank markets and welfare, and if so, why. To our knowledge, this question has not been addressed in the literature. A recent study discuss the international portfolio diversification of Miralles-Marcelo, del Mar Miralles-Quirós, and Miralles-Quirós (2015), but aside from the interbank market and the correlation between liquidity risk and credit risk.

Specifically, in this paper we explore the implications of banking system risk concentration for the functioning of interbank markets in a model where banks are exposed to *both* credit and liquidity risk. Indeed, as show in Cornett, McNutt, Strahan, and Tehranian (2011), Brunnermeier (2009), Covitz and Downing (2007) and Ericsson and Renault (2006) credit and liquidity risk may dramatically correlate over the business cycle especially during financial crisis. Moreover, Da Silva and Divino (2013) show that credit risk is pro-cyclical and default risk depends on structural features, underlining the banking regulation role in presence of credit and liquidity shocks.

The line of inquiry of this paper is related to, and builds on, the contributions by Ibragimov, Jaffee, and Walden (2011) and Wagner (2010, 2011), who show that inefficiencies may arise from individual bank diversification, which does not necessarily result in a more resilient banking system. However, these papers do not consider interbank markets and multiple sources of risks, such as credit and liquidity risk, as we do.<sup>4</sup>

We build a simple model along the lines of Diamond and Dybvig (1983) and Bhattacharya and Gale (1987) models, where banks are exposed to *both* credit and liquidity risk, and there are no informational or market frictions. The market failure in our economy is that contracts are incomplete and therefore, not all risks can be insured. Interbank market breakdowns are defined as parameter configurations under which there is no interbank market equilibrium, and banks implement autarkic allocations.

We show that an increase in the concentration of risks, possibly arising from concentrated market structures, makes interbank markets breakdowns more likely. Differing from the previous literature, our results are not driven by asymmetric information, market power or dysfunctional secondary markets. Rather, they are explained by credit and liquidity risks correlation as suddenly happens over the business cycle. As an example, the ability to diversify these risks may be prevented by *risk management diseconomies* associated with large sizes of financial institutions and the wide scope and complexity of their activities. Indeed, systemically important financial institutions (SIFIs) are seen as institutions

<sup>3</sup> Group of Ten (2001) concluded that "Evidence suggests that [risk] interdependencies between large and complex banking organizations have increased over the last decade in the United States and Japan, and are beginning to do so in Europe. Although a causal link has not been established, these increases are positively correlated with measures of consolidation." A positive relationship between bank concentration and measures of bank systemic risk is found in Boyd, De Nicolò, and Loukoianova (2009a) and Boyd, De Nicolò, and Jalal (2009b). During the periods of intense consolidation of the last decade, De Nicolò and Kwast (2002) found increased risk interdependencies among U.S. large and complex banking organizations. Risk profiles of large and complex U.S. and European banks were also found to have increased in the U.S. in Europe, and globally in De Nicolò, Hayward, and Bhatia (2004a), De Nicolò, Bartholomew, Zaman, and Zephirin (2004b), Stiroh (2004), Hartmann, Straetsman, and de Vries (2005), Stiroh and Rumble (2006), and Houston and Stiroh (2006).

<sup>4</sup> This paper can be viewed as also indirectly related to the papers by Gai et al. (2011) and Anand et al. (2012), as they analyze numerically how network connections and different exogenous interbank structures affect banks' short term funding but do not consider banks' choice of risk concentration and welfare implications, as we do (see Section 6).

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