ERSA Research Brief

October 2017

Information Contagion and Systemic Risk

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Systemic risk is a key concern for policy makers entrusted with safeguarding financial stability. It is defined as the risk of joint default of a substantial part of the financial system, resulting in large social costs. One major source of systemic risk is information contagion: when investors are sensitive to news about the health of the financial system, bad news about one financial institution can adversely spill over to other financial institutions. For instance, the insolvency of one money market mutual fund with a large exposure to Lehman Brothers spurred investor fears and led to a widespread run on all money market mutual funds in September 2008. In South Africa, the insolvency of African Bank spurred fears about the health of South African money market mutual funds and only decisive policy intervention prevented a widespread run akin to the one following the Lehman insolvency.

Despite this practical relevance, many aspects of systemic risk, and information contagion in particular, are not well understood. We examine the effect of ex-post information contagion, i.e. information spillovers following an adverse event, on the ex-ante level of systemic risk defined as the probability of joint bank default. Because of counterparty risk or common exposures, bad news about one bank reveals valuable information about another bank, triggering information contagion.

An investor in one bank will find information about another bank's profitability valuable for two reasons. First, both banks may have common exposure to an asset class, such as risky sovereign debt or mortgage-backed securities. Learning about another bank's profitability helps investors assess the profitability of its bank. Second, a bank may have lent to another bank, for example to share liquidity risk. Learning about the debtor bank's profitability will help investors in the creditor bank assess its counterparty risk.

We develop a model of systemic risk with information contagion. Our model features two banks, and systemic risk is defined as the probability of joint default. We contrast the cases with and without the arrival of in- formation about the other bank. Due to counterparty risk or common exposures, bad news about one bank can trigger the default of another bank. Information contagion is the amount of a bank's additional fragility due to such bad news.

Since a closed-form analytical solution cannot be obtained in many economically interesting cases, we compute the equilibrium of the withdrawal game for any choice of parameters numerically. We incur a small numerical error by discretizing the portfolio choice. However, this error becomes smaller as we refine the grid of portfolio choice variables. Our numerical results are confirmed for several interesting special cases for which we do obtain closed-form analytical solutions, thereby providing additional intuition to our model.

For a given ex-ante choice made by banks, information spillovers mechanically increase systemic risk. Once the portfolio choice adjusts given the potential of information contagion ex post, however, the effect of information contagion on systemic risk depends on the reason why information is valuable for investors. We obtain two results. First, the overall effect of information contagion due to common exposure is an increase in systemic, which we label the *instability effect*.

Second, information contagion due to counterparty risk, by contrast, reduces systemic risk. Banks respond by making more prudent ex-ante choices to counteract ex-post information contagion. Banks choose to expose themselves less to counterparty risk by engaging in less liquidity co-insurance and hold more liquidity themselves. Overall, this reduces systemic risk, which we label the *resilience effect*. The direct detrimental effect of information contagion on systemic risk is more than fully compensated for by an indirect beneficial effect via the ex-ante portfolio choice. Overall, systemic risk in the financial system is lower.

Taking these results together, the effect of information contagion on the level of systemic risk–via changes in banks' ex-ante choices in their portfolios and demand-deposit design–depend on the nature of the interbank linkage. While financial fragility increases when banks are linked via common exposure, financial fragility decreases when banks are linked via counterparty risk.