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Do social networks prevent or promote bank runs?☆

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ABSTRACT

We report experimental evidence on the effect of observability of actions on bank runs. We model depositors' decision-making in a sequential framework, with three depositors located at the nodes of a network. Depositors observe the other depositors' actions only if connected by the network. Theoretically, a sufficient condition to prevent bank runs is that the second depositor to act is able to observe the first one's action (no matter what is observed). Experimentally, we find that observability of actions affects the likelihood of bank runs, but depositors' choice is highly influenced by the particular action that is being observed. Depositors who are observed by others at the beginning of the line are more likely to keep their money deposited, leading to less bank runs. When withdrawals are observed, bank runs are more likely even when the mere observation of actions should prevent them.

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> "I recently asked a group of colleagues – and myself – to identify the single most important development to emerge from America's financial crisis. Most of us had a common answer: The age of the bank run has returned." Tyler Cowen, The New York Times (March 24, 2012)

1. Introduction

During the Great Depression, much economic loss was directly caused by bank runs (Bernanke, 1983). More recently, in 2007, the bank run on Northern Rock in the UK heralded the oncoming economic crisis. Since then, several banks in other developed countries have experienced runs, such as the Bank of East Asia in Hong Kong and Washington Mutual in the US. Run-like phenomena have also occurred in other institutions and markets such as money-market, hedge and pension funds (Baba et al., 2009; Duffie, 2010), the repo market (Ennis, 2012; Gorton and Metrick, 2012) and even in bank lending (Ivashina and Scharfstein, 2010). Other examples of massive withdrawals in these markets and institutions include the collapse of Bear Stearns, the Lehman experience and the depositors' run on Bankia, one of the biggest banks in Spain.

One of the leading explanations for the occurrence of bank runs concerns the existence of coordination failure among depositors (e.g., self-fulfilling prophecy). Depositors might rush to withdraw their money from a bank without fundamental problems if they think that other depositors will do so as well.[1] Diamond and Dybvig (1983) provide the seminal model of coordination problems among depositors. They represent the depositor coordination problem as a simultaneous-move game in which multiple equilibria emerge, one of which has depositors participating in a bank run. Although many researchers have continued to use and build on this model, descriptions of real-world bank runs (Sprague, 1910; Wicker, 2001) and statistical data (e.g., Starr and Yilmaz, 2007) make clear that depositors' decisions are not entirely simultaneous but partially sequential. Many depositors have information about what other depositors have done and react to this information when making their decisions (Iyer and Puri, 2012; Kelly and O Grada, 2000). As it is shown in Kiss et al. (2012a), the information flow among depositors might have policy implications (e.g., for the optimal design of deposit insurance); therefore understanding how observability of actions influences the emergence of bank runs is of first order importance.

This paper attempts to capture the effects of observability as a determinant of bank runs, an issue that has mostly been disregarded by the literature. In our model, we consider three depositors who differ in their liquidity needs. There are two patient depositors and one impatient depositor, so there is no aggregate uncertainty about the number of depositors of each type. Depositors decide in sequence whether to withdraw their deposit or to wait.[2] The impatient depositor withdraws for sure, whereas patient depositors get the highest possible payoff if they both wait. If at least one patient depositor withdraws immediately, we say that a bank run occurs.

To allow for observability of decisions, our model builds on the assumption that depositors are located at the nodes of a network and links enable observability. Hence, a link connecting two depositors implies that the depositor who acts later can observe the other depositor's action. Likewise, the depositor who acts earlier knows that her action is being observed. Using the standard convention in game theory we refer to simultaneous decision when depositors decide without knowing the actions chosen by other, even though decisions are made at different points in time. By contrast, sequentiality implies that previous decisions are known. In our case, the connected depositors play a sequential game, while the depositors who are not linked play a simultaneous game. The social network structure determines then the type of strategic interaction (simultaneous or sequential) and the information flow among depositors.

We study the impact of different network structures on the emergence of bank runs. We show theoretically that if the link between the first two depositors to decide (henceforth, link 12) is in place, no bank run arises in equilibrium (i.e., both patient depositors should wait). The link 12 (and not the information it transmits) thus represents a sufficient condition to prevent bank runs. If the link 12 does not exist, bank runs may occur in equilibrium. Hence, non-observability of initial decisions makes banks fragile (multiple equilibria).

The idea of the link 12 as a sufficient condition to prevent bank runs represents a clear-cut prediction to be tested in a controlled laboratory experiment. We thus designed an experiment to mimic the setup described above.

In line with our theoretical prediction, we find that those network structures that have the link 12 produce the smallest probability of bank runs and are the most efficient ones (i.e., generate the highest total payoffs). We also provide evidence that non-observability of decisions make banks fragile (bank runs are more frequent) but show that observability of decisions affects bank runs in a concrete manner as observing early withdrawals triggers runs as well.

Our findings are consistent with the individual decisions at the depositors' level. We observe that link 12 (as well as the link 13) significantly reduces depositor 1's withdrawal rate, with respect to the case of no links. Regarding depositor 2, the experimental data show the importance of the link 12. Depositor 2's likelihood of withdrawal is significantly lower when she observes a waiting, but is higher upon observing a withdrawal. The latter finding goes against the theoretical prediction.

[1] The degradation of market and bank fundamentals (e.g., macroeconomic shocks, specific industrial conditions, worsening quality of the management) is the other main explanation for the occurrence of bank runs (see for instance Allen and Gale, 1998; Calomiris and Gorton, 1991; Calomiris and Mason, 2003; Gorton, 1988). Ennis (2003) cites examples of bank runs that occurred in absence of economic recession and convincingly argues that although historically bank runs have been strongly correlated with deteriorating economic fundamentals, the coordination failure explanation cannot be discarded as a source of bank runs. Gorton and Winton (2003) provide a comprehensive survey on financial intermediation dealing in depth with banking panics.

[2] We will use "to keep the money in the bank" and "to wait" in an interchangeable manner.