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Bailouts and bank runs: Theory and evidence from TARP

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ABSTRACT

During the recent financial crisis, there were bank runs right after government bailout announcements. This paper develops a global game model of information based bank runs to analyze how the announcement of bailouts affects investors' bank run incentives. The equilibrium probability of bank runs is uniquely determined. I conclude that before the announcement, the existence of such bailout policy reduces investors' bank run incentives, but after the announcement, investors may run on the bank, since such an announcement reflects the government's information about the bad bank asset. The empirical evidence from TARP is consistent with my theory.

1. Introduction

Bank runs and government bailouts became more prevalent during the 2007–2009 financial crisis. In the years of 2008 and 2009, 165 banks failed in the US, in which bank runs are a notable cause. However, only 11 banks failed in the five years before 2008. Even for large financial institutions, there were runs on Northern Rock, Bear Stearns, IndyMac Bank, Washington Mutual, and AIG. The government interventions in the form of various bailouts in the banking sector during this crisis were also the largest in US history. Even though the stated goal of these interventions is to "restore confidence to our financial system",[1] several bank runs happened right after their bailout announcements.

In his description of bank runs during the 2007–2009 crisis, Brunnermeier (2009) wrote

> "…[on] March 11 [2008], …the Federal Reserve announced its $200 billion Term Securities Lending Facility. This program allowed investment banks to swap agency and other mortgage-related bonds for Treasury bonds for up to 28 days…. Naturally, they (market participants) pointed to the smallest, most leveraged investment bank with large mortgage exposure: Bear Stearns…….Bear's liquidity situation worsened dramatically the next day as it was suddenly unable to secure funding on the repo market."

For the case of Northern Rock, Shin (2009) wrote "On September 13, 2007, the BBC's evening television news broadcast first broke the news that Northern Rock had sought the Bank of England's support. The next morning, the Bank of England announced that it would provide emergency liquidity support. It was only after that announcement—that is, after the central bank had announced its intervention to support the bank—that retail depositors started queuing outside the branch offices."

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[1] Statement by Secretary Henry M. Paulson, Jr. on Actions to Protect the U.S. Economy, October 14, 2008. http://www.huntonfinancialindustryresourcecenter.com/uploads/file/Paulson%20statement.pdf.

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The above facts contradict the stated goal of government interventions to “restore confidence” . For these cases, bailouts did not prevent but triggered bank runs. In this paper, I will analyze the effect of bailout announcements on the probability of bank runs.

I consider the following environment. Investors put their funds in a bank. The bank invests these funds in an asset. The quality of a bank's asset is random. Investors choose whether to withdraw their investments early or to wait until the asset is mature. The liquidation of the investment is costly. The government and investors receive private noisy signals of the quality of the bank's asset after its realization. Government bails out a bank in the form of capital injection only if its signal is below some cutoff threshold, i.e., the government helps a bank that is in trouble.

With the model environment above, the announcement of bailouts may increase the probability of bank runs. I use the word “may” because there are two effects. The first one is the capital injection effect in the sense that money transfer to a bank reduces the probability of bank runs. The second is the signaling effect, i.e., the announcement signals the government's information that the bank's asset quality is low, which increases the probability of bank runs. The total effect depends on the magnitude of the two separate effects. The model implies that the probability of bank runs after bailout announcements depends on three factors. First, the probability of a bank run is higher if the bailout amount is smaller. The government providing any positive bailout amount has a constant information effect no matter what the bailout amount is. But the capital injection effect is stronger for a larger bailout. Second, the probability of a bank run is higher if the government signal is more precise. Once a bailout is announced, for the government with a more precise signal, investors will believe it is more likely that the bank fundamental is below the bailout cutoff. Third, the probability of a bank run is higher when the government uses a lower cutoff. Conditional on a bailout, investors deduce from a lower cutoff that the government believes the bank is worse.

The model also provides insights from an ex ante perspective. I consider two economies. The government in economy A commits never to bail out any banks. The government in economy B uses the above assumed exogenous strategy to bail out banks. The probability of bank runs may increase after the announcement of bailouts. However, ex ante, i.e., before the announcement of bailouts, the probability of bank runs in economy B is lower than the probability of bank runs in economy A, because the capital injection effect dominates in economy B. Signaling does not impact the investors' bank run incentives since the government has not announced yet whether the bank will be bailed out or not.

I provide suggestive evidence by studying government bailouts and bank runs during the 2008–2009 financial crisis. The bailouts are from the $700 billion TARP. I use two methods to measure the probability of bank runs, which complement each other with their distinctive advantages. I find evidence consistent with my previous arguments.

In the classic bank run work by Diamond and Dybvig (1983), there are multiple equilibria due to coordination failure, which cause policy analysis infeasible. Goldstein and Pauzner (2005) apply the global game technique to the classic Diamond–Dybvig framework to obtain a unique equilibrium. I add a government sector to their unique equilibrium framework to examine how government bailout announcements affect a bank's risk of experiencing runs. Global games with signaling in a currency crisis context have also been analyzed by Angeletos et al. (2006). Different from my unique equilibrium result, their work has an unappealing multiple equilibria feature by considering the feedback effect from investors' behavior to that of the policy maker. The work by Keister (2010) is closest in theme with mine in studying bailouts and bank runs, but focuses on the time inconsistency government problem. He concludes that it is optimal for the government to bail out banks when a crisis occurs by reducing the public good consumption. In contrast to his paper's focus on optimal policy and moral hazard by assuming bank runs as sunspots, my paper mainly pays attention to the endogeneity of probability of bank runs and to how policy affects that probability.

The rest of the paper proceeds as follows. The benchmark model is introduced in Section 2. A full model with an exogenous government bailout policy is presented in Section 3. Section 4 provides empirical evidence for the theoretical arguments. Section 5 concludes.

2. Benchmark model without information dispersion

The benchmark model without information dispersion is a variation of the Diamond–Dybvig economy (Diamond and Dybvig, 1983).

2.1. The economy

There are three periods, $t=0,1,2$, one homogeneous good, and a continuum [0, 1] of investors. Each investor has an endowment of one unit. They enter the economy in period 0, and consumption happens in either period 1 or 2, denoted by c_1 and c_2. The timing for consumption depends on their types. Investors do not know their types until period 1. There are two types of investors, patient and impatient. The fraction of impatient investors is λ. So the probability for an investor to become patient investors in period 1 is $1-\lambda$. The utility functions for patient and impatient investors are $u(c_1+c_2)$ and $u(c_1)$, respectively. The utility function, which is twice continuously differentiable and increasing, satisfies $u(0)=0$ and relative risk aversion coefficient, $-cu''(c)/u'(c)>1$ for any $c \geq 1$.

Investors can place their endowments in period 0 in an asset which in period 2 yields R with probability θ, or 0 with probability $1-\theta$, where $R>1$, and θ, the underlying fundamental of the asset, which determines the expected asset return,