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Do time deposits prevent bank runs?

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Abstract

In this paper the Diamond and Dybvig (J. Politic. Econ. 91 (1983) 401) model is extended by small consumption shocks; that is, an agent may encounter either a small shock or a big (full) shock. We show that a bank can issue liquid demand deposits and still avoid panics, if it also issues time deposits, which have a low liquidation value. Each agent splits his endowment between the two deposit types. If an agent later encounters a small, common consumption shock he withdraws demand deposits, whereas a big, rare shock requires that time deposits are also liquidated. Agents who withdraw only demand deposits benefit from liquidity.

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1. Introduction

Diamond and Dybvig (1983) present a model in which a bank issues liquid deposits to agents who are, ex ante, uncertain about their preferences over consumption sequences. This liquidity service makes, however, the bank susceptible to runs in which all agents panic and attempt to withdraw their deposits simultaneously. Bank runs can be prevented if the government insures deposits or by suspending the convertibility of deposits to cash. The suspension analysis is

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extended by Wallace (1988, 1990) who shows that the suspending bank allows agents to withdraw their deposits only at a discount.[1]

In this paper, the Diamond and Dybvig (1983) model is extended by small consumption shocks; that is, an agent may encounter either a small shock or a big (full) shock. We show that runs can be prevented without deposit insurance and suspension of convertibility if the bank raises both demand deposits and time deposits. The bank does not now create liquidity. Instead, it transforms the fixed liquidity of its assets to deposits with a varying degree of liquidity: liquid demand deposits and time deposits, which have a low liquidation value. Each agent then splits his endowment between the two deposit types. If an agent later encounters a small shock he withdraws only demand deposits, whereas a big shock requires that time deposits are also liquidated. The agents who avoid shocks maintain their deposits untouched. We regard these kinds of reactions to be realistic. The bank can offer liquidity insurance against small shocks, whereas the agents who encounter a big shock obtain the same utility level as when they are in autarky.

Three points are worthy of remark. First, bank runs can be prevented without deposit insurance. Hence, the negative incentive effects of the insurance can also be avoided. Second, the bank can provide valuable liquidity services even when it does not increase the total liquidity of the economy. This is diametrically opposed to the results of Diamond and Dybvig. Third, the model is consistent with the experience that the banks issue both demand and time deposits. Banks do not only issue demand deposits as in the model of Diamond and Dybvig.

Our work is most related to Wallace (1996). The model presumes two agent types (patient and impatient). Agents have smooth preferences such that each of them will consume in both periods.[2] Since each agent will consume something at asset maturity, the agents are ready to invest a part of their endowment in a liability, e.g. equity, which yields returns only at maturity. If this part is large enough, the bank can raise enough equity to prevent runs. Three agent types exist in our setting.

[1] The Diamond and Dybvig (D and D) framework is utilized extensively. In Alonso (1996), a bank might design a deposit contract that prevents runs. An alternative contract with the property that runs will occur with a positive probability may, however, provide depositors with higher ex ante utility. The same problem is studied by Cooper and Ross (1998). Chen (1999) examines contagious runs: failures of other banks provide very noisy information to poorly informed depositors who may respond to this information by rushing to their own banks and withdrawing. Contagion effects are also examined by Temzelides (1997) who considers a repeated version of the D and D model. Diamond (1997) extends the D and D model by adding a financial market with limited participation and endogenizing the liquidity of assets. Banking system creates liquidity by providing liquid deposits to agents who do not participate in markets and by diverting demand for liquidity from markets. The D and D framework has also been used to analyze interest rate risk, Hellwig (1994), different deposit insurance policies, Hazlett (1997), and depositor's moral hazard, von Thadden (1997, 1998). Some authors, e.g. Qi (1994), extend the framework to an overlapping generations context, while others use it to analyze payment systems, e.g., Freixas and Parigi (1998). See Freixas and Rochet (1997) or von Thadden (1999) for a more exhaustive survey of this literature.

[2] Smooth preferences were first introduced by Jacklin (1987). See also Jacklin and Bhattacharya (1988).