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Over-the-counter loans, adverse selection, and stigma in the interbank market ☆

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ABSTRACT

We study a model of interbank credit where physical and informational frictions limit the opportunities for intertemporal trade among banks and outside investors. Banks obtain loans in an over-the-counter market (involving search, bilateral matching, and negotiations over the terms of the loan) and hold assets of heterogeneous quality that in turn determine their ability to repay those loans. When asset quality is not observable by outside investors, information about the actions taken by a bank in the loan market may influence prices in the asset market. In particular, under some conditions, borrowing from the central bank can be regarded as a negative signal about the quality of the borrower's assets and banks may be willing to borrow in the market at rates higher than the one offered by the central bank.

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1. Introduction

Occasionally, some banks in the U.S. have borrowed in the interbank market for loans (the fed funds market) at a rate higher than the one they would have paid to borrow from the central bank's discount window (Peristiani, 1998; Furfine, 2001; Darrat et al., 2004). This phenomenon is commonly explained as the result of a *stigma* effect attached to borrowing from the discount window. The general argument is that market participants may eventually identify which bank(s) have borrowed at the discount window and take this activity as a sign of weakness in the financial condition of the borrowing institution(s).

While most policymakers and empirical researchers consider the stigma hypothesis plausible, no formal treatment of the issue has ever been provided in the literature.¹ In this paper, we fill that gap by studying a model of interbank credit

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¹ Only recently, Philippon and Skreta (2012) provide an alternative framework that could be used to study stigma. They develop a model of adverse selection in the provision of credit in which participation in government programs can influence the terms of trade available to agents. Their focus is on the design of optimal government interventions, not in the origin or implications of stigma.

where: (1) banks benefit from engaging in intertemporal trade with other banks and with outside investors; (2) physical and informational frictions limit those trade opportunities; and (3) under some conditions a stigma effect like the one commonly associated with the regularities in the data can arise in the model.

The objective in this paper is not to assess the extent to which stigma is prevalent in the U.S. fed funds market. Rather, we take as a starting point that policymakers consider stigma a cause of concern. As an example, while still serving as Fed governor, [Kohn \(2010\)](#) said: “The problem of discount window stigma is real and serious.” In this paper, we intend to provide a detailed formal analysis of the microeconomic foundations of an instance of stigma that is consistent with the more informal explanations commonly provided in policy circles. Among other things, this analytical approach allows us to identify essential elements that form the basis for those explanations.

Understanding the apparent reluctance of banks to use the discount window is crucial to be able to address many important policy issues. For example, the prevalence of stigma may limit the ability of the central bank to effectively implement a “hard ceiling” on the range of interest rates observable in the interbank market. Partly in an effort to address such issues the Federal Reserve completely revised the terms of operation of its credit facilities in 2003. In spite of such efforts, evidence suggesting the presence of stigma could still be found in the data after the change ([Furfine, 2005](#)).

More recently, the reluctance of banks to borrow from the window bedeviled the central bank’s attempts to provide funding support to institutions during the crisis. As explained by [Bernanke \(2009\)](#), “In August 2007, ... banks were reluctant to rely on discount window credit to address their funding needs. The banks’ concern was that their recourse to the discount window, if it became known, might lead market participants to infer weakness – the so-called stigma problem. The perceived stigma of borrowing at the discount window threatened to prevent the Federal Reserve from getting much-needed liquidity into the system.”

The creation of the Term Auction Facility (TAF), and some of its particular organizational features, can be regarded as an attempt to limit the possibility of stigma associated with accessing this source of central bank liquidity.² In this paper, we will discuss specific conditions under which stigma may arise in the context of a formal model. We believe that the resulting insights are useful for evaluating alternative arrangements and policy options aimed at reducing the incidence of stigma in the interbank market.

Banks in our model obtain loans in an over-the-counter market, involving search, bilateral matching, and negotiations over the terms of the loans.³ To repay those loans, banks sell assets of heterogeneous quality to outside investors. When asset quality is observable by loan counterparties but not by investors, information about the experience of the bank in the loan market may influence the price at which the bank can sell in the asset market. In this situation, discount window borrowing may become a negative signal of the quality of the borrower’s assets. When this happens, some of the banks in our model – just as in the data – are willing to borrow in the interbank market at a higher rate than the one they would pay at the discount window.

Aside from the possibility of stigma, our model generates other interesting outcomes even when discount window borrowing is not possible. For example, we find that there is a strong equilibrium interconnection between the outcomes in the interbank market and the asset market. In particular, when participants in the interbank loan market expect disruptions in the asset market (due to adverse selection) they will not be willing to lend to other banks and, as a result, the interbank market effectively shuts down.⁴

We make some simplifying assumptions in our model. It is fairly easy to see that many of them could be readily generalized. However, our main objective here is to formalize in as simple a framework as possible an argument that is often used to explain certain apparently abnormal trading patterns in the U.S. interbank market for funds. Abstracting from some features of reality allows us to better capture the basic mechanism at play and to identify the main components of the logic involved. Some of these components may not have been fully appreciated before; for example, market frictions and bilateral negotiations play a critical role in our formal explanation of the phenomenon but do not often appear in policy discussions. We believe that highlighting these important components is one of the main contributions of our paper.

The model we develop combines several elements that are commonly regarded as important in explaining the nature of financial (and, in particular, interbank) market outcomes. First, as in [Freeman \(1996\)](#) and the large literature that followed, spatial separation plays a key role in limiting the ability of some agents (banks) to trade with other agents (outside investors) at a certain point in time. Second, search and bilateral negotiations determine the terms of trade in the interbank market, as in [Afonso and Lagos \(2011\)](#).⁵ Third, informational asymmetries and asset-quality heterogeneity play a crucial role in determining equilibrium interest rates and prices (as in, for example, [Eisfeldt, 2004](#)). Furthermore, the theory in this paper is in line with the long tradition, launched by [Leland and Pyle \(1977\)](#), of studying the role of signaling in financial markets.

² “The TAF, apparently because of its competitive auction format and the certainty that a large amount of credit would be made available, appears to have overcome the stigma problem to a significant degree.” ([Bernanke, 2008](#)). See also [Armantier et al. \(2008\)](#) and (2011).

³ [Bartolini et al. \(2005\)](#) and [Bech and Klee \(2011\)](#) convincingly argue that the relative bargaining power of borrowers and lenders plays a significant role in the determination of interest rates in the fed funds market.

⁴ There is now a large literature providing formal treatment of various issues related to the functioning of the interbank market. Some prominent examples are [Bhattacharya and Gale \(1987\)](#), [Allen and Gale \(2000\)](#), and [Freixas and Holthausen \(2004\)](#). More recent contributions include [Freixas and Jorge \(2008\)](#), [Allen et al. \(2009\)](#), [Freixas et al. \(2011\)](#), [Bolton et al. \(2011\)](#) and [Acharya et al. \(2012\)](#). For a good discussion of this literature see the introduction of [Allen et al. \(2009\)](#).

⁵ [Ashcraft and Duffie \(2007\)](#) argue that these are realistic features of the U.S. interbank market for funds. See [Duffie et al. \(2005\)](#) and [Lagos and Rocheteau \(2009\)](#) for studies of the general implications of these frictions in financial markets.

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