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Credit mismatch and breakdown

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ABSTRACT

This paper studies the phenomenon of mismatch in a decentralized credit market where borrowers and lenders must engage in costly search to establish credit relationships. Our dynamic general equilibrium framework integrates incentive based informational frictions with a matching process highlighted by (i) borrowers' endogenous market entry and exit decision (entry frictions) and (ii) time and resource costs necessary to locate credit opportunities (search frictions). A key feature of the incentive compatible loan contract negotiated between borrowers and lenders is the interaction of informational frictions (in the form of moral hazard) with entry and search frictions. We find that the removal of entry barriers can eliminate incentive-based equilibrium credit rationing. More generally, entry and incentive frictions are important in understanding the extent of credit rationing and credit mismatch, while search and incentive frictions are important for understanding credit market breakdown.

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Time runs a close second to cash on every entrepreneur's list of scarce resources. (William E. Wetzel, Jr., The Portable MBA in Entrepreneurship, Wiley & Sons: New York, 1997, p. 185)

1. Introduction

Credit markets are far from perfect, capricious and susceptible to occasional *breakdown*. The widespread panics over the past two decades – the 1997 Asian financial tsunami and the 2008 financial crisis – have motivated economists to devote greater effort in studying the workings of credit markets and the accompanied problems. Although notable because of their severity and macroeconomic consequences, these recent events highlight the fragility of credit markets that have been observed historically and in countries under various phases of financial development. For example, in the late 1920s, nearly half of the several thousand cooperative credit associations in Burma had mushroomed from their peak. Cooperative credit breakdowns also occurred during the U.S. savings and loan crisis of the 1980s, in Uganda in the early 1990s and in Japan and Vietnam in the mid-1990s. Similar patterns emerge from specialized loan markets, such as the venture capital and angel investment markets, following the internet bubble of early 2000 and the recent financial collapse.

A commonly observed phenomenon during times of credit markets distress is the *mismatch* between borrowers and lenders, where there is *both* an excess demand for *and* an excess supply of loanable funds.¹ Kanoh and Pumpaisanchai

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¹ The concept of spatial mismatch was established in the labor literature by Kain (1968) who observes the co-existence of unemployment and job vacancies in Chicago and Detroit. Coulson et al. (2001) argue that the presence of search and entry frictions is crucial for explaining the spatial mismatch phenomenon beyond racial discrimination.

(2006) document the coexistence of an idle supply of funds and unfulfilled demand in Japan during its lost decade. Similar credit mismatches have been observed in several developing countries in Asia prior to the 1997 crises (cf. Hwang et al., 2007). In the presence of credit mismatches, funds remain under utilized despite the existence of potentially profitable but unexplored investment opportunities.² This not only generates undesirable social inefficiencies, but also increases the likelihood of a financial market crisis where credit markets can eventually cease to operate (breakdown). The importance of asymmetric information regarding borrower types or unobserved actions as an explanation for the turbulence of credit markets has been well advanced in the literature. Yet such informational asymmetries focus only on the unfulfilled demand for credit. They, by themselves, can neither account for credit mismatch nor the role it plays in determining credit-market participation and tightness (measured by the difficulty of both borrowers and lenders in establishing credit relationships) and the likelihood of breakdown.

To uncover the importance of credit mismatch and the underlying forces which may lead to the phenomena of breakdowns, this paper develops a decentralized model of credit which integrates frictions arising from both asymmetric information and the matching of borrowers and lenders.³ The decentralized nature of our credit market resembles the informal financial sectors of developing countries and rural loan markets, including merchant money lenders and cooperative credit institutions. By emphasizing the roots of financial development, we hope to better understand why these early credit markets were particularly vulnerable to catastrophic breakdowns.⁴ However, the dynamic matching framework is also consistent with three observations that are prevalent even in well-functioning credit markets. First, there is a continuous flow into and out of the credit market by borrowers, mostly small and medium-sized firms, that face entry barriers (entry frictions). Second, borrowing firms must race against time as they search for funding opportunities while lenders must also invest time and resources to convert their idle funds into active investments (search frictions). Third, part of the costs incurred in identifying viable credit relationships are information-based; lenders may face considerable risk given the uncertainty of the investment outcomes of borrowers (incentive frictions in the form of moral hazard).

The basic structure we propose is one in which borrowers and lenders choose whether or not to participate in a decentralized loan market where search for bilateral credit relationships is costly. Over time, the formation of credit relationships enables the financing of investment projects which yield a productive rate of return. These returns are divided up between the lender, in the form of an interest payment, and the borrower, in the form of residual profits. The incentive frictions that arise from asymmetric information allow the possibility of borrowers to abscond with the funds subject to a default cost. Hence, when loan contracts are negotiated they must be incentive compatible to overcome this moral hazard problem; credit rationing, where borrowers receive fewer funds than desired, may emerge endogenously. In equilibrium, optimal loan contracts and the extent of credit rationing are determined jointly with market liquidity (aggregate lending), borrower market participation (endogenous entry), and the tightness of the credit market (the excess demand for loans as measured by the ratio of unmatched borrowers to unmatched lenders).

The interaction of entry, search, and incentive frictions provides a rich structure with which to capture the flow of credit along both the intensive and extensive margins. In particular, we find that, in the absence of search frictions, the optimal incentive-compatible contract and the extent of credit rationing are independent of credit market tightness. While entry frictions are crucial for credit-market participation, market breakdown may still occur in the absence of entry barriers as long as both search and incentive frictions are present. However, even with entry and search frictions, credit market breakdown will never arise as an equilibrium outcome in a world without asymmetric information.

We also find that the equilibrium nature of the optimal loan contract varies with aggregate fundamentals as represented by borrower productivity. If productivity falls below a threshold that is determined by default costs, credit markets break down and cease to operate. When productivity begins to exceed this threshold, an active credit market arises but firms will be rationed. Even high productivity may be associated with rationing if the discount rate is sufficiently low or the length of the loan contract period is sufficiently short. Intuitively, a low discount rate raises the value of absconding with borrowed funds and a short contract duration lowers the value of the match for a borrower who must search again after the match is dissolved. Also, we find that credit market tightness and the extent of credit rationing are positively related when entry is exogenous. However, with endogenous entry, there generally does not exist a monotonic relationship between the two. That is, credit may continue to be rationed in a market where it is relatively easy for borrowers to locate lenders if high equilibrium interest rates induce firm exit out of the loanable funds market. Finally, we show that incentive frictions and entry frictions are important in determining the extent of credit rationing, while incentive and search frictions are important for understanding the likelihood of credit market breakdown. Moreover, eliminating entry barriers can completely rule-out incentive-based credit rationing in equilibrium, while search frictions continue to affect whether or not credit markets fail.

² One may think of the episode delineated in William Shakespeare's *The Merchant of Venice* as an example of credit mismatch. Specifically, the loan provided by the money lender (Shylock, who practices the unpopular "usury") to the merchant (Antonio) remains idle (to back up his friend, Bassanio, in his pursue a highly demanding girl, Portia), leaving potentially productive borrowers unfunded.

³ While not mutually exclusive, the difference between the two frictions is that the former emphasizes the limits on knowledge and the latter emphasizes the limits on time.

⁴ The focus on rudimentary credit markets follows earlier works by Diamond (1990) and Becsi et al. (2005). Different than theirs, however, this paper considers incomplete information and endogenizes credit market tightness. A more detailed discussion will be relegated to the literature review at the end of the introductory section.

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