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LOAN MARKET EQUILIBRIUM WITH DIFFERENCE OF OPINION AND IMPERFECT COMPETITION

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Abstract:

Difference of opinion between banks and borrowers influences the competitiveness of loan markets: the more optimistic the borrowers, the more elastic the demand for loans. This reduces lending rates, decreases the expected profits of banks and discourages entry by banks.

JEL classification: D43, G21

***Keywords*:** banking, competition, optimism, difference in opinion, entry

1 Introduction

Most existing theoretical studies of loan markets adopt the view that potential borrowers, be they firms or consumers, know their ability to repay better than lenders do. Loan and project risk evaluations are, however, subjective by their very nature (Jaffee and Stiglitz 1990), suggesting that alternative information structures may also be empirically relevant. Following Chan and Kanatas (1985), de Meza and Southey (1996), Manove and Padilla (1999), and Allen and Gale (1999), I consider difference of opinion (belief asymmetry) as one such alternative. Unlike the previous studies that have mainly considered the effects of belief asymmetry on the form of the (optimal) loan contracts and lending decisions, this paper focuses on the implications of such belief asymmetry on loan market structure.

Along the lines of Besanko and Thakor (1992) and Chiappori, Perez-Castrillo and Verdier (1995), and many others, this paper applies the well-known model of spatial competition to banking.[1] The framework implies a demand for loans that is not infinitely price-elastic, and I augment it to allow for a belief asymmetry between borrowers and lenders. As it turns out, this yields an interesting insight on the interaction between the beliefs of the market participants and the degree of competition on the market. It is shown, in particular, that the lending rate is decreasing in the degree of borrower optimism on the market because the higher the optimism, the more weight the borrowers put on the lending rate and the more elastic the demand for loans that the banks face. This paper shows, too, that because the more elastic demand makes the market for loans more competitive, the rents of banks decline as the borrower optimism increases. The implication to market structure is that borrower optimism discourages entry by banks.

The remainder of the paper is organized as follows: in the next section, we present the basic model and the main results. Section 3 concludes.

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[1] The seminal reference is Salop (1979).

2 A Loan Market with Difference of Opinion

2.1 Model Framework

Consider a universally risk-neutral economy with spatial competition, where there are banks located on a unit circle and a continuum of borrowers with unit mass distributed uniformly along the circle. When travelling to a bank, the borrowers incur a 'transportation cost'. I let τ and x denote the cost per unit of length and the borrowers' location, respectively.

The loan market is characterized by (exogenous) belief asymmetry (cf. de Meza and Southey 1996). The borrowers' belief is that they each have access to a risky project generating a cash flow R with probability $0 < \alpha p < 1$ and 0 with probability $(1-\alpha p)$. The banks' view is, however, that the project generates the cash flow R with probability $0 < p \leq 1$, and 0 with probability $(1-p)$.

I exclude the possibility of banks holding biased beliefs by assumption, so the true probability of the good state occurring is p. In this framework, the degree of *borrower optimism* on the market is increasing in α. In particular, if $\alpha > 1$, the banks are less confident on the success of the project than the borrowers and the framework thus corresponds to the state of affairs studied by de Meza and Southey (1996). I follow their example, because in the course of their routine business, such as small business lending, banks are less likely than borrowers to hold biased beliefs. A reason for such asymmetry is that by its nature, a start-up loan, say, is typically a one-off experience for a borrower. The borrower therefore faces fewer opportunities for learning (and fewer evolutionary pressures to hold rational beliefs) than the banks (see also Arabsheibani, de Meza, Maloney and Pearson 2000).[2] I also assume that the beliefs are always such that the projects are considered creditworthy and that given their beliefs, the agents in the model maximize their expected utility.

The project size is (normalized to) unity, but the borrowers have no initial liquid wealth so that each project to be initiated is financed entirely by a bank loan.[3] The banks

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2 The model could, however, be easily extended to allow for 'lender optimism'.

3 It can be shown that the main result holds in a model in which the loan size is endogenised as in Besanko and Thakor (1992). The main result would also remain qualitatively unchanged if I instead assumed that the borrowers had some assets that they could pledge as collateral (cf. de Meza and Southey 1996).

compete for borrowers by lending rate offers; I let I_i denote the gross lending rate (one plus the interest rate) of bank *i*. The banks can raise funds at an interest (factor) ρ.

The timing of events is as follows: In *stage* 1, the banks compete for borrowers by announcing simultaneously I_i, to which they commit. In *stage* 2, the borrowers observe the offers and travel to the bank from which they would like to borrow.

2.2 Short-term Equilibrium

There are *n* banks that are assumed to have located themselves symmetrically on the circle. As usual, we focus entirely on full-scale competition, uniform pricing and a symmetric Nash equilibrium. I also require that τ is small enough to guarantee that the entire market will be covered in equilibrium.

Stage Two: The bank is able to attract the borrower located at distance *x* from bank *i* only if her participation constraint (PC) is satisfied and if bank *i*'s loan offer is more lucrative than the offers of rival banks. The PC is $\pi(I_i) - \tau x \geq 0$, where $\pi(I_i) \equiv \alpha p(R - I_i)$. Bank *i*'s offer is more attractive than those of its rivals if $\pi(I_i) - \tau x \geq \pi(\bar{I}) - \tau(1/n - x)$, where $I_j = \bar{I}$ for $j \neq i$. Under full-scale competition the total demand of bank *i* is $D_i \equiv 1/n + (1/\tau)(\pi(I_i) - \pi(\bar{I}))$ and bank *i*'s profit can be written as:

$$\Pi_i(I_i, \bar{I}) \equiv D_i\left(pI_i - \rho\right). \tag{1}$$

Stage One: Given the other banks' choices, bank *i* maximizes (1). It is a straightforward task to establish that $I^* = (1/p)(\rho + \tau/\alpha n)$ and that $dI^*/d\alpha = -\tau/np\alpha^2 < 0$. The following result ensues.

Proposition 1. *In a symmetric Nash equilibrium with belief asymmetry and fixed number of banks on the market, the lending rate is decreasing in the degree of borrower optimism,* α.

This result demonstrates that should the borrowers become more confident, the lending rate would decrease. The intuition behind $dI^*/d\alpha < 0$ is that as the borrowers' optimism regarding the quality of their projects increases, the lending rate has a larger impact on their profit relative to transportation costs. This leads to a more elastic demand, increases the competitiveness of the loan market, and reduces the lending rate.[4]

2.3 Long-term Equilibrium

In this section I ask, whether and if so, how is entry by banks influenced by the difference in opinion. To allow for endogenous *n*, I introduce an entry stage into the model and assume that there is a unit cost of *F* of setting up a bank (cf. Chiappori et al. 1995). The number of banks in the market is determined by the Chamberlinian free-entry condition, i.e., $\Pi^*(n^*) = 0$.

As perceived by each bank, its expected profits net of entry costs are $\alpha\tau / n^2 - F$. Under the free-entry condition, the number of banking firms in the market is

$$n_m = \sqrt{\tau / \alpha F}\ . \qquad (2)$$

The associated free-entry lending rate is $I_L^* = (1/p)\left(\rho + \tau \big/ \left(\sqrt{\tau\alpha / F}\right)\right)$. By differentiating (2) and I_L^* the following result is obtained.

Proposition 2. *Both the size of the banking sector and the free-entry lending rate are decreasing in the degree of borrower optimism, α.*

To grasp the intuition behind proposition 2, note that the expected profit per loan granted, $pI_L^* - \rho = \tau\left(\sqrt{\tau\alpha/F}\right)^{-1}$, decreases as the borrower optimism increases. Entry is therefore *discouraged* by higher degree of borrower optimism since it decreases the lending rates and therefore the banks' expected profits.[5]

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4 Had I explicitly allowed for lender optimism, it would hold that when the banks' optimism on the project increases, the elasticity of demand is not affected, but the banks require a smaller premium over the marginal cost of funds to compensate for the expected risk of default.

5 Had lender optimism allowed for, the banks' more confident view on the borrowers' project would more than compensate the associated reduction in the profit (due to the decrease in the lending rate). Entry would hence be encouraged by an agent's (own) optimism.

2.4 Concluding Remarks

It is perhaps of interest to note that the result of discouraged entry by banks due to borrower optimism does not coincide with what would arise under asymmetric information in this circular road model. Under asymmetric information with free-entry, the number of entering banks remains finite even if $F = 0$ (Hyytinen and Toivanen, 2001). The reason is that when the demand for funds is not perfectly elastic and there is asymmetric information about the quality of borrowers, the marginal cost of funds cannot fully be passed-through on the lending rates. They cannot be passed-through, because the demand elasticity of 'good' borrowers is higher than that of 'bad' borrowers and because banks have to optimize with respect to the average demand elasticity of borrowers. As shown in Hyytinen and Toivanen (2001), this reduces banks' expected profits per loan granted and leads to a barrier to entry.

Finally, borrower optimism interestingly reduces the 'welfare loss' that (with unbiased beliefs) would stem from the excess entry by banks. In the standard circular road model entry can be excessive because an additional bank that enters receives rents larger than the transportation costs that are saved by borrowers (i.e., the socially optimal number of banks is $n_s \equiv \arg\min_n \left(\tau/(4n) + nF\right) = \frac{1}{2}\sqrt{\tau / F} < n_{m|\alpha=1}$). A welfare gain may therefore result from the borrowers holding biased beliefs because the more optimistic the borrowers are relative to the banks, the smaller are the banks' rents and the less eagerly they enter. However, this 'welfare result' need by no means be robust. As is well known, free-entry monopolistic competition can result in insufficient entry from the social viewpoint (Mankiw and Whinston 1986). In such cases borrower optimism, which will further lower the number of banks in the market, will be welfare decreasing. On the other hand, the assumption that everyone is served excludes the possibility that optimism increases the participation of some low productivity borrowers (which, if modelled explicitly, would reduce the average quality of borrowers).[6]

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[6] I would like to thank David de Meza for these observations.

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