



To screen or not to screen? Let the competition decide

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HIGHLIGHTS

- We explore the effect of market structure on banks' incentives to screen loan applicants.
- We develop a theoretical model of spatial competition.
- We take a post-crisis perspective that treats the number of banks as exogenous.
- Changes in market conditions distort the incentives of banks to invest in screening.
- Banks invest less in screening technology when competition is eroded.

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ABSTRACT

We develop a model of spatial competition to explore how changes in the market structure affect the incentives of banks to screen loan applicants. We take a post-crisis perspective that treats the number of banks as exogenous. Our findings reveal that the relaxation of competition distorts banks' incentives to invest in screening.

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1. Introduction

The late 2000s financial meltdown dramatically transformed the market conditions in the banking sector. A new landscape has been shaped due to the numerous mergers and acquisitions, which occurred in the wake of the crisis. In this context, many troubled banks either gone bankrupt or received financial assistance in the form of bailouts, which further fed the transformation of the structure of the banking market. As Calderon and Schaeck (2016) point out, financial crises spawn several reforms in banking such as recapitalisations, consolidations, and assisted failures, which substantially affect the degree of competition.

In view of these profound changes, a relationship which is once again at the forefront of academic and policy debates is that between market structure and banks' incentives to screen loan applicants. We examine this relationship from a theoretical viewpoint deviating from the bulk of the relevant literature

which takes a pre-crisis perspective assuming that the market structure is endogenous in the sense that it is determined by the entry decisions as dictated by the profitability in the sector. In our model setup, we take a post-crisis perspective and treat the number of banks as exogenous on the basis of the following two factors. First, the various government interventions in the form of bailouts, assisted failures, and non-market-based consolidations, which have been the key determinants of the banking market structure in the aftermath of the crisis. And, second, the fact that the banking industry has been subjected to heavy regulation all the years following the crisis. On the whole, the number of banks in the market is thought of as a policy makers' decision variable in our analysis.

The rest of the paper is structured as follows. Section 2 lays out the basic model of interbank competition in the credit market with banks engaged in screening activity. Section 3 characterises the equilibrium and discusses the results and the key implications. Section 4 summarises the paper and concludes.

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2. The model

We consider a model of spatial competition à la Salop (1979) with two classes of players: banks and entrepreneurs. Both are risk-neutral and live for one period, which is composed of Stage 1 and Stage 2.

Entrepreneurs are located symmetrically around a circle of length 1 and their total mass is normalised to 1. Each entrepreneur is endowed with a project that requires an investment of one unit of money. No initial wealth is assumed so that if a project is to be initiated, entrepreneurs must obtain credit from banks.¹ A project either succeeds with probability $p_\theta \in (0, 1]$ yielding a stochastic return $R(p_\theta) > 1$, or fails with $1 - p_\theta$ and returns nothing. The parameter θ describes entrepreneurs' type and takes the following two values: $\{h, l\}$, where h stands for high- and l for low-quality projects. It, therefore, holds that $p_h > p_l$ and $R(p_h) > R(p_l) > 1$, implying that $p_h R(p_h) > p_l R(p_l)$, i.e., the expected returns of a type- h project are always higher.

The fraction of entrepreneurs with high-quality projects equals to q ($0 < q < 1$), where q is common knowledge. That is, both parties know that in each point of the circle's periphery there is a mass q of entrepreneurs with h -type projects and a mass $(1-q)$ of entrepreneurs with l -type projects. The two-point distribution of θ is assumed to be public information. However, θ itself is observable only to entrepreneurs in the beginning of Stage 1. This means that entrepreneurs are aware of the quality of their own projects, while this information is not known to banks.

Each entrepreneur expresses his preference over a particular type of bank loan by travelling along the circumference at a per length transportation cost $\tau_\theta > 0$. Hence, preferences are assumed to be sufficiently heterogeneous to allow the relocation of entrepreneurs on the circle.² The distance $d_\theta > 0$ that an entrepreneur covers to reach a bank is a measure of his disutility to buy a less-than-ideal product. Subsequently, the total cost of buying one unit of money equals to the sum of the lending rate increased by the total transportation cost ($\tau_\theta d_\theta$) the entrepreneur is required to sustain to reach the bank of his preference.

The market consists of $n \geq k$ banks, which, like entrepreneurs, are also symmetrically distributed on the unit circle. Banks are profit maximisers and compete in prices, i.e., loan interest rates.³ Banks are faced with an informational problem in their lending decision as they do not know the exact type of applicants and thus the quality of the proposed projects. They, therefore, proceed to screen entrepreneurs to obtain their type. Since screening is a costly activity, a bank is capable of identifying the type of entrepreneurs at a cost $e \in (0, 1]$ per unit invested. A higher e corresponds to a higher screening cost, or, alternatively, to a more extensive screening effort. We assume that screening is non-contractible, so that banks cannot sell it to their customers as service; also, that the signal received is strictly proprietary in that it is not observable to any other bank in the market. Additionally, screening technology is perfect in the sense that the signal is not noisy. After distinguishing high- from low-quality projects, banks offer entrepreneurs a loan rate r_θ chosen from the set $\{r_l, r_h\}$. By being offered distinct rates, entrepreneurs learn the type which has been assigned to them and travel to the bank that satisfies their type to apply for credit.

It is important at this point to make a distinction between transaction and relationship banking.⁴ The former type of banking

involves arm's length transactions with borrowers rather than long-term relationships (Boot and Thakor, 2000). This business model treats each loan transaction as a single deal and focuses on the risk entailed in a loan contract. Also, under transaction-based banking practices, the price of the service rather than the relationship that the firm holds with the financial intermediary is the means of attracting a steady stream of business. Studies that shed the spotlight on this form of banking focus on a single banking service paying little or no attention on the synergies between different services, assume homogeneous banks in the sense that banks have no prior information on the risk profile of loan applicants, and examine the acquisition of 'hard' instead of 'soft' information. Our model combines all these features and, hence, our study falls into the area of transaction-based banking.

On the other hand, relationship banking is mainly focused on small business lending. It refers to the provision of a variety of financial services towards the establishment of long-term relationships of (mainly) small banks with customers through multiple interactions. Loans are packaged with other services so that the relationship with a borrower has a marketing value for the bank and, as such, the bank needs to consider the overall cost of rejecting a loan when choosing the optimal screening effort.⁵

Our model can be extended to a relationship-banking environment in two ways. First, if we assume a multi-product (instead of a mono-product) banking market where both loans and deposits are offered. In such a case, relationship banking can be examined on a stand-alone basis. Second, if we distinguish between incumbent and *de novo* banks where the former institutions lend to the same business for a second time and, hence, obtain an informational advantage compared to the latter institutions. In this case, relationship banking and transaction-based banking can be simultaneously examined. Both extensions are left for further research.

3. Equilibrium

At Stage 1, banks screen entrepreneurs and reveal their type. Banks then compete in the credit market by simultaneously making their price offers to entrepreneurs as appropriate. At Stage 2, entrepreneurs observe the loan rates and travel to the bank that offers the contract that is compatible with their type.

The equilibrium solution is obtained by backward induction. For any given r_θ , the expected net return of a type- θ entrepreneur is:

$$p_\theta [R(p_\theta) - r_\theta] - \tau_\theta d_\theta \quad (1)$$

An entrepreneur applies for credit only if his expected net profit is non-negative:

$$p_\theta [R(p_\theta) - r_\theta] - \tau_\theta d_\theta \geq 0 \Leftrightarrow d_\theta \leq \frac{p_\theta [R(p_\theta) - r_\theta]}{\tau_\theta} \quad (2)$$

Since $d_\theta > 0$, it holds that $\frac{p_\theta [R(p_\theta) - r_\theta]}{\tau_\theta} > 0$. Both p_θ and τ_θ are larger than zero, and, hence, $R(p_\theta) - r_\theta > 0$, i.e., $R(p_\theta) > r_\theta$. This condition stands for the project's viability constraint and shows that the return of an investment project must always outweigh the lending cost. In fact, this condition ensures that Eq. (2) is not violated.

Assuming that Eq. (2) holds with equality, we obtain:

$$d_\theta = \frac{p_\theta [R(p_\theta) - r_\theta]}{\tau_\theta} \quad (3)$$

Eq. (3) shows that it is not profitable for any entrepreneur to apply for a loan beyond d_θ . Since entrepreneurs have been informed the type that has been assigned to them in the beginning

¹ The term 'entrepreneurs' is, therefore, used interchangeably with the terms 'borrowers' and 'applicants' throughout the paper.

² The idea behind this is that entrepreneurs incur some disutility by conducting business with a bank that is not of their type.

³ We do not model competition on the deposit market assuming that the supply of deposits is perfectly elastic at an interest rate that is normalised to zero.

⁴ We thank an anonymous reviewer for this suggestion.

⁵ Bolton et al. (2013) provide an excellent discussion of the similarities and differences between relationship and transaction-based banking.

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