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Spatial competition in the banking system: Alternative lending technologies and collateral assets

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ABSTRACT

We design a geographical model of banking to examine the optimal use of alternative collateral types and lending technologies: transaction lending, asset-based lending and fixed asset lending. The optimal lending technology and collateral asset are shown to depend on the project quality and bank-borrower distance. Sometimes unsecured lending is optimal. Both loan interest and the share of secured loans may increase or decrease with the bank-borrower distance depending on the collateral type and lending technology. Finally we explore how credit scoring and deregulation intensify competition through distant multimarket banks. The change improves the welfare of borrowers. Asset-based lending with local firms offers a competitive advantage for small local banks.

1. Introduction

This theoretical paper studies via a spatial model the optimal use of alternative collateral assets and lending technologies. The setting poses several questions. What are the optimal lending technology and collateral assets? Do they depend on the bank-borrower distance or the borrower's quality? Do loan interest rates and the share of secured loans increase or decrease with the bank-borrower distance? What is the effect of new innovative lending technology, credit scoring, in this economic environment? The model builds on previous research on spatial competition in banking, lending technologies, collateral and credit scoring.

The paper extends the theoretical research on *spatial competition in banking*. This theory suggests two reasons why distance should serve as a deterrent to lending. First, in travel cost models, e.g. Chiappori et al. (1995), a borrower bears the distance-related travel costs incurred from visiting his bank. The bank charges uniform rates if it cannot observe the locations of borrowers. If the bank observes them, it may engage in spatial price discrimination; it optimally charges higher loan rates to those borrowers who are located closest to the bank. This theory is supported by the empirical findings of Degryse and Ongena (2005): loan rates decline with the distance between the firm and the lending bank and rise with the distance between the firm and competing banks. The second reason is asymmetric information. In Hauswald and Marquez (2006) the quality of the bank's information-generation process erodes with the bank-borrower distance. Since banks receive more credible signals about close-by borrowers, competing banks confront worsening adverse selection problems when they supply loans to distant firms. Therefore, an informed relationship lending bank can charge higher loan rates on closer-situated

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firms. The theory is supported by the empirical findings of Agarwal and Hauswald (2010).[1] Our paper extends this literature by studying alternative lending technologies and collateral assets in a spatial economy. Since it is difficult to examine our research problems in the framework of Chiappori et al. (1995), we have a bit different model. In the first stage we study a small town in which local banks are situated side by side. They compete for borrowers who are located either in the town or in the surrounding countryside at diverse bank-borrower distances. The locations of banks and firms are fixed. To finance a project, a banker needs information. He either monitors the quality of a borrower's project or evaluates his collateral assets. Three alternative lending technologies are available for each bank: transaction lending, asset based lending or fixed asset lending. The optimal lending technology is shown to depend on the type of collateral, on the need for monitoring and on the bank-borrower distance. In the second stage, financial innovations generate new groundbreaking lending technology: credit scoring. Large distant banks utilize credit scoring to make loan offers to the borrowers within the town economy, thereby eroding the geographic boundaries and tightening competition. The paper extends the work of Chiappori et al. (1995) by studying collateral and three loan technologies with diverse travel costs to find the optimal technology in various cases. Each bank can use each lending technology efficiently. That is, banks do not differ in their efficiency of technologies. Asymmetric information has no role in Chiappori et al. (1995) but it is important in Hauswald and Marquez (2006) as well as in our paper. In contrast to Hauswald and Marquez (2006), monitoring technology is assumed to be perfect in our model. In contrast to Chiappori et al. (1995) and Hauswald and Marquez (2006), secured loans are now available. In the cited articles, a bank has market power in the neighborhood. In this paper the location of banks is identical, the banks use the same lending technologies and only borrowers differ in their location. This leads to the perfect competition for the same borrower. The assumptions, most of all perfect monitoring technology, generate pure strategy equilibria. Chiappori et al. (1995) also have pure strategy equilibria whereas in Hauswald and Marquez (2006) a unique equilibrium in mixed strategies exists.[2]

Lending technologies are the second strand of the literature. Berger and Udell (2002, 2006) and Udell (2004) characterize optional lending technologies: asset based lending, fixed asset lending, transaction lending, relationship lending and credit scoring. There is relatively little theoretical and empirical research on lending technologies (especially asset based lending). Boot and Thakor (2000), Hauswald and Marquez (2006) and Inderst and Mueller (2007), however, investigate competition between relationship lenders and transaction lenders. As mentioned above, this paper studies three lending technologies: transaction lending, asset based lending and fixed asset lending. The study reveals that two alternative spatial scenarios occur. In scenario I a bank uses each lending technology near the bank. When the bank-borrower distance increases, travel costs make asset based lending unprofitable, and the bank applies two technologies: transaction lending and fixed asset lending. When the distance increases still, transaction lending becomes unprofitable and only fixed asset lending remains profitable. In scenario II a bank again uses each technology in its proximity. When the distance increases, transaction lending becomes unprofitable and the bank uses only two technologies. When the distance still grows further, asset based lending also becomes unprofitable and the bank grants only fixed asset loans. More commonly, fixed asset lending represents the most inexpensive lending technology for all distances if the quality of the collateral assets is good. Unfortunately, not all borrowers have this type of high grade collateral. Asset based lending is more expensive than transaction lending and thus the bank grants asset based loans only to the least creditworthy borrowers, who cannot get transaction loans because of their high risk. Under each lending technology, the maximal bank-borrower distance increases with the loan size.

Collateral has generated an abundance of research. Bester (1985) advances a screening theory. With respect to moral hazard, in Boot et al. (1991) collateral pledged by a risky borrower motivates him to exert effort in the project. Collateral also influences the incentives of lenders, who utilize it either as a substitute for (Manove et al., 2001) or complement to (Rajan and Winton, 1995) screening and monitoring efforts. Inderst and Mueller (2007) model an imperfectly competitive loan market in which a local relationship lender has an information advantage over large outside transaction lenders. The local lender inefficiently rejects marginally profitable projects but collateral mitigates this inefficient rejection.[3] The novelty of our study is to examine (i) the information costs of collateral, (ii) the effects of the bank-borrower distance on the optimal use of diverse collateral assets and (iii) the role of collateral in alternative lending technologies. A bank must acquire information on a collateral asset to ensure that its value covers the loan repayment. It is easy to evaluate high grade collateral (e.g. government bonds, real estate) but expensive to evaluate information intensive collateral assets (e.g. inventories, accounts receivables, patents, trademarks or copyrights). The information costs of collateral depend on the bank-borrower distance, because the number of costly bank-borrower contacts varies considerably between collateral assets. The setting introduces several questions. How do the bank-borrower distance and the type of the collateral asset affect the optimal use of collateral? Is an unsecured loan sometimes optimal? We discover that the share of secured loans in the economy may grow or drop with the bank-borrower distance. The share of secured loans may fall with the bank-borrower distance, if the collateral consists of information intensive assets, e.g. inventories and accounts receivables. This type of collateral requires frequent bank-borrower contacts. The number of contacts makes lending unprofitable if the bank-borrower distance is very long. In contrast, the share of secured loans may grow with the bank-borrower distance if collateral consists of high grade assets, e.g. real estate. This type of collateral requires fewer bank-borrower contacts than unsecured transaction lending. Thus, this type of secured loan may be profitable even if the bank-borrower distance is very long. Our mixed results are supported by

[1] See also Hauswald and Marquez (2003) and Stein (2002).
[2] For survey articles, see Degryse and Ongena (2004, 2008), Degryse et al. (2007) and Degryse et al. (2009).
[3] See also Inderst and Mueller (2006).