

Hyytinen, Ari

Working Paper

Loan market equilibrium with difference of opinion and imperfect competition

ETLA Discussion Papers, No. 748

Provided in Cooperation with:

The Research Institute of the Finnish Economy (ETLA), Helsinki

Suggested Citation: Hyytinen, Ari (2002) : Loan market equilibrium with difference of opinion and imperfect competition, ETLA Discussion Papers, No. 748, The Research Institute of the Finnish Economy (ETLA), Helsinki

This Version is available at:

<https://hdl.handle.net/10419/63667>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

ETLA

ELINKEINOELÄMÄN TUTKIMUSLAITOS

THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY
Lönnrotinkatu 4 B 00120 Helsinki Finland Tel. 358-9-609 900
Telefax 358-9-601 753 World Wide Web: <http://www.etla.fi/>

Keskusteluaiheita – Discussion papers

No. 748

Ari Hyytinen

LOAN MARKET EQUILIBRIUM WITH DIFFERENCE OF OPINION AND IMPERFECT COMPETITION

First version: January 2001

This revised version: June 2002

Forthcoming: Economics Letters

Address for correspondence: The Research Institute of the Finnish Economy (ETLA), Lönnrotinkatu 4B, 00120 Helsinki, Finland, Tel: +358 400 777086, Fax: +358 9 601753, Email: ari.hyytinen@etla.fi. I would like to thank Marcus Asplund, Pertti Haaparanta, Pekka Ilmakunnas, Esa Jokivuolle, Klaus Kultti, Rune Stenbacka, Tuomas Takalo, Otto Toivanen, Jukka Vauhkonen, the conference participants at the XXIV Symposium of Finnish Economists, and in particular David de Meza for helpful comments on the earlier versions of the paper. All errors are mine.

HYYTINEN, Ari, LOAN MARKET EQUILIBRIUM WITH DIFFERENCE OF OPINION AND IMPERFECT COMPETITION, Helsinki: ETLA, Elinkeinoelämän Tutkimuslaitos, The Research Institute of the Finnish Economy, 2002, 6 p. (Keskusteluaiheita, Discussion Papers, ISSN 0781-6847; No. 748)

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.

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

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:

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

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

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

The associated free-entry lending rate is $I_L^* = (1/p)\left(\rho + \tau/\left(\sqrt{\tau\alpha/F}\right)\right)$. 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

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 $n_s \equiv \arg \min_n (\tau/(4n) + nF) = \frac{1}{2} \sqrt{\tau/F} < n_{m|\alpha=1}$). 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

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

References

- Allen, F., and D. Gale, 1999, Diversity of opinion and financing of new technologies, *Journal of Financial Intermediation* 8, 68-89.
- Arabsheibani, G., D. de Meza, J. Maloney, and B. Pearson, 2000, And a vision appeared unto them of a great profit: evidence of self-deception among the self-employed, *Economics Letters* 67, 35-41.
- Besanko, D., and A. V. Thakor, 1992, Banking deregulation: Allocational consequences of relaxing entry barriers, *Journal of Banking and Finance* 16, 909-932.
- Chan, Y-S., and G. Kanatas, 1985, Asymmetric valuations and the role of collateral in loan agreements, *Journal of Money, Credit and Banking* 17, 84-95.
- Chiappori, P-A., D. Perez-Castrillo, and T. Verdier, 1995, Spatial competition in the banking system: Localization, cross subsidies and the regulation of deposit rates, *European Economic Review* 39, 889-918.
- de Meza, D., and C. Southey, 1996, The borrower's curse: Optimism, finance and entrepreneurship, *Economic Journal* 106, 375-386.
- Hyytinen, A. and O. Toivanen, 2001, Asymmetric information and the market structure of venture capital industry, The Research Institute of Finnish Economy (ETLA) Discussion Papers, No. 768.
- Jaffee, D., and J. Stiglitz, 1990, Credit rationing, in: B.M. Friedman and F. H. Hahn, eds., *Handbook of Monetary Economics*, Vol. II. (Elsevier Science Publishers).
- Mankiw, N. G. and M. D. Whinston, 1986, Free entry and social inefficiency, *Rand Journal of Economics* 17, 48-58.
- Manove, M., and J. Padilla, 1999, Banking (conservatively) with optimists, *Rand Journal of Economics* 30, 324-350.
- Salop, S., 1979, Monopolistic competition with outside goods, *Bell Journal of Economics* 8, 378-393.

ELINKEINOELÄMÄN TUTKIMUSLAITOS (ETLA)

THE RESEARCH INSTITUTE OF THE FINNISH ECONOMY

LÖNNROTINKATU 4 B, FIN-00120 HELSINKI

Puh./Tel. (09) 609 900

Telefax (09) 601753

Int. 358-9-609 900

Int. 358-9-601 753

<http://www.etla.fi>

KESKUSTELUAIHEITA - DISCUSSION PAPERS ISSN 0781-6847

- No 718 JUHA HONKATUKIA, Kotimaisen päästökaupan kokonaistaloudelliset vaikutukset Suomessa. 13.06.2000. 37 s.
- No 719 JUHA HONKATUKIA, Arvioita energiaverotuksen taloudellisista vaikutuksista Suomessa. 13.06.2000. 43 s.
- No 720 RITA ASPLUND, Private Returns to Education in Finland: Back to Basics. 20.06.2000. 14 p.
- No 721 RITA ASPLUND, Inhimillinen pääoma ja palkat Suomessa: Paluu perusmalliin. 20.06.2000. 14 s.
- No 722 HANNU HERNESNIEMI, Evaluation of Estonian Innovation System. 30.06.2000. 68 p.
- No 723 MARKUS PAUKKU, European Union and United States Trade Relations. 01.08.2000. 14 p.
- No 724 HELI KOSKI, Regulators and Competition Spurring or Retarding Innovation in the Telecommunications Sector? 03.08.2000. 21 p.
- No 725 HELI KOSKI, Feedback Mechanisms in the Evolution of Networks: The Installed User Base and Innovation in the Communications Sector. 03.08.2000. 16 p.
- No 726 KARI E.O. ALHO, Implications of EMU on Industrial Relations – The Country Report on Finland. 17.08.2000. 83 p.
- No 727 ESA VIITAMO, Metsäklusterin palvelut – kilpailukykyanalyysi. 21.08.2000. 70 s.
- No 728 ERKKI KOSKELA – MARKKU OLLIKAINEN, Optimal Forest Conservation: Competitiveness versus Green Image Effects. 31.08.2000. 22 p.
- No 729 SINIMAARIA RANKI, Does the Euro Exchange Rate Matter? 01.09.2000. 24 p.
- No 730 TOPI MIETTINEN, Poikkeavatko valtionyhtiöt yksityisistä? – Valtionyhtiöiden tavoitteiden kehitys ja vertailu yksityisomistettuihin yrityksiin. 05.09.2000. 41 s.
- No 731 ERKKI KOSKELA – RONNIE SCHÖB – HANS-WERNER SINN, Green Tax Reform and Competitiveness. 06.09.2000. 15 p.
- No 732 MATTI VIRÉN, Financing the Welfare State in the Global Economy. 06.09.2000. 16 p.
- No 733 LAURA PAIJA, ICT Cluster – The Engine of Knowledge-driven Growth in Finland. 07.09.2000. 29 p.

- No 734 STEFAN NAPEL – MIKA WIDGRÉN, Inferior Players in Simple Games. 14.09.2000. 35 p.
- No 735 KARI E.O. ALHO, Optimal Fiscal and Monetary Policies in a Recession: Is There a Way Out of the Trap in an Open Economy? 26.09.2000. 34 p.
- No 736 ERIK PLUG – WIM VIJVERBERG, Schooling, Family Background, and Adoption: Is it Nature or is it Nurture? 27.09.2000. 22 p.
- No 737 ERKKI KOSKELA – MATTI VIRÉN, Is There a Laffer Curve between Aggregate Output and Public Sector Employment? 10.10.2000. 19 p.
- No 738 PASI HUOVINEN, Työhön ja vapaa-aikaan liittyvä matkailu Helsinkiin. Analyysi majoitus-tilastosta. 24.10.2000. 21 s.
- No 739 HANNU PIEKKOLA, Unobserved Human Capital and Firm-Size Premium. 08.11.2000. 33 p.
- No 740 JOHANNA ALATALO – JUHA HONKATUKIA – PETRI KERO, Energiaturpeen käytön taloudellinen merkitys Suomessa. 08.11.2000. 51 s.
- No 741 JUKKA LASSILA – TARMO VALKONEN, Pension Prefunding, Ageing, and Demographic Uncertainty. 01.12.2000. 21 p.
- No 742 PENTTI SYDÄNMAANLAKKA, The New Challenges, Roles and Competencies of Human Resource Management. 01.12.2000. 6 p.
- No 743 EVA M. MEYERSSON-MILGROM – TROND PETERSEN – RITA ASPLUND, Pay, Risk, and Productivity. The Case of Finland, 1980-1996. 15.12.2000. 26 p.
- No 744 MATTI VIRÉN, Fiscal Policy, Automatic Stabilisers and Policy Coordination in EMU. 21.12.2000. 30 p.
- No 745 JAAKKO KIANDER – MATTI VIRÉN, Measuring Labour Market Flexibility in the OECD Countries. 21.12.2000. 15 p.
- No 746 HANNU HERNESNIEMI – PEKKA LINDROOS, Socio-economic Impact of European Single Market on Lithuanian Companies. Methodology Manual. 27.12.2000. 73 p.
- No 747 PEKKA ILMAKUNNAS – MIKA MALIRANTA, The Turnover of Jobs and Workers in a Deep Recession: Evidence from the Finnish Business Sector. 08.01.2001. 20 p.
- No 748 ARI HYYTINEN, Loan Market Equilibrium with Difference of Opinion and Imperfect Competition. 10.10.2002. 6 p.
- No 749 ARI HYYTINEN, Information Production, Banking Competition and The Market Structure of The Banking Industry. 18.01.2001. 43 p.

Elinkeinoelämän Tutkimuslaitoksen julkaisemat "Keskusteluaiheet" ovat raportteja alustavista tutkimustuloksista ja väliraportteja tekeillä olevista tutkimuksista. Tässä sarjassa julkaistuja monisteita on mahdollista ostaa Taloustieto Oy:stä kopiointi- ja toimituskuluja vastaavaan hintaan.

Papers in this series are reports on preliminary research results and on studies in progress. They are sold by Taloustieto Oy for a nominal fee covering copying and postage costs.