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BANKING NETWORKS: UNVEILING SUPERVISORY INCENTIVES' INFLUENCE ON SOCIAL TIES IN LENDING

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Abstract
Social ties play a pivotal role in shaping individuals' behavior and outcomes within lending contracts. This study explores the influence of acquaintances, extending beyond family connections, in lending relationships. Specifically, it examines two types of social ties allowed by acquaintances in lending contracts: endorsements by endorsers and sponsorships by sponsors. These endorsers and sponsors act as supervisors in a Principal-Supervisor-Agent model, a departure from the conventional perspective where supervisors are non-borrowing entities outside the lending institution.
Our analysis delves into how the incentives of these supervisors impact borrowers' performance, focusing on the effort exerted to mitigate risk in their projects. We model endorsement and sponsorship practices within lending relationships and demonstrate their implications for borrower monitoring and project selection quality.
Interestingly, we find that when endorsers and sponsors are members of the lending institution, their ability to resolve agency issues between the principal (lending institution) and the agent (borrower) is enhanced. This research sheds light on the intricate dynamics of social ties within lending contracts, offering valuable insights into their effects on project selection and borrower control.

Keywords: Social Ties, Lending Contracts, Supervisory Incentives, Borrower Performance, Agency Problems

Introduction

Individuals are embedded in networks of social relationships that shape their incentives and constraints and ultimately affect their behaviour and outcomes (Bandiera, Barankay and Rasul (2010). Similary, relationships in contracts often create social ties that become incentive mecanisms for individuals (Bowles and Polanía-Reyes, 2012). These issues are present in lending contracts and address moral hazard (Biener, and *al*. 2018). In lending contratcts, researches are interested in how social ties of borrowers affect their individual performance. In this article, performance is known as effort borrowers have to do for not engage in too risky projects.
Our paper focuses on a prominent form of social ties – acquaintances, which exceed the frontier of family relationship. We consider two types of social ties permitted by acquaintances in lending contracts: endorsements, given by endorsers or garantors and sponsorships, proposed by sponsors or godfathers. The endorser and the sponsor are considered as supervisors in a Principal-Spervisor-Agent

model. Our model is of a Principal (the lending institution, such as a bank, represented by the credit manager), Supervisor (the nonborrowing member represented by the endorser and/or the sponsor), and an Agent (the borrower).Generally, in lendind contratcts, supervisors are considered nonborrowing actors, so they are supposed to be outside of the lending institution. But, in this paper, we consider supervisors inside the lending institution. That implies, supervisors are borrowers for their own lendind contracts for which they may have supervisors. Lastly, our Principal-Supervisor-Agent model supposes the agent can not be a supervisor in another lending contratct. The paper analyses how supervisor's incentives impact borrowers' performance in terms of effort to not engage in too risky projects. After modeling the endorsement and the sponsorship practices in the lending relationship via a principal-supervisor-agent model, we show that these practices are armfull for better monitoring of borrowers and the quality of project selection.

The ability of sponsorship and endorsement to solve agency problems between the principal (lending institution) and the agent (borrower) is further strengthened when the endorser and the sponsor are inside (or members of) the lending institution. The article is organized as follows. Section 2 presents the theoretical issues of agency appearing in lending contracts.In section 3 we propose a Principal-Spervisor-Agent model from which to understand how supervisoryincentives within lending contracts affect the selection of projects and the control of borrowers. Section 4 presents the findings and section 5 concluds.

Theory

Economics and the non-market institutions

Behavioural economists argue that it is important to understand the complex economic and behaviouralfactors affecting social investors' decision-making.So, the analysis of the effect of social relations networks in the understanding of contracts is a fertile field of the standard economic theory based on the principle of substantial rationality and the method of maximizing interest. The interest of economics for non-market institutions such as social relations networks is reflected in pioneering worksof Stiglitz (1974) on tenant farming, pursued by Laffont and Matoussi (1995) and renewed by Bidishaand *al.*(2018).It also concerns the gift-exchange and market nexus (Akerlof, 1982), extended by Bryson and Freeman (2018).

On the effect of social relations networks within contracts

The impact of non market institutions such as social relations networks in terms of contract efficiency has been analysed in many topics: organization (Ashraf and Bandiera, 2018), management of public goods such as environment (Smith, 2018), etc.A specific concern is devoted to exploring the conditions of effectiveness of lending contracts and this concern is being raised by alternative banking firms such as cooperatives (Banerjee, Besley and Guinnane, 1994; Besley, 1995) and microfinance institutions (Stiglitz, 1990; Varian, 1990; Besley and Coate, 1995, Armendariz de Aghion and Gollier, 2000).

These studies unanimously maintain that taking social ties into account makes it possible to bring out nonopportunistic behaviours through solidarity guarantees, the possibility of social sanctions and long-term interactions. In the studies, the neighbourhood is supposed to have better information about

borrowers and can thus exercise more effective control over them. In a context where information asymmetries can degrade lending relationships, the commitment of the borrower's acquaintances can be used to solve such an information problem. This is the principle of peer review, first analyzed by Varian and then Stiglitz.

Endorsement and Sponsorship are in this case incentive devices that encourage the effort of borrower to not engage in too risky projects. This analytical framework is applied to the understanding of a principal-supervisor-agent model such as the one developed by Banerjee, Besley and Guinnane (1994). They show that the cooperative structure creates the necessary incentives for member or policyholders to be controlled by each other. The contribution of our model is to take into account sponsorship and endorsement practices in order to study their effect in solving agency problems (moral hazard of borrower). Do these practices provide good incentives to borrowers for a better repayment process?

In the next section, we present a model tailored to our setting that makes precise how supervisor incentives can influence borrower' behaviour within lending contracts.

Principal-Supervisor-Agent based model

Conceptual framework

The risk/return nexus

Let suppose a lending financial institution with a cooperative structure and three members: a borrowing member (agent) and two non-borrowing members (supervisors). Each of the three members has two assets: a plot of land and a monetary wealth k. The agent borrows an amount K from the lending institution in order to finance a productive investment $K+k$.

Other members who do not borrow have no opportunity to invest so they receive a deterministic return θ from their land. We assume that the lending institution has no suffisant ressources to finance the project of the borrower. That is, a portion of the capital must be obtained from external lender.

The lending institution therefore borrows an amount b from an external lender[2] with the interest rate of R and lends $K-b$ to the borrower with the interest rate of r. We note π = the probability of success of the project[3];$\pi\epsilon[\underline{\pi}, 1]$. The higher the probability π is, the lower the risk of the π project will be considered.

The risk of a project is considered as a measure of the borrower's ability to repay or not repay the loan. The more risky the project selected by the borrower, the less likely it is that the borrower will be able to repay the loan at maturity.

In addition to the issue of the risk of project, there is also the issue of the rate of return of the project. By noting $\phi(\pi)$the project-Rate of return when the probability of success is π, the expected rate of return of the project is as follows:

$$E\big(\phi(\pi)\big) = \pi\phi(\pi) + (1-\pi)\times 0 = \pi\phi(\pi) \qquad (1)$$

$E'(\pi) = \phi(\pi) > 0$and$\phi'(\pi) < 0$attest that the more risky, the more profitable is a project..

In practice, the more profitable the selected project is, the more likely it will be for the borrower to repay the loan at maturity. Thus, the issue of credit repayment refers to a trade-off between the risk and return of the borrower's project.

The issue of project selection

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As $E(\phi(\pi))$ represents the risk/return nexus, selecting the π project is the same as simultaneously selecting the risk and return of the project based on an implicit arbitration. We note $\overline{r}$, the total amount of interest paid by the borrower for external and internal lendinds. He borrows from the external lender the amount b, with interest rate of R and he borrows from the internal lender (the financial institution) the amount $K-b$ with interest rate of r. So, we have:

$\overline{r} \equiv bR + (K-b)r$

We can write the expected net return of the project as follows:

$E\big(\phi(\pi)\big) = \pi(\phi(\pi) - \overline{r}) + (1-\pi) \times 0 = \pi(\phi(\pi) - \overline{r})$ (2)

The external credit interest rate:, can be determined endogenously by assuming that the external credit market is competitive and that the internal lender (the financial institution) has external opportunities. Suppose that the gross rate of return of theexternal opportunities is ρ.Therefore, the return of the external lending is ρb. We may also considered ρ as the opportunity cost of funds lent by the financial institution internally. Then, the net return of external opportunities is $\rho-\delta$. Finally, the advantage realized by the external lender when it lends $b$to the borrower is written:

$\pi Rb + (1-\pi)l - \rho b$

Where $l$is the amount that the financial institution takes from its own uninvested wealth to compensate the external lender in the event that the borrower's project fails. This means that the role of the external lender is a matter for the lending institution. We will see later that the external lender can represent the endorser (or garantor).

Since the external credit market is competitive, it satisfies the zero profit condition so that the external credit interest rate is obtained as follows:

$$\pi Rb + (1-\pi)l - \rho b = 0 \Rightarrow R = \frac{\rho b - (1-\pi)l}{\pi b}$$

Ultimately, the total amount of interestpaid by the borrower is:$\overline{r} = \frac{\rho b - (1-\pi)l + (K-b)r\pi}{\pi}$ and the expected net return of the project is written:

$E\big(\phi(\pi)\big) = \pi[\phi(\pi) - l - (K-b)r] - \rho b + l$ (3)

[2] Exeternal lender is the supervisor (endorser). b is the estimated monetary value of the supervisor's contribution (the down payement).

[3] The project is identified with the probability of success. The π project is the one with a positive rate of return noted π and the zero project is the one with a return of $1-\pi$.

The interest rate of the internal lending r must compensate the financial institution for the risk undertaken, due to the possibility of bankruptcy associated with the external lending. This is obtained with: $r \geq \rho$.

It would mean that the project $\pi$is financed at a higher cost than it could have been financed if the borrower had the possibility to borrow all the capital Kusing the opportunity cost ρ. The expected net return of the project would then be written:

$E\big(\phi(\pi)\big) = \pi(\phi(\pi) - \rho K) + (1-\pi) \times 0 = \pi(\phi(\pi) - \rho K)$ (4)

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In this case, taking into account the fact that the higher the risk (πbecomes lower) and the higher the expected return of the project, the borrower would tend to choose the riskiest project, the one with the lowest probability of success$\underline{\pi}$. Thus, there is an agency problem and therefore a real need to discipline the borrower, hence the need for the lending institution (the principal) to use supervisors (endorser, sponsor) and formalize mechanisms that positivily contribute to project selection and therefore the maturity repayment of credits.

Supervision practices and project selection

We consider one of the non-borrowing members as the endorser and the other is considered as the sponsor. In the case of internal endorsement, the endorser's liability for an amount is equivalent to engaging the financial institution for the same amount. It is implicitly assumed that the endorser is responsible for its wealth invested as a deposit in the financial instutution. The endorsementis formalized as a liability constraint which is written as follows:$(1+R) \leq l$.

The expected net return of the project (equation 3) increases as the value of $b$proposed by the endorser increases $E'(b) \geq 0$; because$E'(b) = \pi.r\ - p$; we know $r \geq \rho$and $0 \leq \pi \leq 1$

The sponsorship refers to a penalty that the borrower pays if he chooses the $\underline{\pi}$riskiest project. Note c is theamount of the penalty. The sponsor chooses the degree of control so as to affect the selection of the project by the borrower; so, the sponsor chooses the penalty c before the borrower chooses the πproject. If the project success, the borrower pays off the loan to the internal lender and the external lender: $1+rK-b+1+Rb$. Otherwise, if the project fails, the endorser loses the b amount corresponding to the external lending and the financial institution pays the endorser an amount of l that compensate as external lender.

The practice of the sponsorship is to set up an incentive mechanism whereby the choice of the penalty c is such that the borrower will prefer the π project to the $\underline{\pi}$ project. That incentive constraint is as follows: $\pi(\phi(\pi) - r \geq \pi\phi\pi - r - c$

The equilibrium is achieved with the chosen project, the one that gives the following equality:

$$\pi(\phi(\pi) - \bar{r}) = \underline{\pi}\left(\phi\left(\underline{\pi}\right) - \bar{r}\right) - c \qquad (5)$$

The lendind total amount of interest depends on the πprobability of success and the (b, l, r)vector; so that we have:$\bar{r}\left(\underline{\pi}, b, l, r\right)$ and the equilibrium project is obtained as a fixed-point iteration:

$\pi = h\ \bar{r}\ \underline{\pi}, b, l, r\ , c$ (6)(( ))

The πvalue that satisfies this equation is unique if: $\frac{\partial}{\partial \bar{r}} \cdot \frac{\partial \bar{r}}{\partial \pi} < 1$.

This condition is satisfied if $\underline{\pi}$ is high enough. We can therefore write the equilibrium project as follows:

$\pi = g(b\ l\ \ \ ),,,$ (7)

The equilibrium project chosen by the borrower depends on the $b$external lending borrowing amount, the $r$internal lending interest rate; it's also depending on the $l$guarantee proposed by the lender to the endorser, and the level of penalty c. The assumption of internal sponsorship implies that charging a penalty is costly for both the borrower and the lending institution.The cost function of the penalty $M(c)$ is assumed to be growing and convex. This ensures there is a credible commitment for the sponsor to

control the borrower's behaviours. The assumption of internal endorsement implies including the l amount of the guarantee in the financial institution's profit.

Therefore, the internal practices of endorsement and sponsorship require the financial institution to choose the penalty c in order to maximize the following objective function:$\pi(K-b)-(1-\pi)l-M(c)$. The first order optimality conditions aregiven in:

$$\big((K-b)r+l\big)\frac{\partial h}{\partial c}=M'(c) \qquad (8)$$

This equation is solved as follows:

$$c=f(b,l,r,\pi) \qquad (9)$$

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Findings

Equilibrium values of π^* and c^*

The π equilibrium-project has been obtained as a fixed-pointiteration (equation 7) and the c equilibriumpenalty was proposed as a fixed-point iteration (equation 9). The $\pi^*(b,l,r)$ equilibriumvalue of the project and the $c^*(b,l,r)$ equilibriumvalue of the penalty are determined using the two constraints mentioned in equation 5 and

equation 8.These equilibrium values of π^* and c^* are the equilibrium values of π and c, which are used to verify the lending institution's surplus as given in the equation:

$$V \equiv E(\pi) - M(c) - \rho K + (K-b)\delta \qquad (10)$$

The first order optimality conditions are:

$$\begin{cases} \dfrac{\partial V}{\partial b} = 0 \Rightarrow R'(\pi)\dfrac{\partial \pi^*}{\partial b} - M'(c)\dfrac{\partial c^*}{\partial b} - \delta = 0 \\ \dfrac{\partial V}{\partial l} \geq 0 \Rightarrow R'(\pi)\dfrac{\partial \pi^*}{\partial l} - M'(c)\dfrac{\partial c^*}{\partial l} \geq 0 \\ \dfrac{\partial V}{\partial r} \geq 0 \Rightarrow R'(\pi)\dfrac{\partial \pi^*}{\partial r} - M'(c)\dfrac{\partial c^*}{\partial r} \leq 0 \end{cases}$$

Optimal values ofπ and c

The $(\hat{b},\hat{l},\hat{r})$optimal values are:

$$\begin{cases} \text{if } 0 < b < K \Rightarrow \hat{b} \\ \text{if } 0 \leq l \leq bR \Rightarrow \hat{l} \\ \text{if } r > \dfrac{\rho - \delta}{\pi} \Rightarrow \hat{r} \end{cases}$$

Using the $(\hat{b},\hat{l},\hat{r})$optimal values, we have: $\hat{\pi} = \pi^*(\hat{b},\hat{l},\hat{r})$ and $\hat{c} = c^*(\hat{b},\hat{l},\hat{r})$ which are the optimal level of π and c that guarantee the existence and uniqueness of fixed points.

Concluding remaks

First-best and second-best solution

As supervisory practices, sponsorship and endorsement address the agency problem in the lending relationship. The principal-supervisor-agent model used in the article has been effective in identifying projects and levels of control that both maximize the financial institution's profit and motivate the borrower to not engage in too risky projects. The c optimal level of control is a second-best solution because it is determined when an agency problem arises related to the borrower's ability to select the most risky projects. In that case with agency problem, the marginal output of the control is lower than the marginal cost of the control. We have $R'(\pi)\frac{\partial g}{\partial c} < M'(c)$. However, a first best optimalcontrol is determined when no agency problems exist.In this case, the financial institution chooses the $c$control level in order to maximize the surplus, given the πproject. This selection is made outside of equilibrium, based solely on the incentive constraint seen in equation 5. At this optimum level, the marginal value of the control is equal to the marginal cost of the control: $R'(\pi)\frac{\partial g}{\partial c} = M'(c)$.

This relationship overlooks the impact of (b, l, r)on the project selection through $\bar{r}$. We note $\tilde{c}$ is the first best control. It is shown that the c second best optimal control is higher than the first best optimal control: $\hat{c} > \tilde{c}$.

Optimal control

When there is an agency problem within lending relationships, internal sponsorship and endorsement practices result in an optimal level of control that is higher than what would be achieved without an agency problem. The findings attest that when there is an agency problem within lending relationships, internal sponsorship and endorsement practices result in an optimal level of control that is higher than what would be achieved without an agency problem. That is a call for more in-depth consideration when studying agency problems in contracts, particularly lending contracts. Finally, these results invite for further research on personal relationship networks as tools for analysing and solving these agency problems.

References

Akerlof, G. (1982), "Labor Contracts as Partial Gift Exchange", *The Quarterly Journal of Economics*, 97(4):543–569

Armendáriz-de-Aghion, B. and Gollier, C. (2000), "Peer Group Formation in an Adverse Selection Model", *The Economic Journal,* 110(465):632-643

Ashraf, N. and Bandiera, O. (2018), "Social Incentives in Organizations", *Annual Review of Economics*, Volume 10, 2018, pp 439-463

Bandiera, O., Barankay, I., and Rasul, I. (2010), "Social Incentives in the Workplace", *Review of Economic Studies*, 77, 417–458

Banerjee, A.V., Besley, T., Guinnane, T.W. (1994), "The Neighbor's Keeper: The Design of a Credit Cooperative with Theory and a Test", *The Quarterly Journal of Economics*, 109(2):491-515

Besley, T. (1995), "Non market Institutions for credit and risk sharing in low-Income", *The Journal of Economic Perspectives,* Vol. 9, n°3, pp. 115-127.

Besley, T., and Coate, S. (1995), "Group Lending, Repayment Incentives and Social Collateral", *Journal of Development Economics*, vol. 46, pp.1-18.

Bidisha, S., Hossain, A., Alam, R., and Hasan, M. (2018) "Credit, tenancy choice and agricultural efficiency: Evidence from the northern region of Bangladesh", *Economic Analysis and Policy*, Volume 57, 2018, Pages 22-32

Biener, C., Eling, M., Landmann, A.and Pradhan S. (2018), "Can group incentives alleviate moral hazard? The role of pro-social preferences", *European Economic Review*, Vol.101, January 2018, Pages 230-249

Bowles, S., Polanía-Reyes, S. (2012), "Economic Incentives and Social Preferences: Substitutes or Complements?" *Journal of Economic Literature*, 50(2):368–425

Bryson, A., Freeman, R. (2018), "The Role of Employee Stock Purchase Plans, Gift and Incentive? Evidence from a Multinational Corporation", *British Journal of Industrial Relations*, Number 007, pages 1-21

Laffont J.J., Matoussi M.S. (1995), "Moral hazard, financial constraints and sharecropping in El Oulja", *The Review of Economic Studies*, 62(3):381-399

Smith, S. (2018), "Economic incentives and conservation: Crowding-in social norms in a groundwater commons", *Journal of Environmental Economics and Management*, Volume 90, July 2018, Pages 147-174

Stiglitz, J. (1974), "Incentives and risk sharing in sharecropping", *Review of Economic Studies* 41(2):219-255.

Stiglitz, J.E. (1990), "Peer monitoring and credit markets", *World Bank Economic Review*, 4(3):351-366.

Varian, H.R. (1990), "Monitoring agents with other agents", *Journal of Institutional and Theoretical Economics*, 146(1):153174.