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Gyöngyi Lóránth

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Gyöngyi Lóránth, London Business School (LBS) and CEPR

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Centre for Economic Policy Research
90–98 Goswell Rd, London EC1V 7RR, UK
Tel: (44 20) 7878 2900, Fax: (44 20) 7878 2999
Email: cepr@cepr.org, Website: www.cepr.org

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ABSTRACT

On the Incentive Problems in Financial Conglomerates*

This Paper analyses the effects of scope expansion on the core activities of banks and provides a rationale for their interest in offering a wider product range. We show that scope economies may stem from moral hazard in the core business, and argue that a cost of scope expansion might be the inability of banks to credibly commit to penalize their clients in the event of default or poor performance. We find that inefficiencies in conglomerate banks are more prone to occur when competition in the additional activity is intense, and when willingness of firms to pay for a new financial product is higher.

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Gyöngyi Lóránth
Department of Economics
London Business School
Regent's Park
London
NW1 4SA
Tel: (44 20) 7262 5050 x 3436
Fax: (44 20) 7724 8060
Email: gloranth@london.edu

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1 Introduction

In the last two decades an increasing number of new financial products has been brought to markets. Greater product variety has been frequently accompanied by the entry of new competitors, challenging the traditional role of banks. Banks, in turn, have been busy in following up the trend and engaging in new activities.[1] At the same time, financial institutions have been increasingly interested in mergers, aiming at achieving a wider product range.[2]

This paper analyzes the effect of scope-expansion on the core activity of banks and provides a rationale for their interest in expanding the range of available financial services. A standard argument relates the creation of "financial conglomerates" either to demand side externalities, or to economies of scope,[3] based on some form of complementarities between activities.[4] In this paper we argue that complementarities may stem from moral hazard in the bank's core business. This particular feature of the lender-borrower relationship can provide a rationale for undertaking financial innovations and for mergers that aim at scope-expansion. Then, in the presence of this agency problem, we study the relationship between the bank's loan portfolio and the surplus generated by the new financial service.

[1] Off-balance-sheet products - such as options, interest rate derivatives, standby letters of credit for commercial paper and other liabilities, security trading, bond underwriting, foreign-exchange dealing, or advisory work - are increasingly important bank activities.

[2] In a recent study, Smith and Walter (1996) report that in Europe, where banking-insurance combinations are permitted, more than 30% of the M&A activities involved deals between banks and insurance companies in the period of 1985-1995. (Recent examples include SBC's acquisition of S.G. Warburg & co., International Nederlanden Groep's acquisiton of Barings PLC, Credit Suisse and Winterthur.) Using a sample of mergers and acquisitions in Europe for the period 1988-1997, Cybo-Ottone and Murgia find that product diversification of banks into insurance generated a positive and significant stock market reaction at the time of the deal annoucement. Focarelli et al. (2002) analyze MA activities for the Italian banking market for the period 1985-1996. They argue that mergers were primarily driven by strategies aimed at selling more services.

[3] Testing for scope economies in Europe for the period of 1992-1997, Cavallo and Rossi (2001) finds the presence of scope economies at all production levels, but more pronouncedly for big institutions. They suggest that scope economies can increase as banks move towards the universal banking model.

[4] The logic of combining different activities seem to have little to do with cost-cutting.Considering the US market and taking as sample period the end of the 80's among others Hunters et al. (1990), Mester (1990), Jagtani et al (1995) found insignificant cost complementarities between on-and off balance-sheet activities of banks.

Consider a bank facing a pool of firms who wish to borrow to start a project. After making the investment, the firm exerts costly effort which affects the distribution of the project returns. A higher interest rate set by the bank typically leads to lower entrepreneurial effort due to a moral hazard problem, and thereby to a smaller pool of firms with successful projects. Assume now that an additional financial product can be made available to firms with successful initial projects. The new product can create incentives for the bank to lower the interest payment on the initial loan. A lower interest rate improves the firm's incentives, and thereby leads to a higher number of successful firms with potential demand for the new financial service. Thus, one effect of the sale of multiproducts could be an improvement in the bank's loan business, due to a more favourable rent sharing from the bank towards the firm. Complementing the core business with additional activities lengthens the time horizon of bank-firm relationships. This feature, in turn, raises the issue of terminating the relationship with the firm with additional capital needs versus providing refinancing. When the project fails and the bank decides upon refinancing, its decision will be affected by the borrower's value in generating additional business. The threat to terminate future funds creates good incentives for the firm to avoid the risk of default. The possibility of raising the demand for the new product, upon refinancing, however, may render the bank's threat to terminate the availability of funds not credible. If the firm's value as a potential client for the new product is sufficiently enhanced for the bank, the latter will extend credit. However, if the firm anticipates that the threat of termination will not be enforced by the bank, the incentive effect disappears. As a consequence, the relationship between the surplus on the new product and the quality of the loan portfolio may turn out to be non-monotonic: a small surplus can improve the loan portfolio of the bank, a higher surplus can result in a poorer loan portfolio compared to that of a single-product bank.

These results are consistent with the empirical findings by Demsetz and Strahan (1997) and by Steinherr and Rummel (1994, 1998). Demsetz and Strahan show that although larger bank holding companies are better diversified than smaller ones, by no means can they be considered less risky. They often use their diversification advantage to hold a larger and riskier loan portfolio compared to their smaller competitors. Steinherr and Rummel compare universal banks and specialized credit institutions, and find a better trade-off between risk and expected returns for universal banks.

In analyzing the effect of an additional product on the bank's core business, we consider

two different scenarios: (1) the additional product is an "innovation"; (2) there is an existing market for the additional product and the bank may enter this market via a merger.

As for the case with an innovative product, we argue that the loan-originating bank is in a privileged position with respect to a specialized financial institution (that enters in the firm's life after the initial period), in that it can control the moral hazard problem. Thereby the bank can influence the demand for a new financial service. This mechanism creates higher incentives for banks to enter a new market. Our conclusion might seem to contrast with the results of previous contributions to the literature on banking scope and financial innovations (Boot-Thakor (1997), Kanatas-Qi (1999)). The contrast, however, is apparent. In previous contributions, financial innovations were treated as substitutes for traditional banking products. Therefore, in comparison with a specialised institution, an "integrated" financial intermediary with some kind of monopoly power on the loan market had less incentive to engage in financial innovations. This paper instead regards financial innovations rather as "complementary" to lending activity.

Considering the effect of a merger on the loan portfolio of the bank, we show that scope-expansion creates more inefficiencies the higher the competition is in the new activity. This is due to the difference in the rent that can be earned on successful firms that pay the market price for the additional product, and on failed firms that can be captive to the initial lender. The higher future rent earned on the latter is what makes scope expansion profitable, even if the impact of a soft budget constraint on the portfolio of the bank is negative.

The contribution of this paper to the growing theoretical literature on bank mergers is to use the peculiarity of the creditor-borrower relationship to give an alternative explanation for banks' willingness for scope-expansion. Mergers have been explained essentially in two ways: either as a means to create "deep pockets" and achieve skill diversification in the new activity (Boot, Milbourn and Thakor (1999)), or as a result of incentive problems between depositors and bank managers (Boot and Schmeits (2000)). The analysis closest to this is of Boot and Schmeits (2000). However, in their setting the incentive problem arises from the reduced transparency of putting together many activities. Diversification allows co-insurance among different activities, but diminishes the effectiveness of market discipline, since outsiders may not be able to assess the performance of a conglomerate bank accurately. This paper takes a different angle by focusing on the conflict of interests between creditors and borrowers.

Finally, the paper also relates to the "soft budget constraint" literature in banking (Dewatripont and Maskin (1995), and Berglof and Roland (1995)). However, the reason why banks can be "soft" differs significantly from the previous contributions. In Dewatripont and Maskin (1995) softness comes as a consequence of being large (liquid). In Berglof and Roland (1995), the government makes the bank softer by sharing the cost of refinancing. In this paper the banks' softness is rooted in the sale of multiple products.

The rest of the paper is organized as follows. In section 2 we present the model. Section 3 analyzes the firm's effort decision, and the bank's interest rate and refinancing choice in a single-product setting. Section 4 sheds light on the effect of offering additional financial products on incentives, and analyzes the bank's decision to carry out financial innovations. Section 5 derives implications for mergers based on the trade-off presented in the previous section. Section 6 concludes.

2 The model

Consider a three-period (t=0,1,2) model of the credit market with risk-neutral entrepreneurs and bank(s). There is a continuum $[0,1]$ of entrepreneurs with profitable investment opportunities. Entrepreneurs have to make an investment I in order to produce. They have no internal funds, thus they must borrow the entire investment outlay from the bank. For ease of exposition we assume that although there may be many banks, each of them has monopoly power in a well-defined segment of the market[5].

Technology:

Once started, investment is subject to *moral hazard*. Each entrepreneur chooses a level of effort $e \in [0,1]$, which is not observed by the investor. Effort is a crucial production factor in that it determines the probability of project completion e.[6] Effort e costs $\Psi(e)$ to the entrepreneur, with $\Psi^{'} > 0$, $\Psi^{''} > 0$, $\Psi(0) = \Psi^{'}(0) = 0$. For the sake of simplicity we choose $\Psi(e) = \alpha\frac{e^2}{2}$, with $\alpha > 0$. Completed projects yield observable and verifiable returns $R^g > I$ after one period. Incomplete projects do not yield anything, unless additional liquidity $\nu \in [0, I]$ is injected to cover operating expenditures. If ν is invested, the project continues and

[5] This assumption is not essential to the qualitative results of the paper which would hold provided that there is some form of imperfect competition between banks.

[6] Another interpretation of e is the quality of the investment project, as it is referred to later.

yields observable and verifiable returns R^p, and nontransferable private benefit of control to the entrepreneur whose equivalent monetary value is b[7]. As b is nontransferable, the entrepreneur cannot borrow against it. Private benefit b can be interpreted as the disutility saved from loss of perks and reputation when the firm is shut down. If no liquidity is injected, the project is abandoned, and yields nothing.

Contracts:

Contracting between the entrepreneurs and the bank takes place in period 0. The loan agreement defines a rule to split cash flows at $t = 1$: the contract allocates a payment $\{R_b\}$ to the lender, and $R_f = R^g - R_b$ to the entrepreneur from the completed project. As the entrepreneur is protected by limited liability, both parties receive zero if the project remains incomplete. However, for incomplete projects, the entrepreneur and the bank may renegotiate the original contract to their mutual advantage: the new contract allocates R_b^{ref} to the bank, and R_f^{ref} to the firm. We assume a simple bargaining process to determine the cash flow structure between the bank and the firm: the bank makes a *take-it-or-leave-it* offer to the firm at the beginning of each period.

Financial products

We model demand for the additional financial product in a stylized fashion, where the term "financial product" refers to broad category of services provided by the bank. Examples can include the design of a new derivative contract, introduction of a new security, provision of advice to the firm on a new investment, delivering payment services, treasury and information management, or marketing the firm's securities. Firms that completed the initial investment are in the position to benefit from an additional financial product, and buy as long as they receive a non-negative surplus. Firms with incomplete projects become potential customers once their liquidity need is covered.[8] In what follows we consider two different scenarios: (1) the bank is the only provider of the new service, in which case I call it *financial innovation*, (2) the bank competes with others in the new market. There is a *social* value S_m associated to the provision of the financial facility.

The timing of the events are shown in figure 1.

The commitment problem

[7] The assumption, that private benefit is not obtained when the firm is successful, is a simplification which does not influence our point.

[8] The commitment of not buying when the project is abandoned is credible as termination of the project means liquidation for the firm.

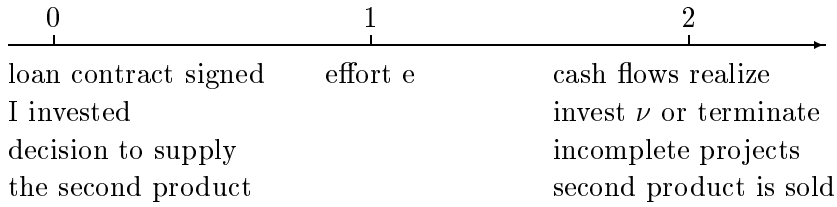

Figure 1: Timing

The crucial assumption of the model is that the bank cannot credibly commit to future prices and to future actions. The solution concept to be used is subgame perfect equilibrium. There are two decisions to be made by the bank after the first period. It should decide about whether to inject money into firms with incomplete project, and it should set a price for the additional financial product.[9]

When the new product is exclusively offered by the bank (i.e. it is an "innovation"), the bank can extract all the social surplus S_m[10] from the product. On the contrary, when the bank offers an already existing product, the surplus parties receive will depend on the number of competing providers n. Once the *firm completes the investment*, there is no way that the bank can exercise monopoly power over the firm.[11] Charging a higher price than that of the competitors would result in zero demand. Promising a lower price at the time when the contract is signed, however would not be credible. Once the effort is chosen by the firm, there is no incentive on the side of the bank to respect the initial agreement and sell the service to successful firms at a lower price than available from other providers.[12]

The case of a *firm with an incomplete* project is different, in that it needs a capital injection for continuation. What is the effect of the new product on the continuation decision of the bank? Potential future surplus from the additional product increases the

[9] This is, obviously, conditional on its first period decision about to extend the number of available products.

[10] We assume that the innovation cannot be imitated immediately, so the innovator has some time to exploit its advantage.

[11] This would not be true if firms faced switching cost to terminate the relationship with the bank. In fact, the initial bank may have a relative cost advantage to other competitors in the issuance of new securities, or providing other services to previous clients. This cost can be viewed as a cost to competitors to become familiar with the operations of a new client, or to acquire information about the client. See Bhattacharyya and Nanda (2000), for example.

[12] The bank would like to commit to a lower price in order to improve the quality of the investment projects but no such commitment is possible in this framework.

value of the firm as a going concern. Thus refinancing for the firm becomes more probable when a second product can be sold to the firm. If the bank was able to credibly commit not to refinance, it would be better off ex ante, as the threat of termination creates good incentives for the firm to avoid failure. However if termination is not Pareto efficient ex-post, the firm anticipates renegotiation of the original contract, and that no liquidation is carried out in the future. Hence lower effort is provided ex ante.

Although informational advantage for the initial lender[13] is not present in this model, I argue that there may be other reasons why the initial lender is rendered to be the only source of financing for the firm: (1) a multiproduct bank is in the position to internalize the joint social surplus from the two products. While the total amount the firm can promise to a new lender is constrained by the future rents it earns on the second product. These rents depend on the level of competition over which the firm has no control.[14] (2) the seniority of the (initial) short-term debt can lead to asymmetry in refinancing incentives between the initial bank and potential new lenders. Bankruptcy procedures provide a varying degree of the protection to creditors' seniority. Loan covenants often impose limitations on further indebtedness. Thus, *new lenders* may be reluctant to enter as long as the value of the refinanced firm does not exceed the sum of the initial senior debt and the firm's liquidity needs.[15] The decision problem of the initial lender is different. As the initial investment is already sunk, the decision of whether to refinance or not just depends on the value of the refinanced firm. Hence not too high continuation value can keep away competition from other banks and yet can lead to refinancing from the initial bank. As the bank is then in the position to control the supply of credit, it can design the terms of refinancing so as to appropriate all the extra surplus produced. Thus surplus sharing from the new product between the firm and the bank will be influenced by the status of the initial investment project.

As follows, we denote by $S_b(n)$ the surplus from the financial product allocated to the bank, and by $S_f(n)$ the surplus allocated to the firm with completed project, and by S_b^{ref} the

[13] See Rajan (1992) and Kanatas and Qi (1994), where lock-in is the result of informational advantage on the side of the initial lender.

[14] Rajan (1998) using a similar argument shows why universal banks are able to attract more clients and make more profit than specialized banks, despite their relative inefficiency in the underwriting business (due to conflict of interest).

[15] Asquith, Gertner and Scharfstein (1994) show that when companies are distressed, banks, who hold most of the senior debt, almost never forgive principal.

surplus allocated to the bank, and by S_f^{ref} the surplus allocated to a firm with refinancing needs.

At time 1 the bank decides whether to provide an additional product, and decides on the terms of granting an initial loan. Assuming that bank funds have a unit cost, and the absence of discounting the optimization problem becomes:

$$\begin{aligned} \max_{R_b} E\Pi^m \quad &= e(R_b + S_b) - I + (1-e)\max\{0, R_b^{ref} + S_b^{ref} - \nu\} - F \\ s.t \quad &(\mathbf{IC})(R^g - R_b) + S_f \; - R_f^{ref} = \Psi'(e) \end{aligned}$$

where

$$R_f^{ref} = \begin{cases} 0 & \text{if the project is terminated} \\ R^p - R_b^{ref} + b + S_f^{ref} & \text{if the project is refinanced} \end{cases}$$

If the second product is not provided, S_b, S_f, S_f^{ref} and S_b^{ref} are trivially zero. If provided, a lump-sum fee F should be paid which can be interpreted as developing and marketing cost. The term $\max\{0, R_b^{ref} + S_b^{ref} - \nu\}$ summarizes the refinancing decision. Refinancing occurs when the continuation profit for the bank is non-negative. The cost of refinancing is the amount of liquidity to be injected. The benefits come from two sources: in the form of repayment from the completed project R_b^{ref} and from the surplus of selling the additional product S_b^{ref}.

The payment R_f^{ref} for firms with unfinished projects depends on the refinancing decision. If the project is terminated, it is zero. If liquidity is injected, the entrepreneur obtains his private benefit b, the residual claims from the completed projects, and, upon purchasing the additional product, a surplus S_f^{ref}.

To focus on the effect of the availability of multiple products on effort and refinancing decisions, we limit the parameter space in a way that refinancing is never ex-post optimal, as long as the bank only lends to the firm.

Assumption 1 *$\underline{\nu} \leq \nu \leq I$, where $\underline{\nu}$ such that $R^p + b = \underline{\nu}$.*[16]

[16] Assumption 1 is actually stronger that one needs to avoid refinancing. It makes refinancing (with one product) ex post inefficient from the social point of view. The condition that insures no refinancing from the bank is $R_p \leq \nu$, as the latter in its decision does not take into consideration the private benefit b of the firm's manager. Therefore termination, indeed, would happen for a larger set of parameter values.

To save on notation, we define $L \equiv R^p + b - \nu$, i.e. as the difference between the cost and the benefit from refinancing, when no additional product is available to firms.

Assumption 2 $R_g - L \leq \alpha$

Assumption 2 puts an upper bound on the returns and it guarantees that the effort level is always bounded by 1.

3 Core business

Before turning to the effect of the additional product on the entrepreneurial moral hazard problem, we solve the benchmark case, where the only available financial product is bank loan.

Lemma 1 (Single-product) *The firm under unobservable effort choice chooses an inferior project quality compared to the socially optimal one.*

Proof. See appendix.

The interpretation of this result is quite straightforward: as the entrepreneur is not receiving all the surplus from a marginal increase in effort, he provides too little effort in comparison with the first-best level of effort.

The planner' solution takes away two kinds of distortions: the moral hazard problem and the inefficiency caused by the monopoly bank. The first kind of inefficiency comes from the unobservability and therefore non-contractibility of the effort. The second arises because of the lack of competition in the banking sector that leads to an excessively high interest payment. Keeping the assumption of the unobservability of effort, ex-ante competition in the lending market would drive down the interest rate and it would mitigate the discrepancy between the first-best level of effort and the actual one.

It is easy to see that the socially optimal level of effort corresponds to the one with observable effort (under Assumption 1).

When effort is observable and therefore contractible, the bank sets the interest rate in a way that it makes the participation constraint of the firm binding, i.e.

$$R_b \qquad s.t. \qquad \mathrm{e}\left(\mathrm{R^g} - \mathrm{R_b}\right) - \Psi\left(\mathrm{e}\right) = 0$$

and chooses the effort level maximizing the following profit function:

$$e \in \arg\max eR_b - I$$

which results in

$$R^g = \Psi^{'}(e^*)$$

Notice that this would not necessarily be true if Assumption 3 was not made. As the social planner would take into consideration also the private benefit b of the firm manager, there would be cases when refinancing would be ex-post efficient from the social but not from the bank point of view. As a consequence the optimal level of effort would be different in the two cases.

4 Incentives to innovate

To show why *banks* involved in the initial *lending* may have higher incentives to develop a new product than *specialized financial institutions* [17] (interacting with the firm only after the initial investment period), consider the following setup.

Assume that firms with completed initial investments are potential buyers of new financial products. The innovator should incur a development and marketing cost F to get the new product to the market. To separate the income effect (entering for pure profit reason) from the incentive effect (i.e. from the moral hazard aspect that we want to capture) to enter into a new market, suppose that F is such that:

$$F \equiv e_s^* S_b \tag{1}$$

where S_b is the surplus per borrower on the new product, and e_s^* is the number of potential clients with completed investment, where the latter is determined by the interest rate choice of the bank which only provides loans. As the innovator is a monopolist in the new market,

[17] The literature on financial innovation (Boot and Thakor (1997), Kanatas and Qi (1999)) uses the term "specialized intermediaries" for the case when financial intermediaries pursue a single activity. In particular the (commercial)bank only supplies initial financing for the firm, and investment banks underwrite or market the firm's securities in subsequent period. Integrated intermediaries are then banks that carry out both (multiple) activities. Here we use the term "specialised financial institution" for financial firms who are not connected to the loan market, thus, the case we consider is compatible with that of the relevant literature.

its surplus S_b is equal to the social surplus S_m, given the assumption on the allocation of bargaining power.

Let us first examine the decision to innovate for a specialized financial intermediary (SFI hereafter) with no access to the loan market. As the SFI does not lend to the firm in the first period, the "size" of the potential market is given for him: it is equal to the mass of completed projects. The latter, in turn, depends on the interest rate choice of the single product bank. With entry cost F a SFI would be indifferent between innovating and not. The difference between a SFI and the bank is that the latter can impact on the moral hazard problem and consequently also on the size of the new market by setting the interest payment for the loan.

4.1 When multiple products alleviate moral hazard problems

Assume now that the bank decides to innovate, and the social surplus is $S_m \in (0, -(R^p - \nu)]$ from the innovation. For these values of surplus no refinancing takes place in equilibrium. What is the effect of a new product on the interest payment of the bank?

$$\frac{\partial E\Pi^m}{\partial R_b} = \frac{\partial \Pi\left(R_b, e\left(R_b\right)\right)}{\partial R_b} + \tag{2}$$

$$\frac{\partial \Pi\left(R_b, e\left(R_b\right)\right)}{\partial e}\frac{\partial e}{\partial R_b} + \frac{\partial e}{\partial R_b}S_b \tag{3}$$

The only additional term in the profit function is the surplus from the new product on successful clients. The derivative of this term with respect to the interest rate is negative, as higher interest rate leads to lower completion rate, and therefore thinner second market. Evaluating the FOC at the previous optimum would make the expression negative. Thus, using the strict concavity of the profit function, the new interest rate should be lower than the choice of a single product bank.

Does the bank have incentives to offer the new product ? Notice that the profit evaluated at the new equilibrium interest rate R_b^m is strictly higher than at the previous one R_b^s (where the s superscript stand for single product and the m for multi-product). The latter in turn is identical to that of the single-product bank, by construction of the (hypothetical) entry cost F that eliminates the income motive to enter into a new market:

$$E\Pi^m\left(R_b^m\right) > E\Pi^m\left(R_b^s\right) = E\Pi^s\left(R_b^s\right)$$

Therefore, contrary to a SFI, a bank involved in lending always has an incentive to design and sell a new financial product. The reason, as explained before, is not due to pure

profitability of this new market. By changing the interest rate for the investment, the bank can control the size of the new market. As long as the potential surplus is positive ($S_b > 0$), the sale of the new product makes lowering the interest rate attractive. Lower interest rate alleviates moral hazard problem and increases the size of the future market[18].

Proposition 1 (Financial Innovation and Pricing) *In comparison with a SFI, a bank has higher incentives to provide the second product. The equilibrium interest rate will be lower and completion rate will be higher than in a single-product bank.*

The actual project quality has improved as a consequence of the lower interest rate. However, this may not be true for the discrepancy between the planner's solution and the firm's project choice.

Proposition 2 (Efficiency) *For low levels of surplus from the financial product, i.e.* $S_m \in [0, -L]$, *the discrepancy between the planner solution and the actual project quality will be higher compared to the case when the bank only lends. For high levels of surplus, i.e.* $S_m \in (-L, -(R^p - \nu)]$ *, for any given value of* ν *there exists a level of* $\widehat{S}_m(\nu)$ *such that for* $\widehat{S}_m(\nu) \leq S_m$ *the discrepancy will be smaller. Furthermore* $\frac{\partial \widehat{S}_m(\nu)}{\partial \nu} > 0$.

Proof. See appendix.

It is not difficult to understand why the distortion in project selection increases for values of $S_m \in [0, -L]$. The planner solution entails a higher project quality now than in the case of a single-product, as she takes into account the positive surplus from the new good that can be obtained by successful firms. The actual effort level chosen by the firm also increases with the surplus from the new product, as the bank sets a lower interest payment on the loan. However, because of the double marginalization, it does with a smaller degree than the socially optimal one. Hence the discrepancy in project quality increases over the range of $S_m \in [0, -L]$.

[18]This result naturally requires that potential competitors (SFIs) are not able to observe the interest rate choice of the bank. Otherwise there would be free-riding on the bank effort to increase the size of the new market. And therefore if no specific advantage was assumed on the side of the bank to undertake the innovation, all the rent would be competed away immediately. This, in turn, would make cross-subsidization not optimal in the first place.

However, it is reasonable to assume that potential competitors are not informed about the interest rate choice of the bank.

For values of $S_m \in (-L,\, -(R^p - \nu)]$ the social planner solution entails refinancing, while the firm has no access to additional financing with the bank. Further, for a given cost-overrun ν, the socially optimal level of effort does not change with the level of social surplus from the other product, when refinancing from the social point of view becomes optimal. However, the actual project quality continues to increase with the level of the total surplus from the other product. The reason is the same as before: a higher surplus results in lower interest and therefore more residual claims left to the firm. Hence in the considered region, for any given cost overrun ν, the gap between the planner and the actual project selection is a strictly decreasing function of the surplus from the additional product. As a consequence, for high enough level of surplus the discrepancy between the first-best and the second-best project choice becomes smaller compared to the case of the single-product bank.

4.2 Refinancing and incentives

For high social surplus, i.e. $S_m \in (-(R^p - \nu), \overline{S}_m]$, refinancing becomes ex-post optimal for the bank. The idea behind is quite intuitive: keeping the firm in business allows the bank to raise demand for the new product and creates additional surplus for the bank. Refinancing takes place when :

$$R^p + S_m \geq \nu$$

Note, first of all, that the bank in exchange for refinancing captures all the surplus from the firm. This is due to the fact that no other lenders would be willing to grant additional funds to the firm. The lack of competition in intermediate stage can be understood in the following way. The bank is the only provider of the second product that makes keeping the firm profitable. A new lender has no control over the rents of the second product captured by the bank. Thus once financing is granted by a new lender, the bank can always appropriate all the surplus from the second product. This, however, leaves no possibility to a new lender to recover the injected capital ν from the project returns R^p

The interest rate choice of the bank is determined by solving the following optimization problem:

$$\max_{R_b} e^{**} R_b - I + e^{**} S_m + (1 - e^{**})\,(R^p - \nu + S_m) \tag{4}$$

$$s.t. \qquad e^{**} = \frac{1}{\alpha}\,(R^g - R_b - b)\,, \tag{5}$$

as the firm rationally expects to be refinanced following default on the initial loan payment.

The additional terms of the first-order condition with respect to the case without refinancing are:

$$-bR_b - \frac{\partial e^{**}}{\partial R_b}\left(R^p - \nu + S_m\right) = -bR_b + \frac{1}{\alpha}\left(R^p - \nu + S_m\right)$$

The first term is negative, showing the bank's intention to ameliorate the moral hazard problem by lowering the interest rate. Once refinancing is anticipated, the firm's effort choice is not only influenced by its residual claims from the investment but also by the control benefit the manager enjoys from staying in business. As incentives - for any interest rate - are poorer when refinancing is foreseen by the firm, the bank mitigates this effect by lowering the first-period interest rate. The second term is positive and captures the bank' s opposite incentive: as refinancing is profitable, the bank has an interest in making it happen.

Proposition 3 (Refinancing and Efficiency) *For $S_m \in (-(R^p - \nu), \overline{S}_m]$ the unique equilibrium entails refinancing. The quality gap between the planner's solution and the actual effort level increases compared to that of the single-product bank.*

Proof. See appendix.

In this equilibrium the bank sells the new product to all types of firms in the second period. However, the future profit that the bank earns on successful firms is higher than on firms with incomplete projects. Thus the bank has an incentive to lower the interest rate to alleviate the moral hazard problem. When the private benefit b from staying in business is very high (i.e. the commitment problem is severe), the reduction in interest rate may not be compensated by the profit on these firms from the future business. Therefore, given the entry cost F, developing the other product becomes profitable only for sufficiently high surplus S_m at high levels of private benefit.(see Appendix)

What are the factors that influence refinancing?

There are two forces which make the refinancing constraint more likely to be met: the size of the surplus S_m and the size of the cost over-run ν. Notice that both of them might be influenced by the business cycle. Demand for the additional product and therefore the surplus captured by the bank may be higher in periods of economic upturns. Firms may

have an increased willingness to pay for a (sophisticated) new product.[19] Therefore the surplus S_m that the innovator can extract can be higher. Similarly, financing sources for the bank may be more accessible and cheaper in the period of market expansion. Therefore ceteris paribus refinancing is more likely to happen when there is boom. Conversely, in the phase of bust the cost of funds for the bank may become expensive, and the surplus firms derive and then the bank can extract from the purchase of the additional product may be lower. Therefore refinancing in equilibrium may be less likely to occur.

5 Scope-expanding mergers

In the previous section we examined the incentives to develop a new financial product. We now argue that the same mechanism may provide a rationale for scope-expanding mergers. To distinguish between financial innovation and scope expansion, the latter refers to a situation when a financial service other than a loan already exists and is provided by financial institutions other than banks. In our benchmark case the bank is specialised on lending and firms completed the initial project can turn to any of the providers to buy the additional service. The feature of this setup is that, as there is competition among providers of the additional financial product, total rent extraction does not occur. Firms rationally anticipate the potential future surplus after completion of the initial project, while determining the effort level. By setting the interest rate, the loan providing bank takes into consideration the effect of the continuation profit on firms' incentives.

Let us modify our initial set-up and assume that there is a market for the additional financial product with n specialized institutions. To abstract from entry into this market, I assume that at the entrance fee F the number of SFI's has reached its long-run equilibrium. Consequently the only possibility to enter is to buy out someone through merger or acquisition. Thus F is equal to:

$$F \equiv e\left(R_{b,} S_f\left(n\right)\right) S_b\left(n\right) \tag{6}$$

where $S_b\left(n\right)$ captures the SFI per customer's profit and $S_f\left(n\right)$ is the surplus accruing to the

[19] Assume, for example, that there is a constant marginal cost c to provide the new product and that firms' preferences can be described by $U = \overline{\rho} V(q) - T$ where q is the amount of good bought from the bank, T is the amount of money paid to the bank, and $V(q) = \frac{1-(1-q)^2}{2}$. Then the surplus the bank can capture is: $S_m = \frac{(\overline{\rho}-c)^2}{2\overline{\rho}}$ which is an increasing function of $\overline{\rho}$.

firms. The size of the market, $e\left(R_b, S^f(n)\right)$, as before, depends on the mass of successful projects. This is a function of the initial lender's interest rate and the surplus from the financial service. Let us also assume that:

$$\frac{\partial S_b(n)}{\partial n} < 0 \qquad \frac{\partial \mathrm{S_f\,(n)}}{\partial \mathrm{n}} > 0.$$

One could think about $S_b(n)$ and $S_f(n)$ as the reduced form of a Salop[20] or Cournot-type of monopolistic competition in the second market.

The next lemma summarizes the benchmark case.

Lemma 2 *(Specialised financial intermediaries) The existence of the additional financial product improves ex-ante incentives and raises the bank's interest rate on the initial loan.*

Proof. See appendix.

We now use the framework above to analyze what happens after a merger between a bank and a financial service providing firm. Does the merger improve incentives or does it instead lead to a worse quality loan-portfolio? We show that while the merger improves efficiency for parameter values such that the unique equilibrium entails no-refinancing for the firm, it can lead to a worse loan-quality and further efficiency losses when refinancing becomes ex-post optimal.

5.1 Mergers that improve incentives

Assume for the moment that the conglomerate bank had no interest to inject money in uncompleted projects. Denote, as before, the total (social) surplus from the additional financial product by S_m. Then this is indeed the case for $S_m \in [0, -(R^p - \nu)]$: refinancing is not profitable from the bank's point of view,[21] as the maximum surplus that could be

[20] Assume, for example that the competition among SFI can be described by a spatial competition model à la Salop.

Let the (net) utility of a typical firm is given by: $\mathrm{U}=\overline{\rho} - P - \gamma x_b$ where P is the price charged for the service, x_b is the distance from the SFI which supplies the firm with the service and γ.is the transportation cost parameter. Then the profit of a typical SFI can be described as: $\mathrm{S}_b(n) = 2\left[\widehat{x}_b\left(P - \overline{R}\right)\right]$ where $\widehat{x}_b$ represents the distance between the SFI and its marginal customer.

The equilibrium outcome of this game will be: $\mathrm{S}_b(n) = \frac{\gamma}{n^2}$ with $\frac{\partial S_b(n)}{\partial n} < 0$ and the surplus of the firm will be equal to: $\mathrm{S}_f(n) \equiv U(n) = \overline{\rho} - \overline{R} - \frac{2\gamma}{n}$ with $\frac{\partial S_f(n)}{\partial n} > 0$.

[21] Note that new lenders have neither incentives to enter and refinance the troubled firm.

captured from the second product does not cover the loss between the money injected ν and the value of the initial project R^p.

Proposition 4 *(Merger and loan portfolio) For $S_m \in [0, -(R^p - \nu)]$ merger incentives vanish when the market for the additional financial product is perfectly competitive ($S_b = F = 0$). For all other levels of competition merger is profitable and increases project quality.*

Proof. See appendix.

The intuition for the first part of the result is the following: when the market for the second product is perfectly competitive, the bank cannot gain by lowering the interest rate on the credit, since all the gains from the higher market share would be competed away. Therefore no additional profits can be captured via mergers. In all the other cases the logic follows exactly the same reasoning I have developed for the case of a product-innovating bank. The bank can control the moral-hazard problem in investing through its interest rate choice. When the surplus in the new market is positive, lowering the interest rate becomes profitable. The lower interest rate alleviates moral hazard in financial contracting and allows the bank to extend the market for the additional product.

5.2 Creating monopoly power via mergers

For $S_m \in \left[-(R^p - \nu), \overline{S}_m\right]$ it becomes profitable for the bank to inject ν into the troubled firm. For the time being let us consider the case when the firm is locked in to the bank, i.e. the bank is the only provider of funds. [22] Then we come back to the question of how consistent this scenario is with the other building blocks of the model.

The next proposition summarizes our findings.

Proposition 5 *(Merger and Refinancing) For any given level of cost overrun ν there exists a level of competition $\overline{n}$, such that for $\forall n \geq \overline{n}$ a merger results in a worse loan portfolio. Inefficiency increases as the number of financial service providers grows in the market. The higher the monopoly rent from the second market, the lower the threshold-level of competitors above which the merged bank holds a lower quality portfolio.*

Proof. See appendix.

[22] This assumption can suit economies where the banking sector is not competitive, either because of collusion or regulation.

The higher $S_b(n)$ is, the more incentive the bank has to induce high effort by lowering the interest rate, as it gains a lot from market extension. On the contrary, when the market for the second product is very competitive, creating demand by lowering the interest rate is not very attractive as the surplus per borrower is small. Instead, the higher is the surplus on unsuccessful firms S_m relative to the surplus on successful firms $S_b(n)$, the less moral hazard matters from the bank's point of view. Hence interest rate will increase, and so does the number of firms captive to the bank. The higher second period rent on firms with incomplete projects is then what makes scope expansion profitable even if the impact of soft budget constraint on the portfolio of the bank is negative.

Profitability of the merger

Concerning the profitability of the merger (as the Appendix shows), merger may not be profitable at all level of S_m if b is too high. Thus merger may not take place when the bank's commitment problem is particularly harmful for the moral hazard problem. However for each level of S_m there exists a range of b such that merger is profitable and leads to a worse loan portfolio compared to the benchmark. For a given level of social surplus S_m the relationship between n and b (under the assumption that merger should be profitable) is ambiguous.

When increasing competition has a higher (marginal) effect on the surplus accruing to successful clients than on the bank surplus, i.e. $(\left|\frac{\partial S_b(n)}{\partial n}\right| \leq \frac{\partial S_f(n)}{\partial n})$ the range of b, for which merger is profitable, shrinks, as n increases. This is due to two effects: (1) when competition greatly benefits successful firms (i.e. $\frac{\partial S_f(n)}{\partial n}$ is high), the interest rate can be set high without hurting incentives. Merger makes the moral hazard problem worse with respect to the single-product case. Hence the loss due to the higher failure probability on the first period interest rate is high in this case. (2) incentives are, ceteris paribus, better, thus the total profit on failed borrowers is lower, as there are less failure. Hence the interval of b for which merger is profitable shrinks with n.

When $\left|\frac{\partial S_b(n)}{\partial n}\right| \geq \frac{\partial S_f(n)}{\partial n}$, the range of b for which merger is profitable may increase with n . The reason is that, (1) loss in interest rate payment due to lower effort matters less, as competition has a relatively little impact on the firm's incentives.(2) as competition for successful clients reduces the bank surplus considerably, the bank cares less about moral hazard problem. Hence in equilibrium more firms become captive to the bank, and the total profit bank earns on them will be higher. Thus merger becomes also profitable for higher

levels of b.

Robustness of the result to intermediate competition in the loan market

Are new lenders willing to enter and compete for firms with uncompleted projects? Assume, first, that potential competitors are banks specialized on lending. Their decision to bid for the firm will depend on whether the firm can credibly commit the future surplus earned on the additional product, in exchange for refinancing. If no future surplus could be pledged to a potential lender the latter would make losses. Hence it would not enter. Commitment problem might arise, as once financing is obtained, it would be the best interest of the firm to secretly negotiate a higher price with the SFI for the product and split the surplus afterwards.

Assuming away the commitment problem, asymmetry between the multiproduct bank and a specialized lender may not cease to exist. In particular, the maximum amount the firm could pledge in exchange for lending is limited by the surplus $S_f(n)$ from the additional product over which the firm has no control. A multiproduct bank, however, could internalize all the surplus from the second activity. Hence its decision would be based on comparing $R^p + S_m$ with the cost of refinancing. As a consequence, there would be cases where single product lenders would not, but the merged bank would refinance.

The previous argument does not take into account the seniority of the initial claims. However it is reasonable to think that a firm with incomplete project has further obligations to the initial lender. Short-term bank debt is often secured, and holders of short-term claims seem rarely to forgive debt. Asquith, Gertner and Scharfstein (1994), in an empirical study about U.S. junk bond issuers, show that when companies are distressed banks virtually never forgive principal. Similar conclusions are reached by Franks and Sussman (2000) in a study about small and medium size UK companies in financial distress. Thus new lenders would not be willing to enter if the total surplus from the refinancing did not cover the initial lender's principal claim and the additional capital injection. Hence, for $R^p + \overline{S}_m \leq (R_b + \nu)$ if bankruptcy laws protect initial lenders' seniority, no new lenders (not even multiproduct ones) will find it optimal to enter.[23]

Finally, even if the condition above did not hold, as long as competition in the inter-

[23]Lack of competition here allows the bank to leverage its monopoly power on the second market. This feature relates the model to the literature on foreclosure (see Rey and Tirole (2000). By controlling the essential facility - in this case refinancing - the bank is able to extend its monopoly power also into a potentially competitive market.

mediate phase would not be perfect, refinancing would lead to some positive returns. The effect of soft budget constraint on the portfolio of the bank would again depend on the rent earned on successful borrowers compared to the rent earned on firms with refinancing needs. A strong competition for successful clients in the second product would still create incentives to expand scope even at the cost of a worse loan portfolio.

6 Concluding Remarks

The aim of the paper was to analyze the effect of scope expansion on the core activity of banks. We showed that complementarities between different activities might stem from an agency problem in financial contracting. We argued that a potential cost of scope expansion might be lenders' inability to commit to tough behaviour upon failure, as a consequence of seeing their troubled clients as potential customers for their other business. Considering the incentive problems in a multiproduct bank, our paper provides a new explanation for the presence of "soft budget constraint" in credit markets.

We showed that scope expansion improves incentives and allow to move closer to the efficient level of effort, when the commitment problem above is not at issue. When instead the sale of the new product alters refinancing incentives, engaging in new activities can make the moral hazard problem in the core business of banks worse. This result is consistent with the recent findings of Demsetz and Strahan (1997) on large bank-holding companies.

We argued that incentives to expand scope may still exist, even at the cost of making the loan portfolio worse. Default on the initial payment creates lock-in for failed borrowers and allows the bank to leverage its monopoly power on the second market, and extract all the surplus. We showed that the inefficiency relative to the first-best effort choice (and loan portfolio) increases as the competition in the new market becomes stronger, and when the firm's willingness to pay for the new product increases.

Appendix

Proof of Lemma 1

Consider, first, the effort choice under asymmetric information. In this case, the firm rationally expects that the bank is not willing to refinance by Assumption 3, $R^p < \nu.$, and chooses the effort level equal to $e^*(R_b) = \frac{(R^g - R_b)}{\alpha}$.

Then the bank sets the first-period interest rate, taking into account that for a given interest rate, the firm exerts effort $e^*(R_b)$:

$$\max_{R_b} e^* R_b - I$$

The optimal interest rate R_b^s and the optimal effort level $e_s^*(R_b^s)$, respectively, are:

$$R_b^s = \frac{R^g}{2} \qquad and \qquad e_s^*(R_b^s) = \frac{R^g}{2\alpha}.$$

where the subscript s stands for the single-product case. Lending take place for $\frac{(R^g)^2}{4\alpha} > I$.[24] Once financed, the investment yields strictly non-negative profit to the entrepreneur: $\frac{(R^g)^2}{8\alpha} > 0$.

The socially optimal level of effort, in turn, is the solution of the following maximization problem:

$$\max_e eR^g + (1-e)\max\{0, L\} - I - \Psi(e)$$

which results in:

$$e_s^{FB} = \frac{R^g}{\alpha}.$$

Hence the discrepancy is equal to:

$$(\textbf{Loss1}) \qquad e_s^{FB} - e_s^*(R_b^s) = \frac{R^g}{2\alpha}.$$

■

Proof for Proposition 2

The social planner chooses the quality of the project, maximizing the following objective function:

$$\max_e e(R^g + S_m) + (1-e)\max\{0, L + S_m\} - I - \Psi(e)$$

which for $S_m \in (0, -L]$ becomes:

[24]We assume that lending always takes place.

$$e_m^{FB} = \frac{R^g + S_m}{\alpha}$$

where the subscript m denotes the multiproduct case.

The actual loan quality is determined by the following maximisation problem:

$$\arg\max_{R_b} e^*(R_b + S_m) - I$$

$$s.t.$$

$$e^*(R_b) = (R^g - R_b)$$

which results in:

$$e_m^*(R_b^m) = \frac{R^g + S_m}{2\alpha}.$$

Hence the discrepancy is equal to:

$$(\textbf{Loss2}) \qquad e_m^{FB} - e_m^*(R_b^m) = \frac{R^g + S_m}{2\alpha}$$

We note that the gap between the first-best and actual loan quality is bigger compared to the single-product bank, and it is an increasing function of the total surplus $S_m \in [0, -L]$.

To see what happens with the incentives for $S_m \in (-L, -(R^p - \nu)]$, notice, first of all, that for this range of values the planner and the bank refinancing decision will differ: the planner solution entails refinancing, while it is not the case for the bank.

The planner's solution now is as follows:

$$e_m^{FB} = \frac{R^g - L}{\alpha} > e_m^*(R_b^m) = \frac{R^g - R_b^m}{\alpha} = \frac{R^g + S_m}{2\alpha}.$$

,

where the LHS of the inequality is the actual loan quality for a given level of S_m. Notice that the actual level of effort is higher than that of the previous range, as this equilibrium exists for $S_m \in (-L, -(R^p - \nu)]$. Furthermore, for a given cost-overrun ν, the socially

optimal level of effort does not change, while the second best effort level increases with the level of the total surplus.

Denote by $(-L+\varepsilon)$ the actual level of S_m, where $\varepsilon \in (0,b]$, i.e. $S_m = -L+\varepsilon$. Thus higher ε means higher surplus. Then the discrepancy between the planner solution and the actual loan quality can be written as:

$$\textbf{(Loss3)} \qquad e_m^{FB} - e_m^* \left(R_b^m\right) = \frac{R^g}{2\alpha} - \frac{1}{2\alpha}(L+\varepsilon).$$

Recall that the discrepancy in the single-product case was equal to $\frac{R^g}{2\alpha}$. Therefore the necessary and sufficient condition for non-increasing discrepancy in the case of the multiproduct selling bank is:

$$(L+\varepsilon) \geq 0.$$

Assume that the cost overrun is equal $\nu = \underline{\nu}$. Then the previous expression is non-negative for all $\varepsilon \in (0,b]$ in the interval by the definition of $\underline{\nu}$. Consider now a δ increase in ν, starting from $\underline{\nu}$. As the expression is a continuous function of ν and ε, there should exist a non-zero measure interval for $\varepsilon \in [\varepsilon\left(\underline{\nu}\left(\delta\right)\right)\ , \mathrm{b}]$ such that the expression is still positive. Denote by $\overline{\nu}$ the cost overrun at which $\varepsilon = b$ makes the expression equal to zero. Note that this happens for $\overline{\nu} = R^p + 2b$. As the expression is a continuous and decreasing function of ν, for each $\nu \in [\underline{\nu}, \overline{\nu}]$ there should exist an interval $\varepsilon \in [\varepsilon\left(\nu\right), b]$ such that the expression is non-negative, where, for a given cost overrun ν, $\varepsilon\left(\nu\right)$makes the equality strict. We can define the relationship between ν and $\varepsilon\left(\nu\right)$ by using IFT:

$$\frac{\partial \varepsilon\left(\nu\right)}{\partial \nu} > 0$$

Letting $\widehat{S}_m\left(\nu\right) = -L + \varepsilon\left(\nu\right)$ gives the result that higher cost overrun makes the expression for higher levels of surplus positive. ■

Proof for Proposition 3

The bank interest rate choice for values of $S_m \in (-(R^p - \nu), \overline{S}_m]$ is determined by:

$$\begin{aligned} & \max_{R_b} \left(e^{**} R_b - I\right) + e^{**} S_m + \\ & \left(1 - e^{**}\right)\left(R^p - \nu + S_m\right), \\ s.t. \qquad & e^{**} = \frac{\left(R^g - R_b - b\right)}{\alpha} \end{aligned}$$

Solving the optimization problem for the equilibrium interest rate we note that it does not depend on the surplus from the second activity:

$$R_b^m = \frac{(R^g + R^p - \nu - b)}{2}$$

The reason is that since in equilibrium all types of borrowers are going to buy the additional financial service, the effect of extending the market for the second product through lowering the interest rate vanishes. Evaluating the effort function at the equilibrium interest rate under refinancing, we get

$$e_m^{**}(R_b^m) = \frac{R^g - L}{2\alpha}.$$

Further, for $S_m \in (-(R^p - \nu), \overline{S}_m]$ the social planner solution is as follows:

$$\max_e e\,(R^g + S_m)\,(1-e)\max\{0, L + S_m\} - I - \Psi\,(e)$$

which results in:

$$e_m^{FB} = \frac{R^g - L}{\alpha}.$$

Hence the discrepancy between the planner solution and the actual one is as follows:

$$e_m^{FB} - e_m^{**}(R_b^m) = \frac{R^g - L}{2\alpha}.$$

Comparing the efficiency loss in the single-product case with that of an economy where $S_m \in (-(R^p - \nu), \overline{S}_m]$, the loss is higher in the latter one:

$$\textbf{(Loss4)} \qquad e_s^{FB} - e_s^*(R_b^s) = \frac{R^g}{2\alpha} < e_m^{FB} - e_m^{**}\,(R_b^m) = \frac{R^g - L}{2\alpha},$$

as L is negative by assumption.

The profitability of the innovation:

To prove that even if refinancing is inevitable it can be profitable for a bank with access to the loan market to engage in an additional activity, we should compare:

$$\begin{aligned} & E\Pi^m\,(e_m^{**}\,(R_b^m)\,, R_b^m, S_m) + (1 - e_m^{**}\,(R_b^m))\,\Pi_{ref} - F \\ > \quad & E\Pi^m\,(e_s^*(R_b^s) R_b^s)\,, \end{aligned}$$

where $F = e_s^* S_m$. Substituting the equilibrium values in the expression we get that developing a new product is profitable iff:

$$(\textbf{Diff1}) \quad \triangle = (e_m^{**} - e_i^*)(R_b^s + S_m) + e_m^{**}(R_b^m - R_b^s) + (1 - e_m^{**})(S_m + R^p - \nu)$$

For a given value of ν consider the social surplus from the innovation that makes the profit from refinancing equal to zero, i.e. $S_m(\nu) = \nu - R^p$. As the first term of the expression is positive, for every $S_m(\nu)$ there exists a range of values of the private benefit b such that for $b \in [0, b(S_m(\nu))]$ the difference is non-negative. For a given ν, the expression $\triangle$ is a continuous and increasing function of S_m. Therefore, for $\forall S_m \in [S_m(\nu), \overline{S}_m]$ there exists an interval for b such that

$$b \in [0, b(S_m)]$$

the expression is positive. Further, it is easy to see that

$$\frac{\partial b(S_m)}{\partial S_m} > 0.$$

For sufficiently high S_m, $\triangle$ becomes positive for all possible values of b, as $b \leq v - R^p$ by Assumption 1. ■

Proof for Lemma 2

Since the firm gets $S_f(n)$ surplus from the second product, its effort will be chosen according to the following function:

$$e_i = \frac{1}{\alpha}(R^g - R_b + S_f(n)),$$

where the subscript i refers to the independent seller case.

When additional financial facilities are provided by specialized institutions, the bank solves the following maximization problem:

$$\max_{R_b^i} e_i(R_b, S_f(n)) R_b - I$$

From where the first-order condition is as follows:

$$\begin{aligned} \left.\frac{\partial E\Pi^m}{\partial R_b}\right|_{R_b = R_b^s} &= \frac{\partial \Pi(R_b, e_i)}{\partial R_b} + \\ &\quad \frac{\partial \Pi(R_b, e^i(R_b, S_f(n)))}{\partial e} \frac{\partial e_i}{\partial R_b} \\ &= \frac{1}{\alpha} S_f(n) > 0 \end{aligned}$$

When there is a strictly positive continuation profit (for successful firms), the interest rate corresponding to the single-product case is no longer optimal. As the existence of (complementary) financial facilities improves incentives at any interest rate, the bank can increase the interest rate compared to the case when no other product is available in the market for successful firms.■

The availability of the new product has an indirect effect on the bank's profit. This goes through affecting the firm's incentives. However, it is important to note that the assumption here is that there is no way for the bank to capture directly the firm'surplus on the second product, if this product was not provided by itself the bank. [25]

Proof of Proposition 4

The profit of the bank can be written as the sum of the two activities with the following FOC:

$$\begin{aligned}\frac{\partial E\Pi^m}{\partial R_b} &= \frac{\partial \Pi\left(R_b, e\left(R_b, S_f\left(n\right)\right)\right)}{\partial R_b} + \\ &\quad \frac{\partial \Pi\left(R_b, e\left(R_b, S_f\left(n\right)\right)\right)}{\partial e}\frac{\partial e}{\partial R_b} + \frac{\partial e}{\partial R_b}S_b\left(n\right)\end{aligned}$$

When there are no entry barriers, i.e. $F = 0$ all the profit is competed away $S_b\left(n\right) = 0$ and the last term (new term with respect to the single-product case) disappears. Therefore the optimal interest rate will be the same as in the single-product case. For $F > 0$, the surplus from the second market will be strictly positive, and the bank will take into consideration the effect of the lower interest rate on the market share in the second market. Therefore it becomes profitable to lower the interest rate.

Note that with independent sellers for the additional product

$$e_i^* = \frac{1}{2\alpha}\left(R^g + S_f\left(n\right)\right).$$

While when merger between a bank and a SFI happens:

$$e_m^* = \frac{1}{2\alpha}\left(R^g + S_f\left(n\right) + S_b\left(n\right)\right) > e^i.$$

[25] Examining the possibility for the firm to pledge $S_f\left(n\right)$ to the bank at time 0, in exchange for lower initial interest rate, we note that this would not make parties better off in the current setup. Yet another possibility would be to write such a contract at time 1, once uncertainty is resolved. Firms with incomplete project may find it profitable to sign such a contract, if this led to refinancing. However, it seems reasonable to believe that no such contract would be possible to write or enforce. One reason might be that the firm would always have an incentive to "renegotiate" this contract. Once refinancing is obtained, it would be optimal for the firm to secretly propose a high price to the provider of the additional product, and split the extra surplus afterwards. This would lead no possibility for the bank to recover the cost of refinancing.

since $S_b(n)$ is strictly positive. Therefore, for $S_m \in [0, -(R^p - \nu)]$ merger leads to higher quality projects.

The profitability of buying out a SFI from the market can be shown along the same inequality chain we developed for the case of a financial innovation:

$$E\Pi^m\left(R_b^m\right) > E\Pi^m\left(R_b^i\right) = E\Pi^s\left(R_b^i\right).$$

where the first inequality comes from the strict concavity of the profit function, and the second equality follows from the construction of F.■

Proof for Proposition 5

Recall that equilibrium with refinancing exists for $S_m \in (-(R^p - \nu)\overline{S}_m]$.

The bank solves the following maximization program:

$$\begin{array}{ll} \max_{R_b} & e^{**}\left(R_b + S_b(n)\right) - I + \left(1 - e^{**}\right)\left(R^p - \nu + S_m\right) \\ s.t. & e_m^{**} = \frac{\left(R^g - R_b + S_f(n)\right) - b}{\alpha}. \end{array}$$

which the leads to:

$$R_b^m = \frac{\left(R^g + \left(S_f(n) - S_b(n) + S_m\right) + \left(R^p - \nu - b\right)\right)}{2}$$

Comparing the interest rate to our benchmark case (i.e.separation between different product providing institutions), one can easily show that for $S_b(n)$ low enough (i.e. when competition in the second market is sufficiently intense), the merged financial institution sets a higher interest rate. Further, the new effort level will be equal to:

$$e_m^{**} = \frac{1}{2\alpha}\left(R^g + S_f(n)\right) + \frac{1}{2\alpha}\left(-S_m + S_b(n) - \left(R^p + b - \nu\right)\right)$$

From where, if

$$(\mathbf{Cond1}) \qquad e_m^{**} \leq e_i^* \Leftrightarrow \left(S_b(n) - S_m - \left(b + R^p - \nu\right) \leq 0\right.$$

the merged institution ends up with a worse quality loan portfolio. Note that for a given S_m and cost overrun ν, when $n = 1$, $S_b(1) = S_m$, and therefore the expression in the bracket is strictly positive. For n[26] $\to \infty$, $\lim_{n\to\infty} S_b(n) = 0$, and since $S_m > -(R^p - \nu)$ the

[26]Here I treat n as a real number with range $[1, \infty]$, rather than a natural number which would be appropriate for talking about the number of competitors. I abstract from this consideration to make the problem continuous.

expression becomes strictly negative. As $S_b(n)$ is a continuous and decreasing function of n there should exists an $\overline{n}$ such that for $\forall n \geq \overline{n}$ merger leads to worse incentives. Moreover, as n increases, the discrepancy increases.

Define $S_b(n) = \beta(n) S_m$, where $\beta(0) = 1, \lim_{n->\infty} \beta(n) = 0$ and $\beta'(n) < 0$. Using the implicit function theorem, it is easy to see that the higher is the total surplus from the financial service S_m the lower will be the threshold level of $\overline{n}$ above which merging financial intermediaries hold worse quality loan-portfolio.

$$\frac{\partial \overline{n}}{\partial S_m} = \frac{1 - \beta(\overline{n})}{\beta'(\overline{n}) S_m} < 0$$

.

Profitability of the merger

Merger is profitable if and only if:

$$\Delta_2 = E\Pi^m(R_b^m) + (1 - e^{**}(R_b^m))\Pi_b^{ref} - F - E\Pi\left(R_b^i\right) \geq 0.$$

where $F = e_i^* S_b$ and R_b^i is the optimal interest rate without merger. This expression can be rewritten in the following form:

$$(\textbf{Diff2}) \qquad \Delta_2 = (e_m^{**} - e_i^*)\left(R_b^i + S_b\right) + e_m^{**}(R_b^m - R_b^i) + (1 - e_m^{**})(S_m + R^p - \nu)$$

From our previous result we know that for each level of social surplus S_m there exists a level of competition $\overline{n}(S_m)$ in the new activity that leads to a worse loan portfolio. Let' fix now the level of *social surplus* S_m and analyze the relationship between competition and the non-negativity of Δ_2.

At $n = \overline{n}$ the expression above simplifies to:

$$\Delta_2|_{n=\overline{n}} = (1 - \frac{1}{2\alpha}(R^g + S_f(n))(S_m + R^p - \nu) + \frac{1}{2\alpha}(R^g + S_f(n))(-b)$$

As the first term of the expression is positive, there should exist an interval for the private benefit b such that for $b \in [0, b(\overline{n})]$ merger is profitable. Let's examine now the relationship between n and $b(n)$, where $b(n)$ is defined, for a given n, as the level of private benefit that makes $\Delta_2 = 0$. Using the implicit function theorem it turns out that

$$sign\{\frac{\partial b(n)}{\partial n}\} = sign\{\frac{d\Delta_2}{dn}\} =$$

$$\frac{\partial S_b}{\partial n}(-S_m + S_b(n) - (R^p + b - \nu)) + \frac{\partial S_f}{\partial n}(-S_m - (R^p + b - \nu))$$

As $\frac{\partial S_b(n)}{\partial n} < 0$ negative and $\frac{\partial S_f(n)}{\partial n} > 0$, moreover for $n \geq \overline{n}$ the multipliers of the two derivatives are negative, the sign can be in both ways. However, it crucially depends on the impact of competition on the firm's rent and on the bank's rent. If

$$\left|\frac{\partial S_b(n)}{\partial n}\right| \leq \frac{\partial S_f(n)}{\partial n},$$

the interval of $b \in [0, b(n)]$, for which merger is profitable, shrinks as n increases. However, the interval has always a positive measure. This can easily be seen as the second and the third term of Δ_2 are always positive.

The necessary condition for the derivative to be positive is that $\left|\frac{\partial S_b(n)}{\partial n}\right| \geq \frac{\partial S_f(n)}{\partial n}$. For high enough n, S_b becomes small, and if the impact of competition is higher on the bank's than on the firm's surplus, the range of $b \in [0, b(n)]$ for which merger is profitable increases with n.

■

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