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The efficiency implications of financial conglomeration

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Abstract

This paper studies the competitive and efficiency implications of financial conglomeration driven by cost-efficiency gains in monitoring credit and insurance customers. The analysis shows that conglomeration is conducive to tougher competition in the credit market and increases profit in insurance. The aggregate profit in the financial sector does not increase, because the conglomerates pass the cost-efficiency gains on to the borrowers in full. More competitive market for financial services also reduces the aggregate risk in the financial markets, indicating that capital requirements in both sectors should be lower in the presence of financial conglomerates

Key words: financial conglomerates, banking, insurance, capital regulation

JEL classification numbers: G21, G22, G38, L40

Finanssiryhmittymien vaikutus rahoitusmarkkinoiden tehokkuuteen

Suomen Pankin keskustelualoitteita 17/2004

Ville Mälkönen
Tutkimusosasto

Tiivistelmä

Tässä tutkimuksessa tarkastellaan finanssiryhmittymien vaikutusta rahoitusmarkkinoiden kilpailullisuuteen ja tehokkuuteen. Analyysi osoittaa ryhmittymien muodostumisen lisäävän lainamarkkinoiden kilpailua ja vakuutusmarkkinoiden voittoja. Rahoitusmarkkinoiden kokonaisvoitot eivät kuitenkaan kasva, vaikka ryhmittymien asiakkaiden monitoroinnista koituvat kustannukset supistuvat, koska kustannusten pieneneminen välittyy suoraan laina-asiakkaille. Pankkisektorin kilpailun lisääntyminen ja vakuutusmarkkinoiden kustannusten supistuminen lisäävät finanssiryhmittymien monitorointia ja siten rahoitusmarkkinoiden stabiilisuutta. Tästä syystä rahoitusmarkkinoiden vakavaraisuusvaatimuksia voidaan lieventää sekä pankki- että vakuutussektorilla, jos näitä rahoituspalveluja myydään ainoastaan finanssiryhmittymissä.

Avainsanat: finanssiryhmittymät, pankkitoiminta, vakuutustoiminta, vakavaraisuusvaatimukset

JEL-luokittelu: G21, G22, G38, L40

Contents

1 Introduction

Many countries have been reforming their financial systems over the past two decades. These reforms have involved a removal of limitations on the activities of financial institutions. These developments have led to the emergence of the so-called financial conglomerates which combine several financial services in one organization. Advocates of financial conglomeration have claimed that the new organizational arrangements will generate significant benefits on both sides of the markets. Included among these are cost-efficiency gains and higher profitability, resulting from economies of scale and scope; increased market efficiency which makes the market less vulnerable to costly failures; and greater convenience on the customer side of the market as a result of 'one-stop shopping' benefits and information advantages generated by long-term business relationships.[1]

One incentive for the banks to expand their product lines is the ability to serve new customers and sell additional products to the existing ones, giving the banks an opportunity to exploit economies of scope and scale. For instance, an institution combining several services under one roof can improve its cost efficiency by using the same distribution channels and customer databases for several services. Provided that these cost-efficiency gains will be, at least partially, passed on to the customers, financial conglomeration may well lead to more efficient financial markets with more affordable financial services. While this is arguably one presumption the regulators have used to justify the removal of restrictions in financial markets, the question whether financial conglomeration leads to more efficient markets, however, depends essentially on the market environment which provides the incentives for prudential and competitive behavior.[2]

In this paper we consider the competitive implications of allowing more financial activities to occur in a financial institution and examine the circumstances where it will improve the market efficiency in terms of pricing and the management of risks. To this end, we develop an example of a financial conglomerate combining banking and insurance services. The model combines features from the literature on industrial organization and financial intermediation. In particular, we consider markets for financial contracts in the presence of moral hazard. In modeling the optimal design of contracts we build on Holmström and Tirole (1997) as the institutions have an access to an interim monitoring technology which can be used to observe the hidden action. We depart from Holmström and Tirole (1997) in that financial institutions are specialized in monitoring different clients as the monitoring costs are determined by the specific types of the clients. The difference in costs thus determines the conditions under which the banks can feasibly act as delegated

[1] For general discussion on the risks and regulatory aspects associated with financial conglomerates, see Mälkönen (2004) and Morrison (2003).

[2] For instance, one purpose of the repeal of Glass-Steagall act (1933) which limited the financial institutions activities (Gramm-Leach-Bliley act 1999) was 'to enhance competition in the financial services industry by providing a prudential framework for the affiliation of banks, securities firms, and other financial service providers, and for other purposes.'

monitors to investors (Diamond 1984) and whether the degree of competition on the markets affects the allocation of risk within the economy.

The key assumption is that financial conglomerates have an informational advantage in monitoring clients which have an established credit relationship with the institution.[3] This gives the institution a local monopoly power over these clients when they shop for an insurance contract to secure their future income. The immediate consequence of this effect is that the credit market becomes more competitive, because the financial institutions engage in a fierce competition for the long-term client relationship. Increased competition in banking imposes downward pressure on interest rates in banking and in equilibrium the conglomerates pass the cost efficiency gains in insurance on to the banking customers in full, indicating that financial conglomeration does not increase the aggregate profit in the financial industry.

The example might be useful in understanding why some argue that the financial conglomerates are unlikely to achieve the expected benefits. For instance, five big international banks – J.P. Morgan Chase, Citigroup, Credit Suisse, Deutche Bank, and UBS – have been primarily unsuccessful in pursuing to capitalize on the synergies.[4] On the basis of the results reported in this study it might be that although the institutions perceive significant gains associated with offering broader set of financial services ex-ante, the attempts to capitalize on the clients' downstream business leads to a market equilibrium in which the anticipated revenues will not be realized ex-post.

From a welfare point of view the model illustrates that conglomeration enhances the efficiency in the financial markets in the following sense. First, in equilibrium the financial conglomerates pass the cost-efficiency gains in insurance on to the banking customers in full, regardless of the degree of competition between the institutions. Second, financial conglomeration reduces the share of riskier loans in the market, because the institutions' have increased incentives to monitor the borrowers as it gives them a competitive advantage in the market for financial services. Finally, increased market efficiency in both pricing and risk management makes the capital adequacy regulation more effective in the case of financial conglomerates than stand-alone institutions. Therefore, we conclude that the regulator can implement equilibrium with the same allocation of risk in the financial markets with lower capital adequacy requirements.

[3] For instance, when a bank or an insurer establishes a relationship with a client, it incurs costs in gathering information about the client. An institution that combines these services can reduce these costs by using a common information system and reusing gathered information. Jappelli and Pagano (2002) use cross-country data and show that information-sharing diminishes the adverse selection problem inherent in credit-relationships and reduces the default rate in credit market. Mester, Nakamura and Renault (2002) find empirical support for the argument that information gathered from different financial services gives an advantage for institutions that combine these services over other lending institutions. Vander Vennet (2002) provides similar evidence in the case of European financial conglomerates and establishes that they have an information advantage over specialized institutions and conglomeration is contribution to a more efficient financial system.

[4] Empirical studies examining the cost-efficiency gains and one-stop shopping benefits also report mixed results about the profitability of financial conglomeration. See eg Berger (2000).

The remainder of the paper is organized as follows. The next section describes the economic environment in banking and insurance business. The third and the fourth sections examine the insurance and credit market equilibria when the institutions' product lines are limited to include only one service. Section five repeats these exercises in the presence financial conglomerates and compares the results. Section six concludes.

2 The model

We consider a risk neutral economy consisting of agents who live for three periods and financial institutions offering credit and insurance services. At the beginning of period one, the agents lack capital, but they are endowed with a technology which combined with one unit of capital yields a stochastic payoff. The banks enter the market as the only source of finance and offer loan contracts to the agents. With the help of bank credit the borrowers start a project which yields a stochastic income at the end of the first and the second period. Other assumptions concerning the credit markets are as follows:

C1) **Assets and risks:** Banks offer a standard debt contracts to the borrowers. The amount of capital required for a start-up project is normalized to unity and the borrowers' debt service obligation to bank i is denoted by r^i. The banks face a perfectly elastic supply of funds at a gross interest rate $\rho_s > 1$. The projects yield a stochastic payoff equal to ρ_r when successful. In the case of project failure, the payoff is zero. The borrowers are protected by limited liability, thus, the borrower with a successful project will repay the bank in full, but in the case of failure, the bank receives nothing.

The outcome of the project depends on two stochastic components. The success of the project is affected by an unobservable effort undertaken by the borrowers $\alpha = \bar{\alpha}, \underline{\alpha}$. If a borrower chooses an effort level $\bar{\alpha}$, her project succeeds idiosyncratically with probability $\pi(\bar{\alpha}) < 1$, regardless of the state of the world. The failure probability $\pi(\bar{\alpha})$ is non-correlated between borrowers.

With an effort level $\underline{\alpha}$ the project survives idiosyncratically with probability $\pi(\underline{\alpha})$ in a high-income state of the world. The high-income state of the world occurs with probability ω, thus, the individual success probability of a project with effort level $\underline{\alpha}$ is $\pi(\underline{\alpha})\omega$. Under low-income state of the world *all projects* with effort level $\underline{\alpha}$ fail with probability $(1-\omega)$, contributing to a system wide risk of loan losses, when the number of low-effort projects is high. In what follows $\bar{\pi} = \pi(\bar{\alpha})$ and $\underline{\pi} = \pi(\underline{\alpha})\omega$ will be used as a shorthand for the individual success probabilities, when the borrower chooses an effort level $\bar{\alpha}$ and $\underline{\alpha}$, respectively. The probability that *each project* with effort $\underline{\alpha}$ will fail is given by $1-\omega$.[5]

C2) **Moral hazard:** The modeling of moral hazard follows Holmström and Tirole (1997). A borrower enjoys a private benefit $B>0$ from choosing $\underline{\alpha}$ rather than $\bar{\alpha}$. The loan contract is therefore subject to a moral hazard problem, because for a given interest rate r a bank cannot implement an effort $\bar{\alpha}$, unless it observes the borrowers' effort level and condition the loan contract on this information. This can be formalized as

$$\underline{\pi}(\rho_r - r) + B \geq \bar{\pi}(\rho_r - r). \tag{2.1}$$

which indicates that when the effort level cannot be verified and the borrower is offered the same interest rate, she will choose action $\underline{\alpha}$.[6]

C3) **Monitoring technology and borrower-types:** We employ an information based model of imperfectly competitive spatial banking system to describe the banks' monitoring behavior. The modeling is based on Diamond's (1984) model of delegated monitoring and Salop's (1979) model of spatial competition. The model considers banks offering loan-contracts to each client y separately and the banks engage in interim monitoring of the clients as in Holmström and Tirole (1997).

Banks are specialized in the sense that their monitoring costs depend on the type of the potential clients' start-up project.[7] More specifically, the borrowers are uniformly distributed on a circle with a two unit circumference and density M. The distribution determines the projects in terms monitoring costs. To monitor a project of a borrower located at $0 < y < 1$, a bank located at position 1 incurs a monitoring cost equal to $x_1 t^B$, where t^B denotes the cost parameter which is identical to all banks and $x_1 = 1 - y$ denotes the distance in the 'technological circumference' between the applicant's project and the one that the bank is fully specialized in monitoring.[8] In what follows we will use the distance parameter x to denote the types of the borrowers.

[5] The specification of risks can be interpreted as follows. Careful project management ($\bar{\alpha}$) means that the borrower takes necessary actions to make the project viable under adverse circumstances in the economy. The idiosyncratic risk component reflects the fact that each project may fail for reasons which are unrelated to management. This justifies the existence of markets for insurance policies.

[6] The private benefit can be interpreted as shirking or, alternatively, as an opportunity cost from careful project management. Since B is non-transferable, the social value of loan contract with an effort level $\bar{\alpha}$ is higher than with $\underline{\alpha}$.

[7] The assumption that some banks have an advantage in monitoring certain clients captures the feature that both geographical and informational specialization are important aspects in small business lending. For instance, Nakamura (1994) suggests that small banks have an organizational structure which contributes to a better ability to solve the informational asymmetries inherent in lending. Further, DeYoung et al (2004) argue that small banks' ability to use of 'soft information' about small clients allows them to survive the competition in the markets.

[8] For a similar modeling approach to specialization in financial markets, see Almazan (2002); Hauswald and Marquez (2002); and Kaas (2003).

The geographical interpretation of the distance x_1 is that the bank 1 pays travel cost to establish relationships with clients at different locations and for this it incurs a cost equal to $t^B x_1$. Once this cost is sunk, the bank can monitor all clients at this specific location without additional costs. The technological interpretation can be understood in the following way: The bank's financial analysts are specialized in a particular industry. To monitor different types of industries, the banks' analysts require specific skills. Therefore, it is plausible to think that the more similar the producer is to the core industry of the bank the lower the cost of acquiring these industry specific skills.

A feasible low-risk contract requires bank-monitoring to mitigate the moral-hazard problem, because monitoring allows the bank to prevent the realization of the private benefit. A bank can accomplish this by offering a contract with sufficiently low rate $r(x)$ which induces the borrower to accept a contract which specifies an effort $\bar{\alpha}$ rather than a contract without any specific requirements. Reflecting the individual failure probabilities, a contract is referred to as high-risk and low-risk contract when $\alpha = \underline{\alpha}$ and $\alpha = \bar{\alpha}$, respectively.

C4) **Capital regulation:** A bank supervisor can influence the credit market through risk-based capital adequacy requirements applied to each bank. These policies require a bank to hold $[1 - \pi(\alpha)]k^B$ units of capital per contract in the form of liquid assets. The cost of capital is $\rho_k > \rho_s$, illustrating the property that although the capital can be invested in safe assets, bank capital is costly. If there were no opportunity cost, which will be denoted by $\Delta = \rho_k - \rho_s > 0$, capital regulation would not influence the banks' investment behavior and regulation would be meaningless.

The idea why capital adequacy requirements are important in preventing the adverse market outcomes in banking is closely related to Flannery (1989); Hellman, Murdock and Stiglitz (2000); and Holmström and Tirole (1997). Minimum capital levels increase the cost the banks incur in the case of credit default. The risk of loosing their own money therefore makes the banks and, perhaps more importantly, their shareholders more careful about the risks they are taking. In the present model this shows up in increased monitoring of the borrowers on behalf of the banks as higher capital adequacy requirements increase the opportunity cost of monitoring.

After the initial investment funded through banks, a successful project yields a stochastic payoff until the end of the second period when all projects are terminated. After the initial investment, a borrower with a successful project thus has no need for additional capital, but has an incentive to obtain an insurance policy to secure the consumption at the final period. The insurers enter the market and offer insurance policies to successful borrowers. To save on notation and without a loss of generality we assume that the actions and the probabilities are identical to those in the case of the initial project.

Other assumptions concerning the contracting environment between insurers and borrowers are the following.

I1) **Expected utility and insurance:** At the beginning of period two, the market consists of borrowers who have a successful initial project and they have repaid their debt to the bank with interest. The project will yield them the following stochastic income at the end of the second period:

$$EU^N(x_i, \rho_r, \alpha) = \begin{cases} (1+\bar{\pi})\rho_r & for \quad \alpha = \bar{\alpha} \\ (1+\underline{\pi})\rho_r + B & for \quad \alpha = \underline{\alpha}, \end{cases} \tag{2.2}$$

where $EU^N(\rho_r, \underline{\alpha}) < EU^N(\rho_r, \bar{\alpha})$, reflecting the fact that an uninsured individual will take an appropriate effort to reduce the probability of failure. If she decides to buy a full insurance from insurer j, her utility becomes

$$U^I(x_i, \rho_r, \alpha, p^j) = \begin{cases} 2\rho_r - p^j & for \quad \alpha = \bar{\alpha} \\ 2\rho_r + B - p^j & for \quad \alpha = \underline{\alpha}, \end{cases} \tag{2.3}$$

where p^j is the premium charged by insurer j. The moral hazard associated with insurance-contract emerges, because $U^I(\rho_r, \bar{\alpha}, p^j) < U^I(\rho_r, \underline{\alpha}, p^j)$ for any given p^j.[9]

I2) **Insurance contracts and monitoring:** The insurer raises capital in the form of premiums collected from policy-holders and invests the capital to safe financial asset ρ_s. They can condition the contract on the effort undertaken by the policy-holders and thereby reduce the moral hazard. The monitoring technology is identical to that of the banks, but the client specific monitoring cost is different. That is, an insurer located at 0 incurs a monitoring cost equal to $t^I x$ ($t^I \neq t^B$) in the case of client x. As is usual in insurance business, the insurer may incur losses even for a monitored policy. However, we assume that the customer base $2M$ is sufficiently large so that the law of large number implies non-negative expected profit insofar as the insurers do not engage in underpricing the contracts.

I3) **Insurance regulation:** The regulator can apply capital adequacy regulation to the insurers. We assume that the requirement is risk-based, ie each insurer is required to hold $(1-\pi)\rho_r k^I$ units of equity capital per insurance contract until the contract expires at the end of second period. The cost of capital is the same as in banking, thus, the opportunity cost of holding capital is given by $\Delta = \rho_k - \rho_s > 0$.

I4) **Cost advantage of financial conglomerates:** Institutions combining insurance and lending activities have an absolute cost advantage in terms of monitoring insurance clients. More specifically, a financial

[9] For the reasons of tractability, we assume full insurance contracts. The examination of partial contracts would be interesting extension to the model, but it is beyond the scope of the present study.

conglomerate incurs no cost of monitoring an insurance client who has established a credit relationship with the banking branch of the institution.[10]

3 Stand-alone benchmark in insurance

This section characterizes the equilibria in stand-alone insurance market. For simplicity, we consider a market configuration with only two insurers located on the opposite sides of the two-unit circumference, indicating that the technological distance between the rival institutions is 1. The analysis is in two steps: first we consider the market for low-risk contracts and then we examine the outcomes of the full game in which the institutions can also offer high-risk contracts. Given the market equilibrium in terms of pricing and nature of existing contracts, we then investigate the role of capital adequacy regulation in the allocation of risks within the market.

3.1 Monitoring in insurance-market

Once the borrowers' future cash-flows have been established, they can purchase an insurance policy insulating their projects from shocks. Since the potential policy holders can negotiate with an insurer for free, the insurers will engage in Bertrand-type bidding competition for *each* potential customer individually. The strategy for insurer j is a continuum of quotes combining a premium p^j and a monitoring effort that implements a desired effort level α. The premium quote will be denoted by $p^j(x_j)$ where x_j denotes a distance between a representative customer at location y_j and the insurer j.

The services are considered homogeneous when both quotes require the same effort. Hence, limiting the insurers' services to monitored policies implies that the buyer chooses a policy with the lowest premium. The insurer 0's problem in quoting a full insurance policy to customer x_0 can be formalized as

$$\begin{aligned}
\max_{\bar{p}^0} EV_I^0(x_0) &= \bar{p}^0\rho_s - C_0^I(k^I, x_0) \\
& s.t. \\
EV_I^0(x_0) &= \begin{cases} \frac{1}{2}\left[\bar{p}^0\rho_s - C_0^I(k^I, x_0)\right] & for \quad \bar{p}^0 = \bar{p}^1 \\ 0 & for \quad \bar{p}^0 > \bar{p}^1 \end{cases}
\end{aligned}$$

where $C_0^I(k^I, x_0) = (1-\bar{\pi})\rho_r(1 + k^I\Delta) + t^I x_0$. The constraint expresses the feature that the customer chooses the policy with lower premium and when the premiums are the same, the customer randomizes between the offers. The first term in the insurer's maximization problem is the return for the premiums invested in safe assets. This return is realized at the end of the second period

[10] The assumption is rather extreme as it would be more plausible to think that the conglomerates would incur just a lower, non-zero, monitoring cost. It should, however, be noted that this would increase the notation without affecting the main insights of the analysis.

when the insurer liquidates its assets in order to meet the claims. The second term with a negative sign is the expected cost including the claim the insurer has to meet at the end of the second period. The expected value of the claim is increasing in the capital ratio k^I, because the insurer is required to collect the capital from the shareholders and hold it in a liquid form. The last term is the monitoring cost the insurer incurs for a contract implementing an action $\bar{\alpha}$.

The insurer solves this problem in the case of each potential policy holder observing the premiums the rival can feasibly offer to the customer. In equilibrium, the accepted quotes can be summarized as follows:

$$\begin{aligned}&\bar{p}^{0*}(x_0) = \arg\max EV_I^0(x_0) \qquad (3.1)\\ &s.t.\\ &\bar{p}^{0*}(x_0) = \tfrac{1}{\rho_s} C_1^I(k^I, x_1) \qquad for \qquad x_0 \in [0, 1/2]\end{aligned}$$

where $x_1 = 1 - x_0$. This expression determines the equilibrium premium in the case of each client who accepts the quote from insurer located at 0. By symmetry, the insurer 1's quotes are identical for customers located at $x_0 \in [1/2, 1]$.

The equilibrium strategy just derived is driven by that the insurer employs local monopoly power over certain types of customers. The result can be understood intuitively in the following way: The insurers observe the location of the rival and therefore and the lowest premium the rival can feasibly offer to each potential client. Since the insurer located closer to the client has a relative cost advantage in terms of monitoring the client, it sets its price just marginally below the rival's lowest feasible premium. It then follows that accepted quotes are increasing in the distance between the customer and the *rival institution* so that customers with the shortest distance to their insurer end up paying the highest premiums. This emerges as equilibrium, because the rival cannot match the offer due to higher monitoring costs. The market mechanism also implies that the cost advantages generated by specialization do not pass on to the potential clients of the insurers, because the individuals located further away from the insurers tend to receive more competitive quotes from the institutions.

Substituting the equilibrium premiums into the insurers' target functions gives the following expected profit in the case of a representative client $x_0 < 1/2$:

$$EV_I^0(x_0) = (1 - \bar{\pi})\rho_r(1 + k^I\Delta) + t^I x_1 - (1 - \bar{\pi})\rho_r(1 + k^I\Delta) - t^I x_0.$$

Rearranging and using the property that $x_0 = 1 - x_1$, we obtain the following expression for the expected aggregate profit for the insurers:

$$\begin{aligned} EV_I^0[p(x)] &= 2M * \int_0^{1/2} [t^I(1 - 2x)]dx \\ EV_I^1[p(x)] &= 2M * \int_{1/2}^{1} [t^I(2x - 1)]dx. \end{aligned}$$

The profit is strictly decreasing in the distance between the insurer and the client, because the clients' outside option becomes more attractive when the rival institution is closer. The result thus shows that by specializing in a specific sub-set of the potential clients the insurer obtains market power vis-à-vis its rival which yields higher profit for the insurer.

3.2 Characterization of the equilibrium in insurance

The analysis of the full game in the markets is in three steps. First, given the optimal strategies derived in (3.1), we determine a quote for which a financial institution can feasibly sell contracts inducing an effort level $\underline{\alpha}$ as an alternative to ones that require monitoring. Second, we illustrate an arbitrage condition which determines whether the insurers can internalize the monitoring cost and how it affects the equilibrium results in (3.1). Finally, we show how capital requirements can be used to inhibit the emergence of equilibrium outcomes where monitored contracts do not survive the competition.

The potential collapse of markets for monitored insurance contracts is due to the customers' willingness to pay for a contract which allows for a lower effort level. When an insurer can offer such contract with a sufficiently low premium, the quotes derived in (3.1) do not survive the competition. To formalize this idea, let $\underline{p} = [(1-\underline{\pi})\rho_r(1+k^I\Delta)]\rho_s^{-1}$ denote the lowest admissible premium for contracts $IC[p,\underline{\alpha}]$ and consider two situations in which the emergence of non-monitored contracts influences the equilibrium derived in the previous section:

$$
\begin{array}{lll}
\textbf{a)} & \exists \bar{x}_0 \in [0,1/2]: & \bar{p}^{0*}(\bar{x}_0) + B = \underline{p} \\
\textbf{b)} & \nexists \bar{x}_0 \in [0,1/2]: & \bar{p}^{0*}(\bar{x}_0) + B < \underline{p}
\end{array}
$$

The two cases above are driven by an arbitrage condition which follows from (2.3) and (3.1). Namely, when the price of a monitored contract is high enough, the customer has a higher incentive to shop for non-monitored contracts. If such contract can be provided at a feasible cost by the rival institution, they will strike a deal at a premium $\underline{p}$. In case **a**) this arbitrage condition implies that quotes in (3.1) cannot be supported as an equilibrium, but the market for monitored contracts does not collapse. In case **b**) the insurers cannot internalize the costs of monitoring in the case of certain subset of clients.

These arguments can be understood in the following way: **a**) Suppose that insurer 0 quotes $\bar{p}^{0*}(x_0)$ to $x_0 \in [0,1/2]$. Anticipating this, the insurer 1 captures the client's business by offering a high-risk contract with a premium $\underline{p}^1(x_0) = \bar{p}^{0*}(\bar{x}_0)+B$. Substituting the cut-off premium, $\underline{p}$, into $\underline{p}^1(x_0)$ and using (3.1) we obtain the condition under which the insurer can feasibly design such contract

$$(1-\underline{\pi})\rho_r(1+k^I\Delta) = C_1^I(k^I, x_1) + B$$

Solving for x_0 we obtain a definition of the critical client for which the insurer 1 can feasibly offer acceptable high-risk contract given insurer 0's strategy $\bar{p}^{0*}(x_0)$

$$\bar{x}_0(B, k^I) = 1 - \frac{1}{t^I}\left[(\bar{\pi} - \underline{\pi})\rho_r(1 + k^I\Delta) - B\right]$$

By symmetry, it is straightforward to see that when $\bar{x}_0 \geq 0$, the contracts derived in (3.1) do not constitute an equilibrium of the full game, because all customers in the region $x_0 < \bar{x}_0(B, k^I)$ accept high risk contract rather than the one specified in (3.1). It is also worth noting that this result is more likely to hold when the private benefit is very large or the monitoring cost is high.

Consider then the optimal responses of insurer 0 which anticipates that it cannot employ its local monopoly power in full, because some of the potential clients rather accept the non-monitored contract. Since premiums $p^{0*}(x_0) > \bar{p}^{0*}(\bar{x}_0)$ do not constitute an equilibrium for the subset of customers satisfying $x_0 < \bar{x}_0(B, k^I)$, the optimal strategy for the insurer 0 entails a uniform premium independent of the distance. This premium just marginally below $\bar{p}^{0*}(\bar{x}_0)$, for each of these clients. For the remaining population, the premium quotes coincide with the ones in (3.1). This result is illustrated in Figure 1.

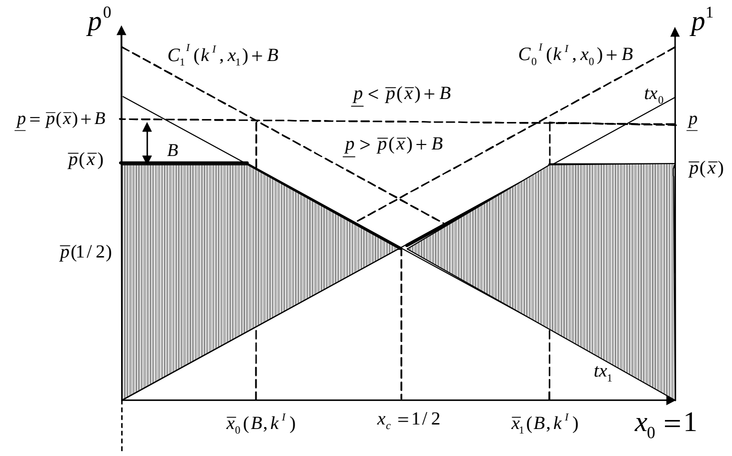

Figure 1: $\underline{p} = \bar{p}^{0*}(\bar{x}_0) + B$

Figure 1 shows that when B is relatively low, the insurer specialized in monitoring clients close to location 0 might not be able to employ its monopoly power in full, because the rival can capture some of the clients with policies which require no monitoring cost. This imposes downward pressure on insurer 0's quotes and inhibits the emergence of equilibrium outcomes described in (3.1).

Case (b): By similar lines of reasoning it is plausible to think that when the private benefit is high enough, the market for monitored contracts collapses locally. To see this, suppose that $C_0^I[k^I, \bar{x}_0(B, k^I)] + B = \underline{p}$ and $\bar{x}_0(B, k^I) < 1/2$. This indicates that the insurer 0 cannot internalize the cost of monitoring in the case of clients $x_0 > \bar{x}_0(B, k^I)$. Thus, the market for monitored contracts collapses in the region $x_0 \in [\bar{x}_0(B, k^I), 1 - \bar{x}_0(B, k^I)]$, because the high private benefit or the cost of monitoring.

The following Proposition summarizes these results:

Proposition 3.1 *The equilibrium of the full game in stand-alone insurance market is characterized by* (*3.1*) *and the following arbitrage condition:* $\underline{p} \gtreqless C_0^I(k^I, 1/2) + B$:

(**i**) *When* $\underline{p} > C_0^I(k^I, 1/2) + B$, *the market is fully covered by monitored contracts. Each policy holder satisfying* $x_0 < \bar{x}_0 < 1/2$ *will be charged a premium* $\bar{p}^{0*}(\bar{x}_0) = \underline{p} - B$. *Customers with* $x_0 > \bar{x}_0$ *will be charged according to* (*3.1*).

(**ii**) *When* $\underline{p} > \bar{p}^{0*}(1/2) + B$, *the market for monitored contracts collapses in the case of clients* $x_0 > \bar{x}_0$, *where* $\bar{x}_0$ *satisfies* $C_0^I(k^I, \bar{x}_0) + B = \underline{p}$. *Clients* $x_0 < \bar{x}_0$ *will accept monitored contracts with a premium* $\underline{p} - B$.

Proof. The proof follows the text. ■

This proposition states that the emergence of markets for monitored insurance contracts depends on whether the insurers can internalize the cost of monitoring and thereby offer the contracts at a feasible rate to the customers who would otherwise sign a less demanding contracts offered by the rival. In terms of the insurers' risk exposures the feature that capital regulation increases the cost of non-monitored contracts thus indicates the following:

Proposition 3.2 *A capital adequacy requirement can be used to prevent the emergence of non-monitored insurance contracts. Otherwise, capital requirements only increase the premiums and diminish the policy holders' welfare.*

Proof. The property that appropriate k^I implements an equilibrium where only low risk contracts are being offered follows immediately from

$$\frac{\partial C_0^I(k^I, x_0)}{\partial k^I} < \frac{\partial \underline{p}}{\partial k^I},$$

ie keeping $\bar{x}_0$ as fixed, higher k^I increases the critical premium, $\underline{p}$, for which the insurers can feasibly offer high-risk contracts. The increase is higher than in the case of the lowest admissible price for low-risk contracts. Thus, there is a k^{I*} that implements an equilibrium in which each contract involves an effort level $\bar{\alpha}$ premium $\bar{p}^{0*}(1/2) = \underline{p} - B$. ■

This result illustrates that when the insurers cannot internalize the costs, an appropriate capital adequacy requirement can be used to induce monitoring, because raising the requirement increases the insurers' expected cost. This effect passes through to premiums in full, but it is lower in the case of policies with lower probability of failure. Hence, by increasing the capital adequacy requirement, the regulator can implement an equilibrium in which $IC[\underline{p}, \underline{\alpha}]$ contracts will be replaced with contracts involving monitoring and equal premiums for each policy-holder.

4 Banking equilibrium

This section investigates the markets for bank loans. For the reasons of tractability the assumptions about the market structure are identical to those in insurance. That is, we assume two banks, located on the opposite sides of the technological circle. The first subsection derives the equilibrium outcomes in markets where the banks can only provide monitored loan contracts. The second subsection examines whether the monitored loan contracts survive the competition when the banks can also provide high risk contracts and discusses the role of capital adequacy regulation in preventing excessive risk-taking in banking.

4.1 Monitoring in banking

A strategy for a bank located at 0 is a continuum of loan contracts and interest rates $r(x_0)$ charged by the bank 0 from a representative borrower x_0. Hence, the bank 0's problem becomes

$$\max_{\bar{r}} EV_B^0(x_0) = \bar{r}^0\bar{\pi} - C_0^B(k^B, x_0)$$

$s.t.$

$$EV_B^0 = \begin{cases} \frac{1}{2}\left[\bar{r}^0\bar{\pi} - C_0^B(k^B, x_0)\right] & for \quad r^0 = r^1 \\ 0 & for \quad r^0 > r^1 \end{cases}$$

where $C_0^B(k^B, x_0) = (1 - \bar{\pi})k_b\Delta + \rho_s + t^B x_0$. The first term in the bank's maximization problem is the expected revenue of the loan contract with a probability of repayment given by $\bar{\pi}$. The second term with a negative sign is the cost the bank incurs from risk-based capital adequacy regulation, funding the loans and monitoring the clients.

The bank sets its quote for each applicant on the basis of the location of its rival. In equilibrium, the accepted contracts are such that:

$$\bar{r}^{0*}(x_0) = \arg\max EV_B^0(x_0) \tag{4.1}$$

$s.t.$

$$\bar{r}^{0*}(x_0) = \frac{1}{\bar{\pi}}C_1^B(k^B, x_1) \qquad for \qquad x_0 \in [0, \tfrac{1}{2}]$$

The equilibrium contracts exhibit similar properties as in the insurance markets: interest rates are higher for the loan applicants located closer to the bank and the cost associated with capital adequacy regulation are passed through to interest rates. Hence, the expected profit per client for the bank is a decreasing function of the distance between the client and the bank and the aggregate profit can be formalized as follows:

$$EV_B^0[\bar{r}(x)] = 2M * \int_0^{1/2} [t^B(1 - 2x)]dx$$

$$EV_B^1[\bar{r}(x)] = 2M * \int_{1/2}^{1} [t^B(2x - 1)]dx.$$

This expression indicates that the profits of the banks are determined by the difference in their monitoring technology. The applicants located at equal distance from the banks get the most competitive quotes as banks engage in tough price competition that eventually leads to zero margin for the bank from which the customer accepts the quote.

4.2 Equilibrium in banking

Consider then the lowest admissible interest rate $\underline{r} = [(1-\underline{\pi})k^B\Delta + \rho_s]/\underline{\pi}$ for which a bank is willing to lend to a borrower without any specific requirements on the effort level. This rate is readily defined by the expected zero-profit condition for the banks. Next, define a cut-off rate $r_c^1[\bar{r}^0(x_0)]$ for which the borrowers are willing to accept a riskier contract rather than a monitored one at a given interest rate $\bar{r}^0(x_0)$:

$$r_c^1[\bar{r}^0(x_0)] = \left[\bar{\pi}\bar{r}^0(x_0) + B - (\bar{\pi} - \underline{\pi})\rho_r\right]\frac{1}{\underline{\pi}}.$$

where $r_c^1[\bar{r}^0(x_0)] > \bar{r}^0(x_0)$. Since $r_c^1[\bar{r}^0(x_0)]$ is the highest rate the customers are willing to accept as an alternative to $\bar{r}^0(x_0)$, the existence of market for high-risk contracts thus requires that:

$$\exists x_0 \quad s.t. \quad r_c^1[\bar{r}^0(x_0)] \geq \underline{r}.$$

This expression states that when the quote for monitored loan contract is high enough, the bank 1 can quote a non-monitored contract which will be accepted by some borrowers.

In equilibrium the nature of contracts offered in the market thus depends on the monitoring costs and on the borrowers' willingness to pay for non-monitored contracts which essentially determine whether the banks can internalize the monitoring cost. The following proposition and Figures 4 and 5 examine the equilibrium outcomes and the role of capital adequacy requirements in more detail.

Proposition 4.1 *The equilibrium in the loan markets can be characterized using the following (exogenous) arbitrage condition:* $r_c^1[C_0^B(k^B, 1/2)] \lesseqgtr \underline{r}$. *In particular,*

(i) *When* $r_c^1[C_0^B(k^B, 1/2)] \leq \underline{r}$, *the market will be covered by low-risk contracts. Each borrower* $x_0 \leq \bar{x}_0$, *where* $\bar{x}_0 < 1/2$ *satisfies* $r_c^1[\bar{r}^{0*}(\bar{x}_0^*)] = \underline{r}$, *will be charged* $\bar{r}^{0*}(\bar{x}_0^*)$ *and the interest rates for more distant borrowers coincide with (4.1).*

(ii) *When* $r_c^1[C_0^B(k^B, 1/2)] > \underline{r}$, *the market for low-risk contracts collapses locally, because borrowers* $x_0 > \bar{x}_0$, *where* $\bar{x}_0 < 1/2$ *satisfies* $r_c^1[C_0^B(k^B, \bar{x}_0)] = \underline{r}$, *will not be monitored. Each borrower* $x_0 < \bar{x}_0$ *will be charged an interest rate* $\bar{r}^0(\bar{x}_0)$ *and the more distant borrowers will accept a high risk contract with interest rate* $\underline{r}$.

Proof. The proof follows the text and therefore it is omitted. ■

The result derives from that the loan contracts are substitutes, but a non-monitored contract allows the borrowers a private benefit. The aggregate risk exposure in the credit market thus depends on whether the banks can internalize the monitoring costs and provide loan contracts at an acceptable rate to the borrowers. When the cost of monitoring or the private benefit is high, the banks are unlikely to accomplish this. Consequently, there will be a segment of borrowers who will not be offered low risk contracts. Figure 2 illustrates the situation in which the market for low risk contracts collapses partially.

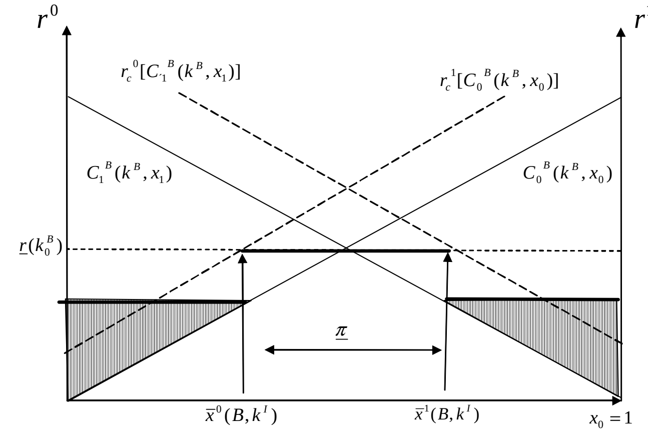

Figure 2

The collapse of markets for low risk contracts may constitute an externality as the aggregate default risk in the market is higher and the banks are subject to higher risk of insolvency.[11] The regulator can correct for the externality through capital adequacy requirements:

Proposition 4.2 *There is a capital adequacy requirement giving raise to an equilibrium in which all borrowers accept a monitored contract with a fixed interest rate* $\bar{r}^{0*}(1/2)$.

Proof. Follows from the property that

$$\frac{\partial \underline{r}}{\partial k^B} - \frac{\partial r_c^1[C_0^B(k^B, x_0)]}{\partial k^B} = \Delta \left(\frac{1-\underline{\pi}}{\underline{\pi}} - \frac{1-\bar{\pi}}{\underline{\pi}} \right) > 0.$$

■

The mechanism through which capital regulation influences the market outcome is illustrated Figure 3. A higher k^B increases the cost of high risk contract relative to that of low risk one. This diminishes the competitive pressures imposed by low risk contracts and helps the banks to internalize the monitoring costs, indicating that an appropriate capital requirement can be

[11] The prediction that the markets for low risk loans in the case of applicants whose projects are more distant to the bank is not implausible. For instance, Acharya et al (2004) report that lending expansion into new or competitive industries contributes to higher level of risk in banks' loans.

used to implement an equilibrium in which only monitored loan contracts are sold at a uniform rate $\bar{r}^{0*}(1/2)$.

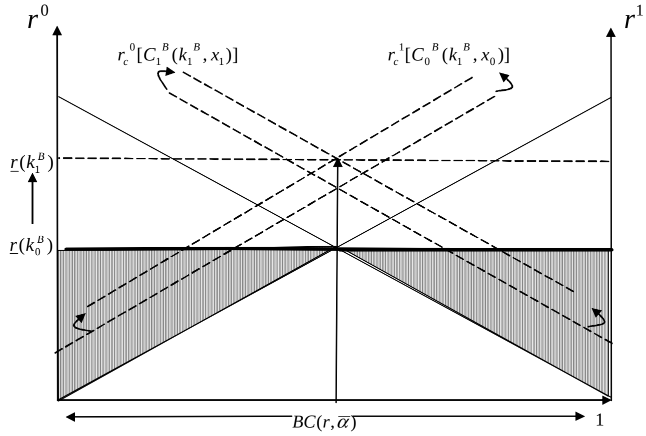

Figure 3

To see the importance of capital requirements, consider the case (**ii**) in Proposition 3, in which the expected profit for bank 0 can be written as

$$EV_B^0[r(x)] = 2M * \int_0^{\bar{x}_0} [t^B(\bar{x}_0 - x)]dx - M(1 - 2\bar{x}_0)(1 - \omega)[(1 - \underline{\pi})k^B\Delta + \rho_s],$$

where the second term on the RHS expresses the risk the bank is exposed when it gambles with non-monitored loan contracts. That is, with a probability $(1 - \omega)$ all non-monitored projects will default, and for this the bank incurs credit default losses equal to $(1 - 2\bar{x}_0)[(1 - \underline{\pi})k^B\Delta + \rho_s]$. The regulator can, however, use the capital adequacy regulation to correct for this externality by imposing capital requirement which diminishes the number of risky loans. In particular, the risk of insolvency disappears when k^B is such that $\bar{x}_0 = 1/2$.

5 Financial conglomerates

In the present model the emergence of financial conglomerates means that an institution combining both financial activities has a cost advantage in monitoring the clients with whom it has an established relationship. The key in understanding the effects of financial conglomeration on the efficiency of the financial markets depends on the following aspects: the effect of conglomeration on the institutions' monopoly power vis-à-vis their clients in both upstream and downstream markets, and the effect on the institutions' incentives to internalize the monitoring costs required to provide low-risk contracts. In what follows, these aspects will be analyzed in a similar manner as in the case of stand-alone institutions and the results will be established by comparing the market outcomes.

Before moving in to the analysis it is important to note that we do not analyze the emergence of financial conglomerates. Rather, we consider the market outcomes after the conglomeration has taken place in the form of mergers or acquisitions. This means that the number of active service providers in each market is the same as in the stand-alone case. In the concluding section we discuss the potential business strategies which explain financial conglomeration in the present framework.

5.1 Equilibrium in insurance market

Consider two institutions located at 0 and 1, each of which has a group of existing clients with an established credit relationship. To fix ideas, denote these groups of clients as $\mathbf{X}^0$ and $\mathbf{X}^1$, and assume that the loan contracts have been monitored at the previous stage of the game. We can then formalize the cost advantage associated with conglomeration by letting $\delta(x_j)$ denote a dummy variable taking values $\delta(x_j) = 1$ and $\delta(x_j) = 0$ for $x_j \in \mathbf{X}^0$ and $x_j \in \mathbf{X}^1$, respectively.

Given the definition of the cost-structure and letting $EV^0_{IC}(x_0)$ denote the expected profit of the insurance profit of the conglomerate 0, the maximization problem of conglomerate 0 in the case of representative client x_0 becomes

$$\max_{\tilde{p}^0} EV^0_{IC}(x_0) = \tilde{p}^0 \rho_s - C_0^{IC}(k^I, x_0)$$
$$s.t.$$
$$EV^0_I = \begin{cases} \frac{1}{2}\left[\tilde{p}^0 \rho_s - C_0^{IC}(k^I, x_0)\right] & for \quad p^0 = p^1 \\ 0 & for \quad p^0 > p^1 \end{cases}$$

where $C_0^{IC}(k^I, x_0) = \delta(x_0) t^I x_0 + (1-\bar{\pi})\rho_r(1+k^I\Delta)$. The conglomerate observes the cost structure of its rival and solves this problem in the case of each potential client. Hence, the equilibrium quotes are essentially the same as in the case of stand-alone institutions: the optimal quote for an insurer with a cost advantage in monitoring is just marginally below the feasible premium of the rival.

In equilibrium, the policy holders accept the quote insofar it is below the one offered by the rival. If the customer is an existing client of conglomerate 0, the rival has to internalize the cost of monitoring, $t^I x_1$. Hence, the solution $\tilde{p}^{0*}(x_0)$ to the pricing problem is the following

$$\tilde{p}^{0*}(x_0) = \arg\max EV^0_{IC}(x_0) \tag{5.1}$$
$$s.t.$$
$$\tilde{p}^{0*}(x_0) = \frac{1}{\rho_s} C_1^{IC}(k^I, x_1) \qquad for \qquad x_1 \in \mathbf{X}^0$$

where x_1 denotes the distance between customer x and insurer 1.

The expression (5.1) readily shows that the equilibrium quotes resemble those in (3.1), but the insurers' expected payoff depends on the predetermined customer-base of each institution. To see this, substitute (5.1) into the insurers target function and let $\tilde{x}_0 \in \mathbf{X}^0$ denote the customer with the longest distance to insurer 0 to obtain the expression for equilibrium profits in the insurance business:

$$
\begin{aligned}
EV_{IC}^{0}[\tilde{p}(x)] &= 2 * \int_{0}^{\tilde{x}_0^c} [t^I(1-x)]dx \\
EV_{IC}^{1}[\tilde{p}(x)] &= 2 * \int_{\tilde{x}_0^c}^{1} (t^I x)dx.
\end{aligned}
$$

The analysis shows immediately that the insurance profits are higher for conglomerates, because they incur lower operational costs with their existing customers:

Remark 5.1 *The cost-efficiency gains imply that financial conglomerates have higher profit in the insurance market than stand-alone insurers.*

This remark summarizes the result that conglomeration does not improve the efficiency in the insurance markets, because the cost advantages will pass directly in to insurers' price-cost mark-up. Hence, in order to illustrate the competitive implications of financial conglomeration, it remains to consider the equilibrium in banking when the conglomerates recognize the potential for additional profit when designing the loan contracts.

5.2 Banking equilibrium

A conglomerate bank observes that each successful loan will yield them an additional profit in terms of insurance policies and set their quotes accordingly. The problem of conglomerate 0 is thus to maximize the combined expected profit in banking and in insurance. This problem can written as

$$
\begin{aligned}
&\max_{\tilde{r}} V_{BC}^{0} = \tilde{r}^0\bar{\pi} - C_0^B(k^B, x_0) + \bar{\pi}V_{IC}^0(x_j) \\
&s.t. \\
&V_{BC}^{0} = \begin{cases} \frac{1}{2}\left[\tilde{r}^0\bar{\pi} - C_0^B(k^B, x_0) + \bar{\pi}V_I^0(x_j)\right] & for \quad r^0 = r^1 \\ 0 & for \quad r^0 > r^1 \end{cases}
\end{aligned}
$$

where $C_0^B(k^B, x_0) = (1-\bar{\pi})k_b\Delta + \rho_s + t^B x_0$ is the cost function of the conglomerate 0's banking branch. Expression $\bar{\pi}V_{IC}^0(x_j)$ denotes the expected profit for the bank when it captures the customer's downstream insurance business.

The equilibrium quote that conglomerate 0 proposes to a customer x_0, is just below the rival's offer insofar as it yields a non-negative long-term profit. To see how the insurance profit affects the pricing of banking services, observe that $V_{IC}^1(x_j) = C_0^{IC}(k^I, x_0)$ which indicates that the insurance profit of the additional banking customer for institution 1 equals the cost efficiency gain the rival obtains from extending its services to insurance. This pro-competitive effect thus induces the banking branches to reduce their rates below the one in (4.1), because they conjecture that adding customers to the client-base yields an additional insurance profit:

Lemma 5.2 *Let $\bar{r}^{0*}(x_0)$ and $\tilde{r}^{0*}(x_0)$ denote the interest rate of the stand-alone and conglomerate bank located at 0, respectively. The accepted contracts in the credit market involve lower interest rates than in the case of stand-alone institutions. The reduction in the rates equals the cost reduction expected in insurance, i.e. $\bar{r}^{0*}(x_0) - \tilde{r}^{0*}(x_0) = \bar{\pi} t^I x_0$.*

Proof. By a Bertrand-type argument, the conglomerate offers a contract involving rate $r(x)$ and an effort $\bar{\alpha}$. The rate is just below the admissible offer of its rival. Using the zero-profit condition of conglomerate 1 we obtain

$$r^1\bar{\pi}-(1-\bar{\pi})k^B\Delta-t^B(1-x_0)+\bar{\pi}V_I^1(x_1) = r^1\bar{\pi}-(1-\bar{\pi})k^B\Delta-t^B(1-x_0)+\bar{\pi}t^I x_0 = 0.$$

Solving for a lowest admissible rate for conglomerate 1 gives:

$$r^1 = \frac{1}{\bar{\pi}}[(1-\bar{\pi})k^B\Delta + t^B(1-x_0) - \bar{\pi}t^I x_0] \tag{5.2}$$

Next, observe that for $x_0 < 1/2$ the conglomerate 0 has an absolute cost advantage in monitoring and will set its price according to the rule $r^0 = r_a^1 - \varepsilon$. Thus, for these customers the equilibrium rate becomes

$$\tilde{r}^{0*} = \frac{1}{\bar{\pi}}[(1-\bar{\pi})k^B\Delta + t^B(1-x_0) - \bar{\pi}t^I x_0].$$

Using (4.1) it is clear that $\bar{r}^{0*}(x_0) - \tilde{r}^{0*}(x_0) = \bar{\pi}t^I x_0$ ■

This result illustrates that the conglomerates have an incentive to lower their quotes so as to capture a higher number of potential insurance customers. However, since both institutions have the same conjecture, this anticipated gain does not materialize ex-post. The failed attempt to increase the customer base imposes downward pressure on interest rates, reducing the profit in banking. Hence, the long-run profits for the conglomerates are given by

$$\begin{aligned} V_{BC}^0[\tilde{r}(x)] &= 2 * \int_0^{1/2} (t^B + \bar{\pi}t^I)(1-2x)dx \\ V_{BC}^1[r(x)] &= 2 * \int_{1/2}^{1} (t^B + \bar{\pi}t^I)(2x-1)dx. \end{aligned}$$

This indicates that the profit of a financial conglomerate equals the combined expected profit of a stand-alone insurer and a bank. Since the interest rates in the credit market are lower, but the insurance premiums are the same, it is straightforward to see that the market efficiency in terms of pricing and the utility of the borrowers increases:

Proposition 5.3 *Financial conglomeration intensifies the competition in banking. Consequently, the interest rates are lower inducing higher payoff for the borrowers and lower profit in the banking business. Although the reduced profit in banking will be compensated in the insurance market, the aggregate profit in the industry does not change, because the cost efficiency gains are passed on to the borrowers. Therefore, the emergence of financial conglomerates indicates a Pareto-improvement in welfare.*

The results just derived establish that the profit-margin for the banking-branch of a financial conglomerate is lower than that of a stand-alone institution. The reason is that the potential for additional profit in the insurance market induces the conglomerates to quote lower interest rates so as to capture the customers' insurance business, indicating that the cost-efficiency gains tend to pass through to the credit market in full. For the conglomerates, the increase in profit is realized in the insurance market which compensates the lower profit associated with tougher competition in the credit market. As a result, the cost-efficiency gains associated with conglomeration will result in a more efficient market environment in terms of pricing the monitored services.

5.3 The regulation of financial conglomerates

Having illustrated the equilibrium outcomes in the markets for monitored financial contracts, we can now analyze whether the emergence of financial conglomerates affects the allocation of risk in the markets and the effectiveness of capital adequacy requirements in preventing the collapse of markets for monitored contracts. Consider first the insurance market in the presence of financial conglomerates and recall that the insurers can support the equilibrium premiums described in (5.1), provided that they can internalize the cost of monitoring of a client for which the rival offers a high-risk contract at a rate $\underline{p}$. By similar lines of reasoning as in Proposition 1, the conglomerates can feasibly internalize the monitoring cost in the case of existing clients, because the monitoring costs are zero for this subset of clients. It then follows that each customer with a monitored loan contract will be offered an insurance policy specifying an effort level $\bar{\alpha}$:

Proposition 5.4 *Suppose that each successful project has been monitored by a banking branch of a financial conglomerate. Then the equilibrium premiums in the insurance market coincide with the ones in Proposition 1. However, each policy involves monitoring and (weakly) lower aggregate risk of failures than in stand-alone markets. Hence, capital adequacy requirements are not required to limit the number of non-monitored insurance contracts.*

Proof. The proof follows immediately from that the insurer has already incurred the cost of monitoring. Hence, absent capital regulation the lowest premium the insurer can feasibly offer for the existing clients is $\bar{p} = (1 - \bar{\pi})\rho_r$. For the high-risk contract the zero-profit premium is $\underline{p} = (1 - \underline{\pi})\rho_r$. By expressions (2.2) and (2.3) we infer that at these prices, the customers also prefer the low risk contract. ■

The result indicates that the emergence of financial conglomerates generates a link between a prudential behavior in banking and risk exposures in insurance. That is, when the financial conglomerate has already incurred the cost of monitoring, it can capture the existing customers' insurance business through undercutting the rivals' offers. Hence, the aggregate risk in the market for insurance policies is diminished, making the capital adequacy regulation less important in insurance.

The result is arguably extreme in that we assume zero cost of monitoring the existing client. The basic idea, however, carries over under weaker assumptions about the cost efficiency gains. For instance, if the cost reductions involved lower, yet positive, cost of monitoring, the market equilibrium would exhibit higher efficiency, because more insurance contracts would be monitored than in stand-alone markets.

In what comes to banking, Proposition 5 gives a new perspective on the industrial organization implications of financial conglomeration. When the banks extend their product line to insurance, they have an additional incentive to monitor the loan contracts. From the regulators' viewpoint this means that the capital adequacy requirements targeted to implement a certain aggregate level of risk in the market should be lower. The reason is that identical allocation of risk can be obtained with lower requirement which would impose lower deadweight loss in the credit market:

Proposition 5.5 *After financial conglomeration, the banks have increased incentives to monitor their clients. Hence, capital adequacy requirements aimed to implement equilibrium with a specific allocation of risks between borrowers should be lower than in the case of stand-alone institutions.*

Proof. The proof follows immediately from expression (5.2). The reason why capital adequacy requirements are inefficient when the regulator does not recognize the cost-efficiency gains is that the cost of regulation passes into interest rates in full. Thus, by reducing the requirement the regulator can implement an equilibrium in which $\bar{x}_0^c(k_c^B) = \bar{x}_0(k_s^B)$, where $k_c^B < k_s^B$ denote the capital adequacy requirements in conglomerate and stand alone markets, respectively. ■

This result compares the market outcomes between stand-alone and conglomerate markets, and claims that in the presence of financial conglomerates the credit market is less fragile. The reason is that the conglomerates have a greater incentive to provide monitored contracts than stand-alone institutions, because the conglomerates perceive the business relationship more valuable. This relationship component is not a factor in the high risk contracts and stand-alone banking, indicating that conglomerates are more likely to internalize the cost of monitoring to counter the competitive pressures imposed by high risk contracts offered by their rivals. As a result, more borrowers will be monitored which mitigates the market failure associated with an increased risk of bank insolvency.

The policy implications of the improved market efficiency are straightforward. If there was a perceived 'optimal' allocation of high and low risk contracts in stand-alone markets, the higher market efficiency would allow the regulators to implement this allocation with lower capital adequacy requirements. Lower requirements diminish the deadweight loss of regulation by reducing the costs of producing loan contracts and interest rates in the credit market.

6 Conclusion

The aim of this paper was to examine the implications of the emergence of institutions combining credit and insurance services in financial markets. To this end we developed model providing a specific example of industrial organization aspects of synergies motivating financial conglomeration. This model was then employed to investigate the implications of financial conglomeration on market efficiency in terms of allocation of risk and pricing of financial services.

Since we were interested in the performance of two different organizational arrangements in financial markets, we first analyzed a stand-alone benchmark in which institutions provide a single service for each customer and compared the results with the market outcomes which obtain when the financial institutions combine these services. In addition to solving for the market equilibria in both cases, we showed that capital adequacy requirements can be used to limit the institutions' insolvency risk generated by moral hazard in both markets.

The stand-alone equilibrium exhibited the following properties. First, specialization in monitoring certain types of clients allows the banks and the insurers to employ a local monopoly power over a subset of customers. Higher monopoly rents, however, induce the rival institutions to offer riskier contracts. The emergence of such contracts reduces the number of projects that have a higher success probability thus increasing the number of potential failures of investment projects in the economy. The regulator can mitigate the institutions' risk-taking by imposing minimum capital requirements which increase the expected cost of non-monitored contracts.

Induced by the expected profit in the downstream insurance market, the conglomerates have a greater incentive to establish a credit relationship with the potential borrowers. This effect shows up in tougher competition for clients in the credit market as the institutions have increased incentives to internalize the cost of monitoring which diminishes the aggregate risk in the market. The borrowers benefit from the improved market efficiency, because lower cost of bank financing increases the borrowers' income and reduces the insolvency risks in the market. In particular, the analysis shows that in the presence of financial conglomerates, the regulator can implement the desired allocation of risk with capital adequacy requirements with lower deadweight loss than in the case of stand-alone institutions.

From the financial institutions' viewpoint the gains associated with conglomeration might be markedly high ex-ante, indicating that in a game where the financial institutions choose their strategies in terms of organizational arrangements, a stand-alone structure would be a strictly dominated strategy. However, the unintended consequence of financial conglomeration is that the institutions cannot capitalize on the economies of scope ex-post. This is because when trying to establish long term relationships with borrowers, the competition becomes more intense in the credit markets diminishing the profit of the institutions. The example in this paper makes this point clear by showing that the aggregate profit in the financial sector is the same regardless of the institutions organizational forms. Hence, it is not implausible to think that the long-term profit of a financial conglomerate is lower than the combined profit of two separate financial institutions, especially when there are costs involved with the re-organization of the institutions or costly frictions in combining the services.

It is worth pointing out that this result is not limited to cases in which banks are allowed to extend their business lines into insurance through mergers and acquisitions. On the contrary, the pro-competitive effect would become stronger if both the insurers and the banks extended their product lines, because the number of active institutions in the markets would increase. This is one direction to which the present study could be extended. In particular, the model does not consider the institutional design aspects of financial conglomeration and assumed that the customers of the financial institutions are myopic in that they do not recognize the consequences of the initial financial contract on the contracting environment in the downstream insurance markets. Thus, a potential extension to the model would analyze the outcomes of a game where stand-alone institutions have the option extend their product lines in the presence of forward looking customers.

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