



Bank efficiency and financial system evolution: an analysis of complementary problems in transitional and state-dominated economies

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Summary

In this paper, a simple model to examine the problems faced by emerging economies in developing their financial systems is presented. The two main findings areas follows. First, the combination of corporate governance and management entrenchment problems in the real sector with monitoring inefficiency in banking leads to impediments in the development of the capital market. Second, banks both compete with and complement capital markets. If banks are sufficiently inefficient, they attract all the borrowers away from the market, and the market does not develop. Improvements in bank efficiency, up to a point, lead to borrowers accessing the market, so that banks complement the market. Beyond that point, banks and the market compete, and further improvements in bank efficiency lead to more borrowers approaching banks. This framework is used to extract policy implications for financial system design in transitional and state-dominated economies.

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1. Introduction

Many formerly centrally-planned economies are currently in the early stages of transition to free-market systems. This process is more advanced in developed countries, like France and Italy, where privatizations are converting state-owned enterprises into shareholder-owned, publicly traded firms. Consequently, financial systems are 'mixed' at present, with nascent capital markets, largely state-owned banks and insurance companies, and a few scattered branches and subsidiaries of foreign banks and insurance

companies. Many governments are asking: what steps should be taken to reform the financial system and guide its future evolution?

This important policy question is asked in the context of rising frustrations over the relatively slow speed at which these economies seem to be successfully developing the institutions and markets necessary for the efficient allocation of capital in a free-market economy. A striking example of this is Romania, whose capital market consists of an over-the-counter (OTC) market called the RASDAQ (patterned after the NASDAQ) and a stock exchange located in Bucharest. Because of a law requiring all privatized (formerly state-owned) companies to list on the RASDAQ, there are over 3000 companies that list there. However, the Bucharest Stock Exchange has only 70 firms listed on it. Getting additional firms to list has been a daunting challenge. This lack of interest by firms in listing on the exchange is viewed as a major impediment to the evolution of the capital market (see Mevendorf and Thakor (1997)).

Why is it so difficult to develop capital markets in countries like Romania? (Note that the problem is not uniquely Romanian: China and Slovenia are other examples). Indeed, this seems to be a thorny problem in many economies that resemble Romania's, as well as more developed economies characterized by heavy governmental control of industries. Understanding the reasons why appears to be central to policy discussions of financial system reform.

The main goal of this paper is to address this question by developing a simple model that has borrowers, banks and capital market. Borrowers need funds that can be acquired from either the capital market or a bank. As in Boot and Thakor (1997a), the role of resolving asset-substitution moral hazard is assigned to banks, and the role of providing pay-off-relevant information feedback to firms through the aggregation of diverse information signals is assigned to the capital market. In addition, it is assumed that the capital market has a corporate governance role, played out through an admixture of auditing standards, legal disclosure requirements, corporate law, and the possible replacement of inefficient managers.

In this setting, banks compete with the capital market as in the analyses of Allen (1992), Allen and Gale (1995, 1997), Boot and Thakor (1997a, 1997b), Bhattacharya and Chiesa (1995), Diamond (1991) and Yosha (1995). Indeed, this is the dominant view in the literature on financing-source choice—banks and market compete. However, this analysis highlights the *complementary* role of banks and markets. It is also shown that if banks are sufficiently inefficient—as one might expect in the case of state-owned banks—then so many borrowers forsake the capital market for banks that the development of the capital market is impeded. The intuition is as follows. Borrowers care about both the cost of financing and

their private control rents. The cost of capital market financing is lower than the cost of bank financing for higher quality borrowers, so that there is a credit quality cut-off such that borrowers above the cut-off access the market and those below the cut-off go to banks. But the managers of high-quality borrowers who go to the market expose themselves to market discipline, which at the very least takes the form of having their ineptitude exposed. Thus, these borrowers face a trade-off between the cost of financing and the probability of jeopardizing control rents when they borrow in the market. This trade-off tilts in the favour of banks when bank inefficiency in monitoring generates additional utility for the managers in borrowing firms. In some circumstances, this results in no borrowers choosing to go to the capital market.

What emerges from this analysis is an interesting complementarity and competition between banks and the capital market. Initially, as the efficiency of banks increases, more borrowers migrate from banks to the capital market, i.e. banks complement markets. Then, beyond a point, the competition effect dominates, as increased efficiency in banking leads to borrowers switching to bank financing as the trade-off shifts in favour of banks, due to bank financing being a sufficiently cheaper funding source for some borrowers. The combination of the competition and complementarity effects produces a non-monotonic relationship between bank efficiency and the credit quality cut-off that determines which borrowers go to banks and which go to the capital market.

A paper related to this paper is Dyck (1997). Dyck focuses on the German privatization programme and shows that management replacement is central to successful privatization. That is, when a state-owned firm is privatized, it is important to replace those who managed the state-owned enterprise with 'western-style' managers. This paper shows that, if this does not happen and if banks continue to be state-owned, then the development of the capital market is retarded.

The rest of the paper is organized as follows. The model is developed in Section 2 and its implications for transitional economies are discussed in Section 3. Section 4 concludes. All proofs are in the Appendix.

2. The model and analysis

2.1. THE MODEL

The model here is an adapted version of that in Boot and Thakor (1997a). Everybody is risk neutral and there is one time period, delineated by two points in time, $t=0$ and $t=1$.

2.1.1. Borrowing firms

Each firm needs \$1 to invest in a single-period project. Self-financing is not possible, so these firms must borrow the funds they need. It is assumed that this external financing is achieved through debt contracts.[†]

Each firm is operated by a manager whose utility depends on the value of his firm as well as a private control rent, $C > 0$. The manager enjoys C if he is still in control, with his reputation or perceived ability intact at the end of the period and forfeits C if he is either removed from control or there is auditing that exposes him as being incompetent.[‡]

With probability $1 - \theta$, the firm will have a choice between a "good" and a "bad" project. With probability $\theta \in (\theta, \bar{\theta}) \subset (0, 1)$, the firm is locked into a choice of the good project. The good project pays off $R > 1$ at the end of the period with probability $\delta \in (0, 1)$ and 0 with probability $1 - \delta$. All of R is observable *ex post* and contractible *ex ante* from the lender's perspective. The bad project generates no contractible pay-off, but yields a non-contractible private rent of $N > 0$ for the manager. It is assumed:

$$0 < \delta R - N < r_f \quad (1)$$

where r_f is 1 plus the riskless rate. The restriction $\delta R - N > 0$ ensures that if the manager could self-finance the project, he would prefer to invest in the good project rather than the bad project, given a choice. The restriction $\delta R - N < r_f$ ensures that the manager would prefer the bad project over the good project with external financing. This is because the expected net pay-off from the good project is $\delta R - r_f$ if lenders price loans competitively and the manager enjoys a pay-off of N from the bad project.

2.1.2. Banks

Assuming that there is a competitive banking industry, each bank is able to monitor the borrower after extending a loan. This monitoring enables the bank to sometimes prevent the borrower from investing in the bad project when the borrower has a project choice. Thus, there is a noisy monitoring technology such that,

[†] Despite the fact that I focus on asset-substitution moral hazard, it does not make any difference to the analysis whether I use debt or equity. See Boot and Thakor (1997a).

[‡] For simplicity, I do not model the unobserved heterogeneity in managerial types that is implicit in this set-up. The idea is that the manager may not know his own type so that (possibly noisy) auditing has a positive probability of revealing him as incompetent and, thereby, threatening his control rents.

conditional on the borrower being in a state in which its manager can choose between the good and the bad projects, the bank can enforce the choice of the good project with probability $P \in [0,1]$; and with probability $1 - P$ the borrower chooses the bad project. The bank is assumed to be able to raise deposits at r_f . Assume that, at the time of pricing the loan, the bank knows whether the borrower is in the state in which there is a project choice. However, on condition of being in that state, the bank cannot tell whether it successfully prevented the borrower from choosing the bad project.

2.1.3. *The capital market*

There are many investors in the market who individually produce information about the borrowing firm and use this information to determine their trading strategies. There is a market-maker who crosses orders from investors and acts as a risk-neutral Walrasian auctioneer, setting the price of the security (the interest factor) so that investors' expected return, conditional on the information contained in the order flow observed by the market maker, is equal to the risk-free rate.

This is a fairly standard market microstructure setting in the noisy rational expectations framework. However, the innovation is the assumption that investors who acquire (costly) information about the firm end up learning something that even the firm's manager did not know. Consequently, as in Holmstrom and Tirole (1993), the manager can glean information, from his firm's market price, that is of decision *relevance*. The consequent change in the firm's real decisions enhances its expected real pay-off on average, and this pay-off enhancement is anticipated by the market-maker in setting the firm's price.

This argument is formalized in Boot and Thakor (1997a). The details are excluded here and a reduced-form version of the model is used. In particular, it is assumed that the probability of success of the good project, δ , is enhanced by $s \in (0, 1 - \delta)$ if the firm borrows in the capital market.

Further, it is assumed that capital market borrowing leads to mandated information disclosure and auditing that could expose the firm's manager as being inept, which in turn could jeopardize the manager's control rents. The probability of this happening to the manager of a firm that borrows in the capital market is $\epsilon \in (0, 1)$. That is, conditional on borrowing in the capital market, the probability is ϵ that the manager will lose C . If we are talking about an advanced capital market like the U.S., ϵ could be interpreted as the probability that the firm would be taken over and the CEO fired. In transitional financial systems, corporate control contests are less likely to be a dominant factor. In such capital markets,

however, the fact still remains that the manager exposes himself to additional scrutiny that might be absent if the firm borrows from a bank, especially an efficient bank. In what follows, for expositional directness, we will refer to the outcome of such scrutiny as the manager 'losing control', even though he may not literally be removed from office.

2.2. ANALYSIS

The expected utility of the borrowing firm's manager is examined first. Other than the non-pecuniary project rent N and the corporate control rent C , the utility of the manager is synonymous with the expected pay-off to the borrowing firm. Let i_b and i_m represent the interest factors at which the firm is able to borrow from a bank and the market, respectively. Let us consider bank borrowing first. We know that in the no-moral-hazard state, which occurs with probability θ , the borrower invests in the good project with probability 1. Thus,

$$i_b(\text{NMH}) = r_f/\delta, \quad (2)$$

where "NMH" stands for 'no moral hazard'. In the complement of this state, denoted "MH", the bank knows that the borrower will choose the good project with probability P and the bad project with probability $1-P$?

$$i_b(\text{MH}) = r_f/P\delta. \quad (3)$$

Since there is no chance of losing control with bank borrowing, the manager computes his expected utility as:

$$\begin{aligned} U_b &= \theta\delta[R - i_b(\text{NMH})] + [1 - \theta]\{P\delta[R - i_b(\text{MH})] + [1 - P]N\} + C. \\ &= P\delta R + \theta\delta R[1 - P] + [1 - \theta]N - P[1 - \theta]N - r_f + C. \end{aligned} \quad (4)$$

If the firm borrows in the capital market, it will always choose the bad project when it has a choice. This means that the probability is θ that the good project will be chosen and $1 - \theta$ that the bad project will be chosen. Moreover, when the good project is chosen, the probability of success will be $[\delta + s] \in (0, 1)$, and the manager will lose control with probability α . Thus, the manager's expected utility from capital market borrowing will be:

$$U_m = \theta[\delta + s][R - i_m] + [1 - \theta]N + [1 - \alpha]C.$$

Since $i_m = r_f/(\delta + s)$ with competitive market pricing, we can write U_m as:

$$U_m = \theta[\delta + s]R - r_f + [1 - \theta]N + [1 - \alpha]C. \quad (5)$$

We will assume that

$$sR > \alpha C. \quad (6)$$

All that this restriction means is that the incremental benefit of capital market financing, sR , exceeds the incremental cost to the manager, αC . If this were not true, no borrower would ever go to the market, and the issue of trade-offs between bank and capital market financing would become moot.

We now have the following result.

PROPOSITION 1: There exists a cut-off $\theta^* \in (\underline{\theta}, \bar{\theta})$ such that all borrowers with $\theta > \theta^*$ borrow in the capital market and all borrowers with $\theta \leq \theta^*$ go to banks. Moreover, $\partial \theta^* / \partial P > 0$ and $\partial \theta^* / \partial P^2 < 0$.

If we define credit quality as being synonymous with θ , then we see that higher-quality borrowers go to the market and lower-quality borrowers approach banks. This result is familiar from Boot and Thakor (1997a), and its intuition is straightforward. The lower the θ , the higher the probability that the lender will face an asset-substitution moral hazard problem. Banks can address this problem, albeit in an imperfect way because the probability of preventing the bad project from being adopted is not 1. The capital market, on the other hand, is totally incapable of addressing this problem. Thus, the ex ante pricing of credit in the capital market reflects the ex post 'cost' that investors face due to this moral hazard. This cost is lower for bank borrowing. The advantage of borrowing in the market, of course, is that the success probability of the good project is elevated by s . Thus, in choosing between bank and capital market borrowing, the borrower trades off the benefits of a lower moral-hazard-related borrowing-cost premium and a lower probability of losing corporate control with a bank loan against the benefits of a higher success probability for the good project with capital market financing.?

As θ increases, the benefits of bank financing, as well as those of capital market financing, increase. However, for any $P > 0$, the benefits of bank financing increase more slowly than those of capital market financing. This is because the bank's monitoring ability produces a lower moral-hazard-related cost in the first place, so that diminishing this cost by increasing θ has lower value at the margin. What this generates is the set of utility curves

† This higher success probability has two benefits for the borrower. First, it increases the gross expected pay-off on the good project. Second, it lowers i_m , the interest factor for capital market borrowing. Both effects work in the same direction to increase the net expected project pay-off for the borrower.

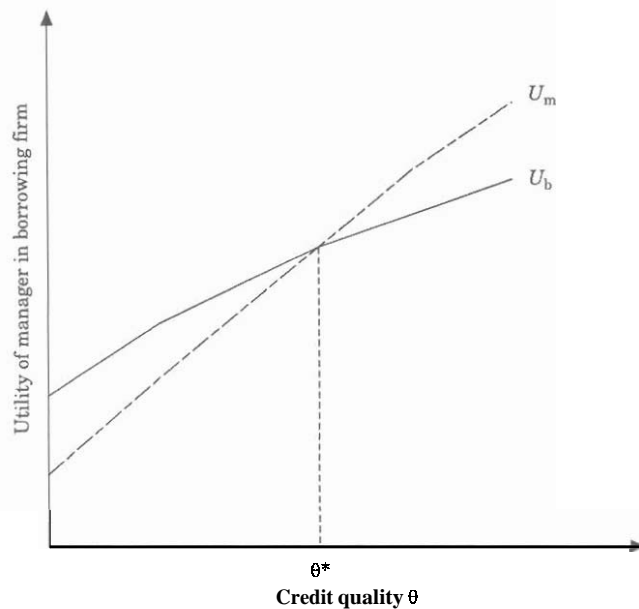


FIGURE A. Bank vs. capital markets and the borrower credit quality cut-off.

depicted in Figure A, with θ^* being the θ at which the two curves intersect. Higher- θ borrowers go to the market because they pose a smaller moral hazard problem and thus attach a lower value to the more efficient moral-hazard attenuation service provided by banks.

The fact that θ^* is increasing in P means that as bank monitoring becomes more efficient, more borrowers go to banks. The reason is that a decline in P means that banks look more like the market from the standpoint of resolving moral hazard. Conversely, an increase in P increases the *uniqueness* of bank financing relative to the market and thus enhances the marginal value of a bank loan relative to capital market financing.

2.3. THE DIFFERENT PHASES OF BANK EFFICIENCY

In the context of our model, we can visualize two phases in the evolution of bank efficiency in emerging economies. In the *first phase*, banks *overestimate* the precision of their monitoring. That is, they price loans under the assumption that $\bar{P} = P$ when in reality $P = P^o < \bar{P}$. During this phase, let us assume, for simplicity, that \bar{P}

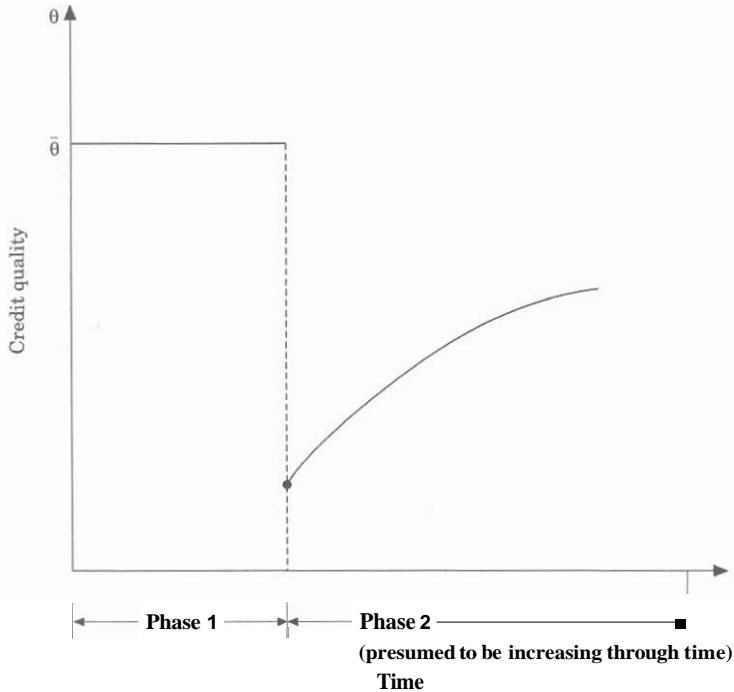


FIGURE B. The relation between borrowers' financing source choice and the evolution of bank efficiency.

remains unchanged. Banks learn, however, through time that they are not as efficient in monitoring as they thought they were. Over time, \hat{P} converges to P^o , and bank efficiency enters the second *phase* of evolution. During this phase, P is correctly identified, but efficiency improvements show up in increases in P . The idea is that the information processing and monitoring capabilities of banks are not developed overnight. In Germany and Japan, for example, where banks have emerged as important corporate monitors, it took decades for this expertise to develop.

For ease of exposition, a particularly simple version of this story is analysed. It is assumed that in the first phase, banks assume that $P = \hat{P} = 1$, when in reality $P = P^o = 0$. This means that in reality, banks are offering the borrowing firm nothing of real value relative to what the market can do. All of the value the manager in the borrowing firm perceives comes from the mispricing of the loan and the relatively greater preservation of the manager's corporate control rent. We now have the following result.

PROPOSITION 2: For any P in the second phase, banks will have more borrowers in *the first phase* than in *the second phase*. Moreover, if $\bar{\theta} < [\alpha C + r_f] [sR + r_f]^{-1}$, then all borrowers will borrow from banks in the first phase and none will go to the capital market.

What this proposition generates is a picture like the one shown in Figure B. All (or most) borrowers gravitate to bank financing in the first phase because their loans are being priced as if the bank could deter moral hazard with probability 1, but borrowers' project choices are not being constrained at all by banks in reality. That is, managers can have their cake and eat it too! In addition, they also end up not exposing themselves to the risk of losing control rents.

Things change in the second phase because bank pricing is now tied to the imperfection in bank monitoring that both the bank and the borrower agree on.[†] The cost of moral hazard is now borne by the borrower *ex ante*, so that the borrower begins to make the trade-offs that led to Proposition 1.

2.4. ANOTHER INTERPRETATION OF EFFICIENCY EVOLUTION

Within the context of this model, there is another reasonable way to think about efficiency evolution. Suppose we are in an economy in which Equation (6) does not hold, and $sR < \alpha C$. This is actually a very plausible assumption. In emerging economies, capital markets are relatively underdeveloped and offer low liquidity. Fewer sophisticated and potentially informed investors will be attracted to such markets than to more well-developed markets. Thus, the information feedback provided by the market is likely to be less valuable, leading to a low sR . The corporate control rent, C , on the other hand, is likely to be quite high because borrowing firms are likely to be run by the same managers who controlled these firms when they were state-owned, a time during which entrenchment motives deepened. It is relatively easy to show that in this setting no borrower will choose to go to the market because $\theta^* > 1$.

Such an economy finds itself in a 'Catch 22' trap. Because s is low relative to C , firms eschew the capital market. Unless firms raise significant capital in the market, there is insufficient depth or liquidity to attract the investors whose collective trading would raise s enough to make it worthwhile for borrowers to go to the market. This leads us to our final proposition.

[†] What is important is not that the bank is 'correct' in estimating the precision of its monitoring in the second phase, since P is nothing more than the bank's subjective assessment of its precision. What is important is that the borrower agrees with the P used by the bank in pricing the loan. In the first phase, the bank's estimate of P is higher than the borrower's estimate.

PROPOSITION 3: Unless corporate *governance* in the real sector is impudged by replacing *borrowing* firms' managers with high C 's, by those with sufficiently lower C 's, the financial system may be permanently stuck in a version of the first phase in which all firms continue to borrow *exclusively from* banks.

When we put Propositions 2 and 3 together, we see that the growth of the capital market can be retarded either because banks are in the first phase of their efficiency evolution *and/or* because corporate governance in the real sector is flawed.? In many emerging financial systems, it is suspected that both effects work in concert to impede capital market development.

3. Implications for transitional economies

The analysis in this paper has two broad implications for transitional economies. First, there should be considerable focus on improving corporate governance in the real sector before one begins to tinker with the financial system. This goes well beyond just privatizing state-owned enterprises. The managers who run these enterprises must be replaced by managers who are well-trained in free-market management principles. The advantage of doing this is that former government bureaucrats will be replaced by professional managers whose human capital will have a sufficiently *high* market value so that their interest in being entrenched will be *low* (i.e. low C).

Second, there should be a strong emphasis on privatizing state-owned banks and also replacing the managers *there with managers experienced* in western-style banking. This will hasten the evolution of these banks out of the first-phase and facilitate capital market development.

As straightforward as these policy recommendations sound, the fact of the matter is that the process is being "botched" in many countries. For example, Dyck (1997) describes the actions of the *Truehand* (the German privatization agency) as follows:

'...but *Truehand* focused on rapid privatization rather than state-led restructuring despite the financial ability to purchase investment equipment and hire new management.

t A key assumption in deriving Proposition 3 is that α is not dependent on managerial type. If managerial types were in a continuum and α was decreasing in managerial type, then there would always be an interval of sufficiently good managers for whom $sR > \alpha C$, so that at least a nascent capital market will emerge.

Analyzing the Germany program, critics have suggested that the restructuring strategy was inefficient and the outcome reveals corruption."

Meyendorff and Thakor (1997) point out similar problems in Romania. Even though thousands of state-owned enterprises have been privatized, in many of these firms the managers are still the same as those who were in control when these firms were state-owned. Making matters worse is the fact that the ownership structure in these privatized enterprises is very diffused, with the majority of shares held by a large number of individual lay-persons with little expertise to monitor management. Moreover, all the major banks are still state-owned. Thus, our model seems particularly applicable to the Romanian experience. What is perhaps a little surprising is that our model also applies to countries like Italy, and to a large extent, France, where major banks are state-owned and the top managers in privatized enterprises are the same people who ran these enterprises when they were state-owned.

4. Conclusion

The simple model described was developed to show that corporate governance problems in the real sector can have an important effect on how the financial system develops. Moreover, banking efficiency affects the development of the capital market. This highlights that the relationship between banks and the capital market is both competitive and complementary. When banks are very inefficient, an increase in banking efficiency actually results in more borrowers migrating to the capital market. Beyond a certain point, an increase in the efficiency of banks attracts more borrowers to banks. Thus, the quality cut-off that determines which borrowers go to the market and which go to the banks is non-monotonic with respect to bank efficiency.

The policy implications of this analysis for transitional economies are that it is critical to focus on improving corporate governance in the real sector if one wants a good financial *system*. Just as importantly, it may not be possible to develop a good capital market in an economy that does not have good banks. Thus, in developing a financial system, the initial focus should be on improving the efficiency of banks. A rather straightforward way to do this would be to allow western banks to buy stakes in local banks. This is something that has been an important element of the bank privatization programmes in many Eastern and Central European countries, but the shortcoming in many cases is an excessive focus on the price paid by the western bank for acquiring the local bank,

rather than on the pivotal importance of upgrading information processing and monitoring capabilities.

It is easy to see how the analysis in this paper could be extended. Essentially, a reduced-form version of what should ideally be a more general model of the financial system has been presented. Future research should attempt to endogenize many of the elements that have been assumed. In particular, a greater focus on corporate governance in the real sector and efficiency in banking promises to yield rich pay-offs in future research on financial system design,

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References

- Allen, F. (1992). Stock markets and resource allocation. In: C. Mayer & X. Vives, Eds., *Capital Markets and Financial Intermediation*. Cambridge: Cambridge University Press.
- Allen, F. & Gale, D. (1995). A welfare comparison of intermediaries and financial markets in Germany and the U.S. *European Economic Review*, 22, 179–209.
- Allen, F. & Gale, D. (1997). Financial markets, intermediaries, and intertemporal smoothing. *Journal of Political Economy*, 105, 523–546.
- Bhattacharya, S. & Chiesa, G. (1995). Proprietary information, financial intermediation, and research incentives. *Journal of Financial Intermediation* 4, 328–357.
- Boot, A.W.A. & Thakor, A.V. (1997a). Financial system architecture. *Review of Financial Studies*, 10(3), 693–733.
- Boot, A.W.A. & Thakor, A.V. (1997b). Banking scope and financial innovation. *Review of Financial Studies*, 10(4), 1099–1131.
- Diamond, D.W. (1991). Monitoring and reputation: the choice between bank loans and privately placed debt. *Journal of Political Economy*, 99, 688–721.
- Dyck, A.I.J. (1997). Privatization in Eastern Germany: management selection and economic transition. *American Economic Review*, 87(4), 565–597.
- Holmström, B. & Tirole, J. (1993). Market liquidity and performance monitoring. *Journal of Political Economy*, 101, 678–709.
- Meyendorff, A. & Thakor, A.V. (1997). Romanian financial system reform. Working paper, William Davidson Institute, University of Michigan Business School.
- Yosha, O. (1995). Information disclosure and the choice of financing source. *Journal of Financial Intermediation*, 4, 3–20.

Appendix

PROOF OF PROPOSITION 1: θ^* is the value of θ for which $U_b = U_m$, where U_b is given by (4) and U_m by (5). Solving the equation $U_b = U_m$ yields

$$\theta^* = \frac{\alpha C + P[\delta R - N]}{sR + P[\delta R - N]}. \quad (\text{A.1})$$

It is clear that if $\theta > \theta^*$, then $U_m > U_b$, and if $\theta \leq \theta^*$, then $U_m \leq U_b$. Moreover,

$$\partial \theta^* / \partial P = \frac{[\delta R - N][sR - \alpha C]}{\{sR + P[\delta R - N]\}^2}$$

Since $\delta R > N$ and $sR > \alpha C$, we have $\partial \theta^* / \partial P > 0$. Moreover, it is easy to see that $\partial^2 \theta^* / \partial P^2 < 0$. ■

PROOF OF PROPOSITION 2: In the first phase, $P=0$ but banks price loans as if $P=1$. Thus, $i_b = r_f / \theta \delta$ and the manager of the borrowing firm computes his expected utility as:

$$\hat{U}_b = \theta \delta [R - \{r_f / \theta \delta\}] + [1 - \theta]N + C \quad (\text{A.2})$$

Thus, the quality cut-off $\hat{\theta}$ that achieves $U_m = \hat{U}_b$ where U_m is given by Equation (5) and \hat{U}_b by (A.2) is

$$\hat{\theta} = \frac{\alpha C + r_f}{sR + r_f}. \quad (\text{A.3})$$

Borrowers with $\theta > \hat{\theta}$ go to the market and those with $\theta \leq \hat{\theta}$ go to banks. Comparing (A.1) and (A.3) we see that

$$\hat{\theta} > \theta^* \quad \forall P \in [0, 1].$$

This proves that more borrowers go to banks in the first phase than in the second phase. Clearly, if $\hat{\theta} > \bar{\theta}$, then no borrowers go to the market in the first phase. ■

PROOF OF PROPOSITION 3: Obvious. ■