Relationship Banking, State Co-Ordination and Long-Term Debt: Reinterpreting the Big Push

Sanjay Basu
National Institute of Bank Management, Pune

Swapnendu Bandyopadhyay (Banerjee)
National University of Singapore

Abstract:
We develop a lending game in which relationship-specific investments by firms benefit banks and vice versa. We show that even if all firms and banks prefer high-tech relationship loans under the first-best, asymmetric information and investment non-contractibility make them choose low-tech transaction loans. However, governments with intermediate risk ratings can use Groves subsidies for a concerted switch to long-term relationship loans. To avoid premature liquidation, they finance the scheme with long-term foreign debt. Thus, we try to explain the positive correlation between subsidies and long-term domestic and foreign debt, which was a salient feature of the East Asian development experience.

Keywords: Relationship Banking; Groves Subsidies; Intermediate Rating; Long-term Debt.
JEL classification: G21, H63, L14, O30.

© 2005 Sanjay Basu and Swapnendu Bandyopadhyay (Banerjee). Corresponding Author: Sanjay Basu, National Institute of Bank Management, P.O.: NIBM, Kondhwe Khurd, Pune - 411048, INDIA. Tel: 91-20-2683-3080-87, Fax: 91-20-2683-1447, E-mail address: sanjaybasu@hotmail.com. The authors thank Sudipto Bhattacharya, Parkash Chander, Indraneel Dasgupta, Aditya Goenka, Basant Kapur, Sougata Poddar and other seminar participants at NUS and ISI Calcutta for their comments and suggestions. Swapnendu Banerjee gratefully acknowledges financial support from the Singapore Millennium Foundation. The authors are solely responsible for any remaining errors. Views expressed herein are those of the authors and do not necessarily reflect the views of the Department of Economics, National University of Singapore.
1. INTRODUCTION

The East Asian Miracle gave rise to rich debates on a possible alternative to the Anglo-Saxon financial system. Till the late 1980s, the East Asian model stood for rapid growth, fiscal prudence, close Government-Bank-Firm relationships and high rates of investment, financed by long-term domestic and foreign debt (Amsden 1989, World Bank 1993). But, so far, few have tried to explain why these features could be interrelated. In particular, existing theories on developmental states are virtually silent on two issues: (a) the devices used by a government to pick winners (Amsden & Euh 1993, Rodrik 1994) and (b) the relation between such policies and aggregate debt maturity structure.

An empirical analysis of thirty countries, between 1980 and 1991, finds that subsidies to industry raise the ratio of long-term corporate debt to assets (Demirguc-Kunt & Maksimovic 1999). Another study on foreign capital flows for 111 investment-grade countries, between 1975 and 1997, shows that the share of long-term inflows (specifically FDI) falls with higher country risk or credit ratings (Albuquerque 2003). Is there a link between these apparently disparate results? Can these strands be tied up with the East Asian experience? In short, can we relate incentives for co-ordination to the choice of domestic and foreign debt maturity structures? In this paper, we say yes.

In a world of asymmetric information and incomplete contracts, we show how simple Groves subsidies can co-ordinate efficient relationships between banks and good firms. These schemes induce them to undertake co-operative, relationship-specific, investments, which generate positive externalities. We suggest how a farsighted state, with an intermediate sovereign risk rating, can use such incentives to develop a long-term
domestic debt market. Such schemes also show its fiscal strength and enable it to borrow long-term from abroad.

As the previous paragraph indicates, we stress on relationships between banks and good firms. In the first-best, all firms and banks prefer relationships to transaction loans. Therefore, banks form relationships with better firms first and then give transaction loans to those who are not eligible for relationship loans. In contrast, much of the literature on banking argues that banks should form relationships with low-quality firms. The logic is that since they focus on loan commitments, renegotiation or sectoral expertise primarily to avoid default, banks can earn more on relationship loans to bad firms.

But, we show how good firms can confer external benefits on banks, by exerting costly effort, to motivate mutually valuable relationships. For instance, a firm might set up its own audit cell and reduce the bank’s cost of loan monitoring. Good banks and firms would then have a common interest in relationships – firms would have higher returns and banks would face lower costs. The gains would increase with the quality of the partner. The existing literature neglects such value addition by good firms. These relationships raise firm-level productivity and can take an economy from a low-tech equilibrium to a high-tech equilibrium.

However, asymmetric information and incomplete contracting create two co-ordination problems. The first one is between good firms and banks: unlike the first-best, they do not make costly investments to generate externalities. All banks and firms trade only in transaction loans. Then, it’s up to the state to subsidize and induce investments. Therefore, the broader problem is between the state and the private sector – investments
are optimal or zero depending on whether the state subsidizes or not. Its sovereign risk rating decides which equilibrium is chosen – subsidy or no subsidy. If it does subsidize, good firms and banks will make their first-best investments.

These co-ordination problems bring our paper very close to the vast literature on the big push (Rosenstein-Rodan 1943, Murphy, Shleifer & Vishny 1989). We believe that the core of such a theory consists of (a) a possibility of multiple, Pareto-rankeable, equilibria and (b) the co-ordination of simultaneous investments. An exclusive focus on demand spillovers and economies of scale has led to controversies over (a) strength of sectoral scale economies and (b) existence of cheaper alternatives (i.e. import restriction or export expansion) for market creation (Ellis 1958). In this paper, we show that scale economies are not necessary for a theory of big push (or balanced growth, BG).

We believe that our paper is the first one on big push to (a) focus on asymmetric information (b) include relationship banking and (c) exclude scale effects. A relationship loan is a customized input by a bank, to raise firm-level productivity. Conversely, the effort by a firm would reduce the loan servicing cost for a bank. In order to reap these externalities, in a model with asymmetric information and incomplete contracts, we use Groves subsidies. Of course, whether or not the gains for a firm-bank pair imply massive industrialization will depend on the number of banks. In what follows, we assume the number of banks to be large.

The standard BG theory must resolve at least two problems (Myint 1973). First, the state should have a lot of local and macro information for a big push. The trouble is that, even the most advanced governments may not have so much information. Secondly, the objectives of the government might be in conflict with the goals of the private sector.

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1 An exception is Dinc (2000).
As a result, desirable investments may not be undertaken, both in the public and the private sectors. In order to be successful, BG must induce private sector participation.

Our story addresses both the issues. First, by using Groves subsidies, we can ensure truthful type revelation and co-ordination of co-operative investments, by banks and firms, regardless of what the government knows. Since the subsidy does not depend on one’s own report, truth-telling is the dominant strategy for all banks and firms. Better banks and firms, trading in relationship loans, emerge as winners because they earn more subsidies and higher profits. The losers get lower subsidies. The worst firms trade in transaction loans. Therefore, we suggest that an ignorant state can use Groves subsidies to identify and co-ordinate winners. Its choice need not be based on the development experience of other countries, at any stage.

Second, we show that the conflict of interest arises between a myopic state and the private sector. In contrast, the objectives are complementary when the state is farsighted and has an intermediate risk rating. It would then provide subsidies, to local banks and firms, contingent on trade in long-term domestic debt. Such schemes would be backed up by long-term sovereign debt, to avoid sudden maturity mismatches. While private sector profits rise, the state also gains from cheaper foreign debt. Hence, we not only derive the conditions for a mutually beneficial big push, we also establish a link between state subsidies, fiscal balances and debt maturity structures.

Big push theories have, in general, also paid little attention to supply-side factors. They either assume that the surplus, needed to finance an investment, is readily available

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2 cf. Rodrik (1994, p. 68): ‘This approach also suggests why “picking winners” was not so difficult in the early years of the Korean and Taiwanese experience. Policy makers in these countries only had to look at Japan and the more advanced countries to see their future. Of course, once the catch up is nearly complete, it becomes more difficult to play the same game.’
or that factor costs do not rise too much with industrialization. An exception is the model by Murphy et al. (1989), on the need (Fleming 1955) for simultaneous investment in essential infrastructure and consumer goods. Infrastructural development would reduce production costs in the consumption good sectors, which (in turn) provide a large enough market for such infrastructure. The upshot is that a theory of big push industrialization can focus, as we do, on supply-side externalities as well.

The preceding logic is similar to that of Schumpeter (1934) who argues that, for industrial development, banks must reduce borrowing costs for a large number of firms which, in turn, provide them with a critical market size. The point is that, by borrowing from a bank and increasing its market size, each firm indirectly reduces financing costs for others. Da Rin & Hellmann (2002) use this idea to show how a large bank, with enough market power, induces a big push by charging firms low interest rates. But, unlike us, their model is also based on scale economies.

We complement Da Rin and Hellmann by suggesting that, even when large banks do not exist, governments with intermediate sovereign risk ratings can promote bank-based industrialization. This is similar to Rodrik’s (1996) emphasis on state co-ordination in middle income economies. In our model, governments with very good institutions and ample forex reserves will rather save on subsidy costs and roll over their short-term foreign debt. At the other end, states with low ratings cannot enter long-term sovereign debt markets and have no incentive to subsidize. There would be no subsidies or long-term debt in economies at the two extremes – either by choice or by compulsion.

A crucial assumption in our analysis is the absence of banking competition. This is because such competition might set an upper bound to the interest rates a bank can
charge and erode its rents from relationship loans (Petersen and Rajan 1995). With perfect (or Bertrand) competition, for a given loan size, at least a part of the subsidies must be transferred as lower interest rates to the borrower. Or else, the relationship borrower would prefer rival banks, which charge lower rates. This means that no bank has an incentive for optimal investments, because it does not get its due return.

A common critique of the Groves approach is that the size of the total transfers could bust any budget (Cornes and Sandler 1996). But, by construction, we focus only on those states which can afford their Groves subsidies. This might entail substantial budget balances but, compared to the massive public investment programmes outlined for BG, the subsidy burden should be light. Therefore, governments should use Groves subsidies, rather than comprehensive investment strategies for a big push, because they can pick winners, even with poor information.

In section 1, we present a survey to relate our paper to the existing literature. In section 2, we show that good firms get relationship loans under perfect information and contractibility. But, in section 3, we find that private information and investment non-contractibility destroy the relationship loan market. In section 4, we introduce Groves subsidies to restore the first-best. In section 5, we show how a farsighted state backs up such schemes with long-term, foreign, debt. In section 6, we present some evidence from East Asia. In section 7, we summarize and indicate avenues for future research.

1. Related Literature

A large literature explores why contracts could be incomplete, i.e. with gaps or missing provisions subject to future renegotiation (Hart 1995, Segal 1999). Recent work has begun to focus on asymmetric information, which might lead to underinvestment
because the payment offered by an uninformed party, during renegotiation, is inadequate (Bajari & Tadelis 2001). Or, in order to accommodate possible renegotiation offers, the original contract might become less flexible and ineffective as a revelation mechanism (Reiche 1999). In our model, underinvestment stems from an adverse selection problem, which makes interest rates insensitive to bank and firm qualities.

This erodes the returns from co-operative, relationship-specific, investments (Che & Hausch 1999). Such investments confer direct benefits on the trading partner but not the investing party. The possibility of renegotiation (or asymmetric information), which makes returns invariant to investment levels, could then destroy all investment incentives in the original contracts.

A possible solution to these underinvestment problems is a binding commitment to non-renegotiation, through a fine payable to a third party, upon a breach. However, since the third party could, in principle, collude with either of the contractants, Maskin & Tirole (1999) suggest that the fine be paid to a community, whose collective temptation to collude is much less. But, the problem (Hart & Moore 1999) is that the community, as a whole, is not a party to the contract. So, it cannot enforce the fine in case of a breach. Any representative, as a signatory or a collector, is also open to collusion.

Our solution to this impasse is in terms of a hard state. Such a state can use credible policies, as a Stackelberg leader, to ensure optimal investments by banks and firms. In contrast, the soft state follows a few interest groups (Wade 1990, Grabowski 1994). Grabowski (1994) suggests that the larger the domestic market, the more credible is the state’s threat to introduce competition and destroy vested profits. Huff et. al. (2001) focus on the initial conditions which make such a state farsighted, i.e. insensitive to short-
term benefits. This is because the prior probability of being a hard state should be high enough to make the subsequent choice of a dynamic social optimum credible.

In contrast, we stress on the state’s ability to pick good banks and firms, through contingent subsidies, and co-ordinate their relationship-specific investments. This is also a measure of its fiscal strength. This enables it to tap long-term global capital markets and match the maturity structures of domestic projects and foreign debt. In other words, the state can ensure efficient relationship banking.

There are three salient features of relationship banking: (a) the bank gathers much more customer-specific information, than what is publicly available (b) information is gathered through multiple interactions with the same borrower, over time and/or across financial services (c) the information remains confidential. In contrast, transaction banking refers to a single transaction with a customer or multiple identical transactions with different customers, as in brokerage services for investment banking (Boot 2000).

Much of the literature in relationship banking centres on loan commitments to firms: superior credibility of banks vis-à-vis individuals (Boot, Thakor & Udell 1991), reputational rents to efficient banks (Boot, Greenbaum & Thakor 1993, Rajan 1998, Dinc 2000) and, hence, the need to specialize in renegotiation (Chemmanur & Fulghieri 1994). But, we extend the work of Boot and Thakor (2000), in which a relationship loan is a specialized input, by banks, to raise firm productivity. We introduce an asymmetric information, incomplete contracting environment. We also suggest that, by exerting effort to reduce servicing costs of banks, good firms can form relationships with good banks.

The holdup problem may hurt relationship banking in two ways. Since the incumbent bank has monopoly control over the relationship borrower, at the renegotiation
stage, it can demand very high payment by threatening to call back its short-term debt. In
anticipation, the firm will not exert optimal effort (Rajan 1992). The incumbent firm
might also switch over to rival banks and deny the relationship bank its due surplus (Das
& Nanda 1999). In anticipation, the bank may not invest in the relationship. The common
solutions to these problems are (a) a social penalty, on the deviant, in terms of reputation
loss (Sharpe 1990) and (b) long-term debt contracts.

In this paper, we use long-term (domestic and foreign) debt to deter inefficient
renegotiation by opportunistic banks and firms. In contrast to much of the literature (e.g.
Boot and Thakor 2000), we also show that it is socially efficient for good types to form
relationships and bad firms to trade in transaction loans. Even when firms and banks do
not have adequate incentives, for such relationships, governments can subsidize and co-
ordinate optimal investment levels to engineer a big push.

Our focus on relationship banking is motivated by the relatively recent emphasis,
of big push theories, on supply-side factors. The literature on big push (for an overview,
see Ray 1998, Ch.5) looks primarily at scale economies induced by demand spillovers.
Although it admits that investments in infrastructure (Fleming 1955) and social overhead
capital (Rosenstein-Rodan 1961) are vital for cost reduction, formal recognition came late
(Murphy et.al. 1989). It was modified to accommodate intermediate inputs (Rodrik 0996)
and banks (Da Rin and Hellmann 2002).

Rodrik builds a model with two final goods – high-tech and low-tech. The high-
tech sector needs a variety of intermediate inputs. No variety will be produced when the
high-tech sector is nonexistent and the high-tech sector does not exist because there are
no intermediate inputs. He suggests that an investment subsidy or a minimum wage policy could break the deadlock and take a middle-income economy from a low-tech to a high-tech equilibrium. As already noted, Da Rin and Hellmann (2002) analyze how a large bank uses its market power to provide cheap capital for massive industrialization. Our story develops on both these papers.

Unlike Rodrik, we assume that there is one specialized input per firm, supplied by one relationship bank. Similarly, provision of optimal effort by a firm does not depend on what other firms do. This allows us to avoid scale effects, which appear in Da Rin and Hellmann as well. Moreover, unlike Rodrik’s type-invariant subsidies, we use Groves subsidies to pick winners under asymmetric information. We also add to Rodrik by focussing on the state’s budget constraint, i.e. its ability to provide subsidies and to Da Rin and Hellmann by suggesting the (intermediate) range of states, which might promote bank-based industrialization from scratch.

With this background, we now investigate the conditions under which high-productivity relationships between good banks and firms will prevail in an incomplete contracting environment with asymmetric information.

2. The Model

There are N banks and K firms in the economy. Without loss of generality we assume $K > N$. Both parties are risk-neutral. A firm does not have any fund of its own and must borrow from (at least) one bank to finance a two-period project. The project costs Rs. $I$ and can be financed by (a) a relationship loan or by (b) a transaction loan. With a transaction loan, the project returns $Y$ with probability $\theta$, and 0 with probability $(1 - \theta)$. 

Although our model follows Boot and Thakor (2000) very closely at this point, we make the distinctive assumption that $\theta_i$ is the unobservable quality of borrower $i$ and $\theta_i \in \Theta_i$ where $\Theta_i \in (0,1)$ is the set of possible types of borrower $i$. Thus, $(\theta_1, \ldots, \theta_K)$ have been drawn from some set $\Theta = \Theta_1 \times \Theta_2 \times \ldots \times \Theta_K$ according to a probability density $g(\cdot)$.

Without loss of generality we assume that $\theta_1 > \theta_2 > \ldots > \theta_K$.

With a relationship loan, the story is a little different. The project returns $Y$ with probability $[\theta_i + v_j (1 - \theta_i)]$ and zero with probability $[1 - \theta_i] [1 - v_j]$. The variable $v_j$ refers to the value a bank adds to the relationship borrower. It captures the degree of sector specialization i.e. the extent to which loans are tailored to the specific needs of the firm.

Formally, $v_j = \gamma_j v_H$ where $v_H > 0$. Here, $\gamma_j = 1$ denotes maximum specialization such that $v_j = v_H$ while $\gamma_j = 0$ indicates no specialization such that $v_j = 0$. In other words, given a particular $\theta$, the income lottery with relationship banking first order stochastically dominates (FOSD) the income lottery without relationship banking.

The cost of specialization is given by $C_j(\gamma)$ with $C_j' > 0$, $C_j'' > 0$. Specifically we have $C_j(\gamma_j) = \frac{c_j \gamma_j^2}{2}$ where $c_j$ is known only to bank $j$ and $c_j \in \xi_j$, $\xi_j$ being the set of all possible types of bank $j$. Thus, $(c_1, \ldots, c_N)$ are drawn from some set $\xi = \xi_1 \times \xi_2 \times \ldots \times \xi_N$, according to a probability density $f(\cdot)$. The more efficient bank $j$ is at specialization, the lower is $c_j$. Again without loss of generality we assume that $c_1 < c_2 < c_3 < \ldots < c_N$. We make the following assumption regarding firm and bank types, but clarify its implication later.
Assumption 1: \( \frac{c_r}{c_r} \neq \frac{(1 - \theta_i)^2}{(1 - \theta_p)^2}, r \neq p, \forall r = 1, \ldots, N \) and \( \forall p = 1, \ldots, N \).

On its part, a firm invests costly effort \( e \) in the relationship. Such investment reduces the servicing cost of the bank and induces it to specialize in the symbiotic relationship. Specifically, the effort cost for a firm of quality \( \theta_i \) is \( C_i(e_i) = \frac{(1 - \theta_i)e_i^2}{2} \).

So, better firms are also capable of exerting effort at lower cost. We assume that the effort exerted by a firm \( i \) reduces the servicing costs \( m \), for a bank. For simplicity we assume that servicing costs are same across banks and also independent of borrower quality\(^3\). Therefore, the servicing cost for a bank is

\[
m_R = [m - e_i], \text{ when } e = e_i,
\]

and \( m_T = m, \quad \text{ when } e = 0\)

where the subscripts ‘R’ and ‘T’ stand for ‘relationship’ and ‘transaction’ loans respectively.

Thus, we are in a world of co-operative investments (Che & Hausch 1999) with private information, i.e. each bank knows it’s own \( c_j \) and hence \( \gamma_j \) and each firm its \( \theta_i \) and hence \( e_i \). We also assume that \( \gamma_j \) and \( e_i \) are noncontractible. To begin with, we study the benchmark case in which agent types are common knowledge and relationship-specific investments contractible. We assume that each firm can form relationships with at most one bank, i.e. we focus on single, rather than multiple, relationships\(^4\). This is not an unreasonable assumption, since asset specificity is costly for both firms and banks.

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\(^3\) We can also assume that servicing costs are lower for high quality banks as well as high quality borrowers. But this will only strengthen our result which follows.

\(^4\) In other words, we assume that after making the investments, the parties are locked to each other and the lock-in is complete (cf. Hart-Moore 1988).
2.1. The First-best

Ideally, in the first-best world, the project should continue when it is successful and be liquidated when it is not (Rajan 1992). This means that the bank is able to recover only a liquidation value $L$ from an unsuccessful project and $L < I < Y$. Continuation or liquidation occurs at the end of period 1 i.e. at $t=1$. The project returns $Y$ or $0$ at the end of period 2 i.e. at $t=2$. Contracting, relationship-specific investments and lending involve a sequential (three-stage) process at the beginning of period 1, i.e. at $t=0$. The time line of events is as follows:

\[ s = 1: \text{Bank and firms match for Debt contract.} \]
\[ s = 2: \text{Parties make relationship-specific investments.} \]
\[ t = 1: \text{Project liquidation/ Continuation.} \]
\[ t = 2: \text{Payoffs Realized.} \]

In the first-best world, when agent type is common knowledge and investment levels contractible, debt maturity does not affect the choice of first-best investments. Given the specialization and servicing costs of relationship banks and the effort costs of firms, the joint surplus between a firm of type $\theta_i$ and a bank of type $c_j$ is as follows:

\[
S_{jk}(y,e) = \left[ \theta_i + v_j(1 - \theta_i) \right] [Y - I] - \left[ 1 - v_j \right] [I - L] - \left[ m - c_j \right] - c_j \frac{Y^2}{2} - (1 - \theta_i) \frac{\epsilon^2}{2} \quad (1)
\]

From such a surplus function, we get
Result 1: In the first-best world with known agent types and contractible investments

(a) Cet. par., the less efficient a bank, the lower is sector specialization.
(b) Higher is the firm quality, greater is the effort exerted.

Proof: Substituting for $v_j$, the joint surplus function becomes

$$S_R(\theta, c_j) = [\theta_i + \{v_j(\gamma_h)\}(1-\theta)](Y - L) - [1 - \{v_j(\gamma_h)\}]1 - \theta_i(L - L) -$$

$$[m - e_i] - \frac{c_jv^2}{2} - (1 - \theta_i)e_i^2$$

(1a)

Differentiating the surplus function w.r.t. $\gamma_j$ and $e_i$ yield respectively

$$\frac{\partial S_R(\theta, c_j)}{\partial \gamma_j} = 0 \Rightarrow \gamma_j^* = \frac{(1 - \theta_i)[v_h Y - L]}{c_j}$$

(2)

$$\frac{\partial S_R(\theta, c_j)}{\partial e_i} = 0 \Rightarrow e_i^* = \frac{1}{1 - \theta_i}$$

(3)

From equations (2) and (3) we have the result.

The first observation follows from equation (2). Given any surplus-sharing rule, an inefficient bank (with higher $c_j$) will be more cost-constrained, cet.par., such that its optimal specialization level $\gamma_j^*$ is lower. Likewise, equation (3) shows that higher quality firms exert more effort. This is intuitive, since they can provide effort at lower marginal cost.

It is clear that high-quality banks and firms can make lower-cost investments. But, better firms benefit more from transaction loans as well. Even then, we show that they prefer relationships to transaction loans.
Proposition 1: *In the first-best world, with symmetric information and contractible investments, relationship lending occurs between banks and high-type firms. The worst firms get transaction loans.*

**Proof:** See Appendix A.

Proposition 1 follows from the fact that the difference between the maximum joint surpluses from relationship and transaction loans is a convex function of firm and bank types. This means that, for any bank or firm, the optimal excess profit from a relationship rises more than proportionately with an improvement in its partner’s quality. Every firm (bank) will then try to pair up with the most efficient bank (firm). But, in equilibrium, each firm will form a relationship with the best available bank, for its type, and vice versa. Better banks will reject its offer while worse banks get rejected. This is a variant of the standard “marriage problem” in the theory of matching (Wolfstetter 1999).

Thus, in the first-best, the top N firms will form relationships with the N banks and the matches are given by \( (\theta_i, c_j), i = j, \forall \theta_i \geq \theta_N, \text{ and } c_j \leq c_{N^*}. \) The rest of the firms \( (K - N) \) are not matched. They take transaction loans directly from an entity called the government\(^5\). Since we focus on relationships, the analysis of transaction loans to unmatched firms is of minor importance. The introduction of the government, at this stage, preserves the one-to-one matching between banks and firms.

Therefore, in the first-best, we find,

(i) Relationship Banking \( \forall \theta_i \geq \theta_N. \)

(ii) Transaction Loans \( \forall \theta_{N^*} > \theta_i \geq \theta_K. \)
Proposition 1 can be interpreted in two ways. Both imply that it is more than a benchmark result. First, it tells us *why* firms and banks might have optimistic beliefs, à la Da Rin and Hellmann. They observe that if firms were optimistic, big push would be spontaneous. We suggest that the *basis* for such beliefs is institutional strength. It makes good types confident of relationship banking and induces high-tech industrialization.

A related interpretation is that countries with strong institutions for information transmission and contracting can enforce bank-firm relationships for industrialization, without state intervention or reference to debt maturity structures. In light of the analysis that follows, this turns out to be a very important result, because it tells us that these economies do not need subsidies, or long-term debt, to industrialize. We will elaborate on this theme in Section 5.3.

Proposition 1 is the exact opposite of a key result (Theorem 1, case i) in Boot & Thakor (2000). In their model, high-quality firms (and banks) trade arms-length while worse types form relationships. In our setup, the conclusions are reversed because we emphasize that firms provide costly effort. This effort reduces the servicing costs of banks and gives them an incentive to form relationships with good firms.

Though the resolution of the debate is an empirical issue, our analysis makes it clear that relationships need not remain confined to weak firms and banks, which have a mutual interest in averting failure. The best of banks and firms can also form symbiotic relationships – a possibility that is said to be at the root of the East Asian Miracle.

\[ \theta_k \geq \frac{(I - L) + m}{(Y - L)} \]  

* Implicitly, we assume \( \theta_k \geq \frac{(I - L) + m}{(Y - L)} \). This ensures that the worst firm gets some positive surplus from a transaction loan.
3. Private Information

In this section, we show how private information and co-operative investments destroy the relationship loan market. Alternatively, we examine what firms and banks do when contracts cannot perfectly align investment levels to returns. From the ideal world of complete information and perfect contractibility, we now move to the other extreme - asymmetric information and noncontractible investments.

In such an environment, the revenues are independent of investment levels. More specifically, because of asymmetric information and adverse selection, the firms can only observe the average quality of the banks, which we denote by \( \bar{c} \). Similarly, banks can only observe \( \bar{\theta} \), the average quality of the K firms. Let us assume that the firm approaches the bank for a loan of size \( I \) with associated payments \( R(\bar{\theta}, \bar{c}) \) for a relationship loan and \( T(\bar{\theta}, \bar{c}) \) for a transaction loan. Because of asymmetric information and adverse selection, \( R(\bar{\theta}, \bar{c}) \) and \( T(\bar{\theta}, \bar{c}) \) are constants. Better firms pay more than they should while better banks cannot charge lower rates.

Thus the maximum profit a firm can expect from a Relationship Loan (ignoring inefficient renegotiation), at the contracting stage, is:

\[
\left[ \left( \bar{\theta} + v_{j}(1 - \bar{\theta}) \right) \bar{v} - \frac{(1 - \bar{\theta})e_{j}^{2}}{2} - \bar{R}(\bar{\theta}, \bar{c}) \right] 
\]

(8)

Obviously, \( e_{j}^{*} = 0 \), for all firms. The reason is simple: because investments are co-operative, costly effort by firms does not increase their own profits. Given adverse selection, interest payments are independent of firm quality.

Similarly, when a bank invests in costly specialization, it can earn at most
Here, the same two forces are at play again. First, owing to the adverse selection problem, $R(\tilde{\theta}, \tilde{c})$ is independent of $c_j$, and hence $\gamma_j$. Second, since costly specialization does not increase bank’s own returns, the optimal investment is zero.

The foregoing analysis makes it clear that if firms have no incentive to exert effort when banks specialize, they will not exert effort when banks don’t specialize. Similarly, the dominant strategy for banks is to invest nothing in sector specialization. In our model, adverse selection plays the same role as that of renegotiation in perfect information models – it generates returns independent of investment levels. This gives rise to a Prisoner’s Dilemma, in which each party tries to benefit from the other’s investment, doesn’t invest itself and ends up in zero-investment equilibrium.

**Proposition 2:** In a world of bilateral asymmetric information and co-operative investments, all firms apply for transaction loans with net payoffs: $\theta Y - T(\tilde{\theta}, \tilde{c})$.

Likewise, all banks float transaction loans and earn $T(\tilde{\theta}, \tilde{c}) - I$.

To summarize, we can arrive at this result in three steps. First, since investments are co-operative, they do not directly benefit the party which invests. Second, therefore, the incentives to invest, for one party (bank or firm), should come from the partner (the beneficiary), in terms of interest rate adjustments. Third, adverse selection ensures that all interest payments are given (for the average quality). This means that, irrespective of what its counterpart does, no bank or firm will invest and only transaction loans will prevail in the market.
The analysis in this section tells us why firms and banks could have *pessimistic* beliefs. Even if they are as skilled as in section 2, weak information transmission and contracting mechanisms make them avoid the relationship loan market and, as noted by Da Rin and Hellmann, converge on a low-level equilibrium trap.

4. Groves Subsidies

We are still in the second best world of private information and non-contractible investments, in which mutually valuable relationship banking has been found to collapse altogether, because each bank or firm maximizes its own, rather than social, surplus. In other words, when investments are co-operative, no bank or firm has a unilateral incentive to invest because interest rates are fixed in terms of average quality.

But, even in such a case, we shall see how a government can co-ordinate private investments, through Groves subsidies, to the first-best levels. The scheme is such that truthtelling is a dominant strategy (Mas-Colell et. al. 1995, Cornes & Sandler 1996). These subsidies also provide banks and firms with unilateral investment incentives. The government then announces the types publicly, to replicate optimal relationships.

4.1. Truthtelling

First, let us recall that co-operative investments confer positive externalities on the trading partner (without direct benefits to the investing party). Hence, the private optimum is less than the social optimum and appropriate subsidies are required. Agents would also overstate their types if subsidies were based on their reports. But, if the subsidy is independent of one’s announcement, then there is no incentive to lie. This is an intuition due to Vickrey (1961) and used by Groves (1973) to design demand-revealing
mechanisms for public goods. The transfer depends on announcements (of valuations) made by others. So, each report is true. In short, here we use Dominant Strategy Implementation (Mas-Colell et al. 1995).

The modified timeline will now appear as follows:

```
<table>
<thead>
<tr>
<th>s = 1</th>
<th>s = 2</th>
<th>s = 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>t = 0</td>
<td>Period 1</td>
<td>Period 2</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
</tbody>
</table>
```

- s = 1: Government collects reports and announces subsidies.
- s = 2: Banks & Firms matched and LT Loans offered.
- s = 3: Relationship-Specific Investments made and Subsidies paid.
- t = 1: Project Continuation.
- t = 2: All Payoffs Realized.

Essentially, by moving first with a Groves subsidy, the state ensures the first-best. The Groves mechanism works in our model as follows. At $t = 0$, the government declares that it will pay each relationship bank or firm a subsidy equal to the external benefit that its investment confers on its partner. So, it asks a firm to report the benefit it gets from its partner bank. Likewise, a bank is asked to report the benefit from its partner firm. The firm’s subsidy is based on the bank’s report and vice versa.

All possible firm/bank types, their distributions and the matching environment are common knowledge. Given stable one-to-one matching, each firm or bank (as also the government) can deduce its best available partner type and the associated benefits. Since the set of external benefits for each bank-firm pair is unique$^6$, it reveals the types of both the bank and the firm. The government need not ask them to reveal their types.

---

$^6$ Assumption 1 ensures that external benefits conferred by banks are unique.
At this point, let us recall that when firm $i$ invests $e_i$ units of effort, its partner’s servicing cost falls by $e_i$ rupees - the positive externality it confers is Rs. $e_i$. Similarly, bank $j$ confers an external benefit of Rs. $(1 - \theta_j)\gamma_j (Y - L)$, by its sector specialization, on firm $i$. Now, let us check whether bank $c_j$ has an incentive to tell the truth. If firm $i$ is truthful, i.e. it declares that it derives a benefit of Rs. $(1 - \theta_i)\gamma_i (Y - L)$, then bank $j$ gets Rs. $(1 - \theta_j)\gamma_j (Y - L)$ as subsidy, irrespective of its own report. So, it will report the true benefit $e_i$ it gets from firm $i$. Similarly, since firm $i$ gets its true subsidy $e_i$, when bank $j$ is truthful, it will report its own external benefit, from bank $j$, truthfully.

Does a firm or bank have the incentive to lie? The apparent answer is yes. Since each firm wants to get matched with the best bank, ex-post, it might announce that the external benefit it derives from its partner bank is $(1 - \theta_i)\gamma_i (Y - L)$. Similarly, each bank can claim to be the best one and report $e_i$ as its external benefit. But this will only lead to a pooling equilibrium, without subsidies. We have shown that all firms and banks are better off with separation than pooling. This possibility will be internalized by all firms and banks and they will reveal their benefits (and thus types, given one-to-one matching) truthfully. The threat of lying is not credible.

Such an approach to dominant strategy implementation also ensures that the final equilibrium is collusion-proof. Each bank or firm might over-report its partner’s type, and benefit, in the standard Groves approach. But, as our analysis has shown, such collusion is ruled out by the danger of a self-defeating pooling equilibrium. Moreover, there is another deterrent to collusion, which we need not invoke. In our common knowledge
environment, all governments know their ‘true’ subsidy burdens. If banks and firms collude to overreport, the actual subsidy bill will exceed the true level.

Therefore, the actual budget balance, i.e. the net payoff for the government, will fall short of its ‘true’ level. As shown in section 5, this makes a government switch from subsidized relationship loans, financed by long-term sovereign debt, to transaction loans funded by short-term foreign debt. Better banks and firms lose all potential gains from relationships. Therefore, no firm or bank, which prefers relationship lending, will collude. We strengthen the Groves scheme with the government’s budget constraints.

However, this need not deter a low-quality firm, below the average, which prefers a transaction loan under adverse selection, rather than full information. This is because its interest burden based on average quality, under adverse selection, will be less than the amount payable, as per its true quality, under full information. Hence, if the government does not compensate its extra profits under private information, the firm will misreport and the pooling equilibrium will persist. Therefore the government has to subsidize not only good firms and banks, but also the bad ones, which prefer a pooling equilibrium, in order to induce optimal relationship banking.

But how to subsidize the worst $K - N$ firms? To illustrate, let losses for the worst firm (type $\theta_K$) from separation be $D_K$, for the second worst firm $D_{K-1}$ and, finally, the loss for the $(K - N + 1)^{th}$ firm be $D_{K-N+1}$, where $D_K > D_{K-1} > \ldots > D_{K-N+1}$. The government can announce a subsidy of $D_k + \varepsilon$ for each of the $K - N$ unmatched firms and one can easily check that all firms will reveal their types truthfully.7

---

7 There might be many other subsidy schemes that achieve the desired result. This example illustrates how a simple scheme can ensure truthful revelation from the unmatched firms.
In the next two subsections, we explain how these subsidies restore the first best investment levels.

4.2. The Firm

As we have seen, firm $i$’s Groves subsidy will be $e_i$, the gross positive externality it confers on its partner bank. The net profit to the firm after such a subsidy, without considering the value added by the partner bank, is:

$$\Pi_i^{FE} = \Pi_i^{FT} + e_i - C_i(e_i)$$

(10)

$$\Pi_i^{FE} = \theta Y - T(\tilde{\theta}, \tilde{\epsilon}) + e_i - \frac{(1 - \theta_i) e_i^2}{2}$$

(11)

where $\Pi_i^{FE}$ is the profit of firm $i$ after investment (effort) and $\Pi_i^{FT}$ (independent of $e_i$) its profit from transaction lending. The key idea is to provide a subsidy which covers the investment costs and induces a firm to exert relationship-specific effort.

Differentiating w.r.t. $e_i$ and manipulating we get

$$e_i = \frac{1}{(1 - \theta_i)} \forall i = 1, \ldots, N$$

(12)

In equilibrium, each firm gets a subsidy of Rs. $e_i$. Therefore, the subsidy scheme makes firm $i$ internalize the benefits conferred on bank $j$. Alternatively, the government gives each firm a subsidy which exceeds its effort costs. Hence, relationship-specific effort adds to a firm’s profit from transaction loans, even when its partner bank does not add value. This makes the exertion of effort a dominant strategy for all firms who took relationship loans in the first-best environment.

---

8 Note that each firm is pivotal in its relationship with its partner bank.
The subsidy can also be viewed as a deduction from the pooling equilibrium interest burden, $T(\tilde{\theta}, \tilde{c})$. This is because, in a perfect information regime, a better firm pays less, ceteris paribus, because it gets more compensation for higher effort. But, under adverse selection, the interest burden is the same for all firms. This discriminates against better firms and rules out costly effort. Since total subsidies are higher for better firms, which exert more effort, the cum-subsidy interest burden decreases, ceter. par. for higher-quality firms. Hence, we can also re-write (11) as

$$\Pi_{i}^{FE} = \theta_i Y - \frac{(1-\theta_i)c^2_i}{2} - \{T(\tilde{\theta}, \tilde{c}) - e_i\}$$

Ex-post, i.e. after considering the value addition by bank $j$, the net profit of firm $i$ ($\Pi_{i}^{FR}$) from relationship banking, is:

$$\Pi_{i}^{FR} = \theta_i Y + v^*_j (1-\theta_j)Y + e^*_i - \frac{(1-\theta_i)c^2_i}{2} - R(\theta_i, c_j).$$

$$= \theta_i Y + v^*_j (1-\theta_j)Y + \frac{1}{2(1-\theta_i)} - R(\theta_i, c_j).$$

Therefore, co-operative investments by the partner further increase the profits from relationship banking, over transaction lending, for both parties.

A number of interesting results follow from the analysis above. These are:

(i) In equilibrium, all firms are paid the same lump-sum subsidy per unit effort. But, total subsidies are higher for those who exert more effort.

(ii) All firms get at least their second-best profits - nobody has an incentive to lie.

4.3. The Bank

Each bank $j$, which invests in sector specialization, should be paid $(1-\theta_j)v_{ij}(Y-L)\gamma_j$ as a subsidy, for it to internalize the benefit it confers on the partner
firm. Denoting bank $j$’s profit after sector specialization by $\Pi_j^{BS}$ and that from transaction lending by $\Pi_j^{BT}$, we have

$$\Pi_j^{BS} = \Pi_j^{BT} + (1 - \theta_i)(v_H)(Y - L)\gamma_j - \frac{c_j\gamma_j^2}{2}$$

$$\Pi_j^{BS} = T(\widehat{\theta}, \widehat{c}) - m + (1 - \theta_i)(v_H)(Y - L)\gamma_j - \frac{c_j\gamma_j^2}{2}$$  \hspace{1cm} (13)

Differentiating the above expression with respect to $\gamma_j$, we get bank $j$’s optimum degree of sector specialization:

$$\gamma_j^* = \frac{(1 - \theta_i)(v_H)(Y - L)}{c_j}$$  \hspace{1cm} (14)

The total subsidy to bank $j$ is: $\frac{[(1 - \theta_i)(v_H)(Y - L)]^2}{c_j}$ and

$$\Pi_j^{BS} - \Pi_j^{BT} = \frac{[(1 - \theta_i)(v_H)(Y - L)]^2}{2c_j}$$  \hspace{1cm} (15)

The analysis here is the same as for firms. Per unit of investment in sector specialization, each bank receives a type-invariant subsidy and, therefore, has no incentive to lie. But, because they are more cost-efficient (lower $c_j$), better banks invest more per unit subsidy and earn higher total subsidies and profits, in equilibrium. Since sector specialization is more profitable than transaction lending (viz.15), all banks will make such investments even when firms do not exert effort.

Thus, ex-post, the profit for bank $j$ from relationship lending, $\Pi_j^{BR}$, after taking into account the cost reduction by firm $i$, is:

$$\Pi_j^{BR} = R(\theta_i, c_j) + (1 - \theta_i)(v_H)(Y - L)\gamma_j^* - \frac{c_j\gamma_j^*}{2} - (m - e_i)$$
\[
= R(\theta_i, c_j) + \frac{(1-\theta_i)^2(\nu_H)^2(Y-L)^2}{2c_j} - (m-e_i^*).^9
\]

The arguments on coalition-proofness, in our model, can also be modified to show that the government pays the subsidies if and only if firms borrow **long-term**. The subsidies make banks and firms float non-renegotiable long-term debt and also reveal types truthfully. Once typecasting is made public and subsidies induce the first-best investment levels, there will be no renegotiation from erroneous cross-matching. We explain in section 5.4 why firms and banks prefer to follow the government and trade in long-term debt.

In conjunction with section 3, the key insights from this section are as follows:

**Proposition 3:** *(a)* The government provides subsidies to noncontractible investments for mutually beneficial, coalition-proof, relationships. Since domestic debt is long-term, such contracts are renegotiation-proof as well. This restores the first-best equilibrium.

*(b)* There are multiple equilibria – high-tech relationship banking occurs if governments subsidize, low-tech transaction lending occurs without subsidies. So, industrialization depends on whether governments provide subsidies or not.

---

^9 Note that, ex-post, mutually gainful bargaining will ensure that

\[
T(\theta, \bar{c}) - \frac{\left[\left(1-\theta_i\right)(\nu_H)(Y-L)\right]^2}{2c_j} \leq R(\theta_i, c_j) \leq T(\theta, \bar{c}) + v_j\left(1-\theta_i\right)Y + \frac{1}{2(1-\theta_i)},
\]

as firm \(i\) and bank \(j\) share their higher, cum-subsidy, relationship profits. Clearly, \(R(\theta_i, c_j)\) can be less than \(T(\theta, \bar{c})\).
5. Sovereign Ratings and Debt Maturity

In this section, we investigate when a government chooses to separate. That is, we derive the conditions under which it subsidizes firms and banks to induce relationship lending. There are two issues here: (a) the ability and (b) the willingness to subsidize.

Indeed, as we will show, some governments do not subsidize because they cannot, i.e. neither their resources nor credit ratings permit such costly separation. Others choose not to subsidize - they prefer to economize on subsidy costs and allow a pooling equilibrium. In our model, governments which subsidize will borrow long-term from world capital markets. Those which don’t, borrow short term – some by choice, others by compulsion.

5.1. Myopic Governments

Our government, rather than being a benevolent dictator, maximizes its own payoffs. Therefore, when it provides subsidies, it compares its payoffs from pooling vis-à-vis separation. For the moment, let us abstract from relationship banking and assume that only transaction loans exist. Then, it is a standard result that all bank-firm pairs below the average prefer pooling to separation. Likewise, the above-average bank-firm pairs will prefer separation.

In order to prevent the government from separation, the sub-average pairs can bribe it, a la Campbell and Kracaw (1980). That is, they transfer it a part of their excess profits from the pooling equilibrium. Conversely, all pairs above the average will bribe the government to retain a separating equilibrium. We show that the resolution of this tussle, in a static game, is unambiguous, i.e.

**Proposition 4:** In a static game, there is a unique equilibrium in transaction lending.
\textbf{Proof}: See Appendix B.

The upshot is that what the government knows, or gets from banks and firms, does not matter. There will always be some types who bribe it with their potential excess profits in such a manner that its total payoff from transaction loans remains the same, under both pooling and separation. In a static model, then, relationship banking adds only to the subsidy bill but not to its income.

5.2. \textit{Long-Term Sovereign Debt}

From the preceding discussion, it follows that the state must have a dynamic motive to subsidize relationship banking. This means that it could suffer future losses if it does not subsidize. Such an approach is motivated by the recent literature on repayment of sovereign debt (see Eaton and Fernandez 1995 for a survey). However, unlike that literature, the source of future losses upon a breach of commitment – enduring reputation (Cole and Kehoe 1998) or threat of direct sanctions (Bulow and Rogoff 1989) – is not very important to us. It does even not matter whether the amount borrowed per project, \(I\), is optimal (Eaton and Fernandez 1995) or not.

Conversely, if a state does honor its commitment, future benefits could dominate its static gains from a pooling equilibrium, e.g. through a reduction in future borrowing costs, which overcompensates the current subsidy burdens. This argument shows why it might prefer long-term sovereign debt. This is because it commits to subsidize \textit{iff} firms and banks trade in long-term debt. To make its commitment to long-term relationship banking \textit{credible}, the state itself must borrow long-term from abroad. The reduction in its borrowing cost might then generate a sustained income stream, which exceeds the static payoffs from financing a pooling equilibrium with short-term debt.
By borrowing long-term, it ensures that there is no sudden maturity mismatch between its foreign liabilities and domestic assets. Both firms and banks are then assured that there is no threat of premature asset liquidation. Had the government borrowed short-term from foreign lenders, it would have to provide short-term domestic debt to banks and/or maintain large stocks of foreign exchange reserves, to guard against maturity mismatches. Its threat to condition subsidies on domestic long-term debt might not have any more bite and it might have to forego payoffs from long-term relationship lending. This exercise gives us sovereign credit ratings which permit subsidization.

The preceding analysis makes it clear that the government wants to insulate local projects, from global capital market shocks, in two ways. First, it maintains a stock of forex reserves to absorb these shocks. Second, it borrows long-term to guard these projects against interim liquidation. Terminal shocks at $t=2$, i.e. after project completion, might liquidate physical assets if reserves are inadequate, but will not affect payoffs.

With this preamble, we can now calculate the farsighted government’s payoff from long-term, foreign, loans in a separating equilibrium. If it borrows long-term, the present value of its net payoffs from a subsidy scheme is

$$\frac{1}{1-\delta^2} \left[ (R_R + B) - S_G - \frac{L}{\beta} \right].$$

The discount factor is $\delta^2$, the primary budget surplus $B$, the receipt from banks $R_R$, the subsidy outflow $S_G$ and the publicly observed sovereign risk rating (probability of repayment) $\beta$. As is clear, foreign lenders are risk-neutral and competitive. The payoff from a two-period loan is discounted at a higher rate. The later a given payoff arrives, the lower is its present discounted value.

---

10 The technique of discounting two-period loans at $\delta^2$ is borrowed from Cole and Kehoe (1998).
However, if it breaks its subsidy commitment, it will be able to borrow short-term, only as much as it can repay with its forex reserves, for financing a static pooling equilibrium. To illustrate, it might subsidize till the end of period $T-2$, i.e. till time $T-2$. At time $T-2$, it promises a subsidy, gets a foreign loan of size $I$ and breaks its promise. The economy ends up in a pooling equilibrium, at time $T$, with the government payoff being $\left( R_p + B \right) \frac{I}{\beta}$. As we already know, the probability of repayment is lower for such transaction loans. Foreign lenders might not receive their expected returns.

Hence, the state is subsequently downgraded and denied a long-term loan of size $I$. With the lower rating, it gets a smaller short-term loan, which can be easily liquidated if returns are not expected to be enough. Lenders reduce both the maturity and loan exposure, to guard against potential losses. For computational simplicity, we ignore the subsequent government payoffs from such a loan. Therefore, the state will not deviate from subsidies and long-term debt when

$$\frac{1}{1-\delta^2} \left[ (R_R + B) - S_o - \frac{I}{\beta} \right] \geq \left[ 1 + \delta^2 + \delta^4 \cdots \delta^{T-2} \right] \left[ (R_R + B) - S_o - \frac{I}{\beta} \right] + \delta^T \left[ (R_P + B) - \frac{I}{\beta} \right]$$

or,

$$\frac{1}{1-\delta^2} \left[ (R_R + B) - S_o - \frac{I}{\beta} \right] \geq \left[ (R_P + B) - \frac{I}{\beta} \right]$$

Let $\frac{1}{1-\delta^2} = M > 1$

After some algebra, $\beta \geq \frac{(M-1)I}{M(R_R - S_G) + (M-1)B - R_P} = \beta_L$  \hspace{1cm} (18)

**Lemma 1**: $\beta \geq \beta_L > 0$ with $R_R < S_G$ iff $B + R_R - S_o > \frac{S_o + R_p - R_R}{(M-1)}$
The intuition behind Lemma 1 is simple. Equation (13) makes it clear that banks will not invest in sector specialization if \( R_R \geq S_G \). But, in the static model of section 5.1, the state prefers transaction loans to relationship banking, if \( R_R < S_G \). Though relationship loans are ruled out in a static setup by this conflict of interest, they can be offered (i.e. \( R_R < S_G \)) in a dynamic game, if the primary budget surplus, \( B \), is large enough to cover the discounted sum of subsidy \( (S_G) \) and opportunity costs \( (R_P) \). In a static model, \( B \) is irrelevant. Hence, Lemma 1 tells us why, even with foreign debt, it is possible to sustain relationship banking only in a dynamic framework.

Alternatively, since penalties hurt only future payoffs, the dominant strategy in a static model is to promise Groves subsidies, ask for long-term foreign debt and finance more profitable transaction loans. But, by backward induction, the state gets only short-term foreign debt, the (interest-inclusive) size of which will be limited by the quantum of forex reserves. Only in a dynamic model can we get a subgame-perfect Nash equilibrium in long-term relationship banking. Lemma 1 sets out the condition for such equilibrium.

We can also see why the loan size falls. Lower rating \( (\beta < \beta_L) \) is associated not only with a higher interest rate but also lower budget balance \( (B < B_L) \) and, hence, a smaller stock of reserves. The only way to reconcile lower reserves with a higher interest rate is to reduce the size of the loan \( (< I) \). From this, Bulow and Rogoff (1989) would infer that the penalty for a deviation involves both downgradation and partial sanctions on the use of external assets. Cole and Kehoe (1998) would perceive the fall in budget balance as the reputational cost of breaking the subsidy commitment. In both the cases, debt capacity falls below \( I \) after a breach.
It is clear that governments with $\beta < \beta_L$ do not have the resources and, hence, the requisite ratings to subsidize a separating equilibrium. Even if they do subsidize, they cannot borrow long-term, given their low budget balances, because foreign lenders would realize that such policies are unsustainable. Hence, in equilibrium, they do not subsidize but use short-term foreign debt ($I$) for low-quality transaction loans. They remain locked in a no-industrialization equilibrium. Their presence deters more creditworthy governments, with access to long-term debt, from breaking subsidy commitments and choosing short-term foreign debt.

**Comparative Statics:**

(a) $\frac{\partial \beta_L}{\partial B} = -\frac{I}{(\ldots)^2} < 0$

(b) $\frac{\partial \beta_L}{\partial S_G} = \frac{M}{(M - 1)(\ldots)^2} I > 0$

(c) $\frac{\partial \beta_L}{\partial M} = \frac{R_R - S_G - R^P}{(\ldots)^2} < 0$, since $R_R < S_G$.

The results are easy to explain. As the budget surplus increases (as we consider governments with higher budget surpluses), payoffs from long-term debt increase more than those from short-term debt. Therefore, more creditworthy (higher budget surpluses) governments tend to choose long-term debt. Conversely, a bigger subsidy bill makes them prefer short-term foreign loans. As states become more farsighted (as $M$ rises), they prefer to commit to the subsidy burden and choose long-term debt.

The results of this subsection can be summarized as
Proposition 5: Governments choose long-term sovereign debt if and only if their risk ratings exceed a threshold $\beta_L$. More subsidies shorten sovereign debt maturity. But higher budget surpluses and greater foresight induce more long-term debt.

5.3. High Risk Ratings

However, some governments also prefer short-term foreign debt. This is because they have sufficient foreign reserves to roll their short-term debt over indefinitely. These are from the advanced economies of Section 1, with strong institutions for information transmission and contract enforcement. In these countries, as already seen, firms and banks form efficient relationships without subsidies. So there is no commitment value of long-term sovereign debt. Short-term debt then becomes attractive because it can be rolled over faster, than long-term debt, to generate a higher present value of payoffs. The state borrows short-term, rather than long-term, on the strength of its reserves.

Let the proportion of reserves be $\alpha$ per period i.e. gross short-term government revenues are $\alpha(R_r + B)$\(^{11}\). Then the net payoff from a short-term loan of size $I$ is

$$\frac{1}{1-\delta} \left[ \alpha(R_r + B) - \frac{I}{\beta} \right].$$

The government will earn a higher gross income after project completion, but may still prefer a short-term loan because present discounted value of payoffs is higher than a two-period loan.

It is important to appreciate what is happening here. The government can convert an amount $\alpha(R_r + B)$ into reserves. From these reserves, it uses $\frac{I}{\beta}$ to repay its short-term loan (with interest). So the net usable reserves are $\left[ \alpha(R_r + B) - \frac{I}{\beta} \right]$. Since interest

\(^{11}\) Interest on reserves assumed to be zero.
rate on reserves (= 0) is less than that on foreign loans, the state can borrow short-term only if its gross reserves, \( \alpha (R_R + B) \), are high vis-à-vis the amount repayable. It can then roll over the net reserves indefinitely. Therefore, a government with sufficient reserves will prefer short-term foreign debt if:

\[
\frac{1}{1 - \delta} \left[ \alpha (R_R + B) - \frac{I}{\beta} \right] > \frac{1}{1 - \delta^2} \left[ (R_R + B)S_c - \frac{I}{\beta} \right]
\]

i.e. after some algebra, when

\[
\beta > \frac{\delta I}{(\alpha [1 + \delta] - 1)(R_R + B) + S_c} = \beta_H
\]

(19)

**Comparative Statics:**

(a) \( \frac{\partial \beta_H}{\partial I} = - \frac{\delta I}{(\alpha [1 + \delta] - 1) (R_R + B) + S_c} \geq 0 \), iff \( \alpha \leq \frac{1}{1 + \delta} \)

(b) \( \frac{\partial \beta_H}{\partial S_c} = - \frac{\delta I}{(\alpha [1 + \delta] - 1) (R_R + B) + S_c} < 0 \)

(c) \( \frac{\partial \beta_H}{\partial \alpha} = - \frac{\delta I (1 + \delta) (R_R + B)}{(\alpha [1 + \delta] - 1) (R_R + B) + S_c} < 0 \)

These results are quite intuitive. First, as budget surplus increases, the chances of borrowing short-term rises (falls) if the proportion of reserves, \( \alpha \), is high (low). In our model, governments borrow long-term because they do not have sufficient reserves. Without such collateral, borrowing short-term could entail premature asset liquidation and breach of domestic commitment. As budget surplus increases (or as we consider more creditworthy governments), the capacity to post liquid collateral, given \( \alpha \), increases. However, if \( \alpha \) is small, governments might still prefer long-term foreign debt. The upshot is that, reserves permitting, higher budget surpluses will raise the demand for short-term foreign debt.
The second result is easier. An increasing subsidy burden, cet.par., tends to shorten maturity of foreign debt. Even at the cost of a breach of domestic commitment and loss of reputation, governments try to escape subsidy burdens. Similarly, as the proportion of liquid assets, $\alpha$, increases, cet.par., the ability to finance domestic long-term loans with short-term foreign debt rises. With high reserves, the correlation between domestic and foreign debt maturities breaks down.

Our analysis also makes it clear why governments with high risk ratings provide more subsidies (compared to those with low ratings). The reduction in the cost of funds (as ratings improve) is greater than the rise in subsidy burdens. Therefore, governments with higher ratings will increase subsidies, to attain a separating equilibrium, as long as the lower funding costs (associated with higher ratings) cover their subsidy bills.

\[
\text{Result 2: } \frac{I}{\beta_L} - \frac{I}{\beta_H} \geq \left[ \left( (S_G)_H - (S_G)_L \right) - \left( (R_R + B)_H - (R_R + B)_L \right) \right].
\]

We summarize our major findings, of this subsection, as

**Proposition 6:** As ratings improve, sovereign debt maturity falls with a cet. par. increase in either the subsidy burden, $S_G$, or the proportion of reserves, $\alpha$. However, as long as $\alpha$ is small enough, governments with higher budget surpluses prefer long-term foreign debt.

So, we get only long-term foreign debt for intermediate credit ratings and short-term debt for the extreme cases. Letting $S_t = \frac{S_t}{D_t}$ be the proportion of short-term debt in foreign debt, we have,
\[
S_t = \begin{cases}
1 & \beta \in (\beta_H, 1] \\
0 & \beta \in [\beta_L, \beta_H] \\
1 & \beta \in [0, \beta_L)
\end{cases}
\]

In sum, the highlights of this section are as follows:

(a). At low budget balances and risk ratings (low \(B\) and \(\beta\)), there is a unique equilibrium - governments don’t subsidize, use small amounts of short-term foreign debt and fund low-tech transaction loans. Even with subsidies, they cannot industrialize. With high budget balances, risk ratings (high \(B\) and \(\beta\)) and good institutions, equilibrium is again unique - no subsidies or long-term debt. These economies do not need subsidies to industrialize. So, they just use the ample reserves to roll their loans over faster, than they can with long-term debt, and increase the present value of their payoffs.

(b). At intermediate ratings (\(\beta \in [\beta_L, \beta_H]\)), there is a possibility of multiple equilibria - banks and firms invest in more productive relationships if their governments subsidize, but remain stuck with low-productivity transaction loans without subsidies. Governments find it incentive compatible to provide Groves subsidies and coordinate relationships, because it gives them access to cheap, long-term, sovereign debt over time. Without sufficient reserves, they cannot borrow short-term given their commitment to the domestic long-term debt market. As budget surpluses and liquid reserves improve, they drift towards short-term debt, to save on subsidy costs.

5.4. Long-term Domestic Debt

So far, we have claimed that a sufficiently creditworthy state will subsidize if and only if banks and firms trade in long-term debt. Now, we examine what happens if they do not trade in long-term debt. There could be two possibilities: (a) they could both invest
but trade in short-term debt or (b) they might not invest, trade in short-term debt and try to pocket the subsidies promised (at $s=1$, Sec. 4) by the government.

If local, short-term, debt is risky (e.g. there could be a liquidity shock with probability $p$), the expected returns to relationship firms and banks, after subsidy, are 

$$(1 - p)\Pi^{FR}$$ and $$(1 - p)\Pi^{BR}$$ respectively. If short-term debt is riskless, at most (i.e. if the government continues to subsidize) they earn the same payoffs as with long-term debt. So, banks and firms weakly prefer long-term debt to short-term debt.

If banks and firms do not invest, the government has no incentive to provide the promised subsidies. When the private sector reneges on its commitment to invest, it is incentive compatible for the government to break its promise. If nobody invests, the government receives $R_P$ in a pooling equilibrium. With a net revenue of $(R_P + B - S_G)$ (rather than $(R_R + B - S_G)$), as explained in section 5.2, the sovereign rating will decline. Moreover, the size of future credit will also be squeezed, because after being downgraded, the state cannot bear a higher interest burden.

If it is to be cut off from global capital markets anyway, then the government will save its subsidy costs, maximize its static payoffs and earn at least $(R_P + B)$. Everybody – banks, firms and the state – lose out as a result. The private sector has to remain satisfied with its pooling equilibrium payoffs. However, section 4 tells us that subsidies guarantee at least the pooling payoffs. It is, therefore, incentive compatible for relationship firms and banks to make co-operative investments and float long-term debt.
6. The Evidence

The fascinating literature on the East Asian Miracle is full of debates on (a) industrial policy and (b) institutions for business-finance co-ordination. The former refers to the set of government incentives and guidelines to key sectors. The latter refers to formal communication channels between the state and the private sector for shared growth. While there is a sharp focus on Japan, Korea and Taiwan, which stood for state-led late industrialization (Amsden 1989, Wade 1990, Rodrik 1994), we show how Thailand and Indonesia also tried to govern markets.

6.1. State Co-ordination

An important element of industrial policy was the provision of subsidized credit to priority sectors and firms through the banking system. The goal was to direct long-term credit to sectors with high social returns, where financial markets were missing (Stiglitz and Uy 1996). Specialized (development) banks were set up for the purpose and commercial banks had to follow their leads. While the productivity gains from such policies are debatable, there is a consensus that priority sectors did contribute much more to gross value added in manufacturing (World Bank 1993, Kwon 1994, Pack 2000).

The directed credit regime in Korea began with a focus on Heavy and Chemical Industries in the early 1970s. About 49% of all bank loans in 1980 went to targeted sectors, at a subsidy of 4%- 5% (Nam 1994). Such intervention became more selective during the 1980s, but the state did control nominal loan rates whenever necessary. In 1989, when tight monetary policy pushed short-term government bond rates to 18.9%, the loan rate for commercial banks stayed at 12.5% (Amsden & Euh 1993). The share of
policy loans, at banks, was 47.5% during 1988-90. Korea Development Bank, Korea EXIM Bank, agriculture, housing and facility investments were the major recipients.

Preferential credit in Indonesia was directed primarily at stabilization of rice prices, adoption of better farming technology and promotion of industrial investment. Banks which participated in government lending programmes for firms could rediscount a fraction of the loans at subsidized rates, from the Central Bank, under a system of *liquidity credits*. At the end of 1982, the average rediscount proportion was 43%, the rediscount rate ranged from 3% to 13% and the priority sector loan rate varied between 5% and 13.5% (Chant & Pangestu 1994, Hanson 2001).

However, the Thai government lacked a coherent industrial policy. Subsidized credit was directed, through banks, at rural infrastructure, agricultural investment and diversification (Jansen 2001). Therefore, on an average, government subsidies to private and public firms, between 1983 and 1991, were 6.3% of GDP per annum for Korea and only 1.4% for Thailand (Demirguc-Kunt and Maksimovic 1999).

But, an important similarity between the Korean and the Thai states was in the existence of formal mechanisms for Government-Business-Finance interaction. Monthly Export Promotion Meetings and Monthly Briefings on Economic Trends were held in Korea since the mid-1960s. These were chaired by the President and attended by top government officials, bankers, heads of firms and industry association representatives.

The President sought corporate opinion on specific issues and ministers had to submit progress reports on these in subsequent meetings. These meetings, supplemented by discussion groups for middle-tier officials, were conducted along two lines: functional (e.g. public finance) and sectoral (e.g. automobiles). The financial sector was the treasury
unit, the corporate sector was the production and marketing unit while the state became the planning and control unit (Lee 1992, World Bank 1993, Vittas & Cho 1996).

The National Joint Public-Private Sector Consultative Committee (NJPPSCC) in Thailand also played the same role, at a later stage (World Bank 1993, Krongkaew 1999). It was set up in 1981, by the combined efforts of Board of Trade, Federation of Thai Industries and Thai Bankers’ Association. It was chaired by the Prime Minister and consisted of all economic ministers and representatives from the three founding groups. It had to co-ordinate private-public sector activities, for faster resolution of key problems, and involve the private sector more in economic development. Provincial consultative committees were set up later to supplement the NJPPSCC.

Thus, there was an attempt in East Asia to bring firms and banks together and eliminate information asymmetries and lender myopia. Sauer, Gawande & Li (2003) test the big push theory for eight countries in East Asia and Europe, by examining whether common trends in output and value added exist across industries. While results support the hypothesis of simultaneous investments, the Korean data also makes a case for selective intervention over time: with industrial development, only sophisticated sectors like automobile, electric machinery and scientific equipment move together – breaking away from items like rubber and plastic.

Demetriades (2000) tests the results of financial intervention in East Asia. He shows that, of the 8.16% average annual growth rate in Korea (1955-1995), 0.4% came from financial sector development while financial policies added a sample maximum of 0.5%. In Thailand, financial sector development contributed a sample maximum (1.16%) while financial policies added 0.05% to a growth rate of 7.52%. We should note here that
financial development was also governed by the state in East Asia. Moreover, financial intervention had actually reduced growth for seven other countries in the sample.

To conclude, we note that Korea, Indonesia and Thailand enjoyed intermediate, investment grade, ratings on sovereign borrowing. In March 1995, Moody’s awarded Korea A1, Thailand A2 and Indonesia the lowest investment grade Baa3. (World Bank 1996). The point is that they got neither the best nor the worst grades – their intermediate ratings allowed them to borrow long-term. The fiscal deficits (vis-à-vis GDP) between 1980 and 1988 were also good – Korea had an average of 1.89% (World Bank 1993) while Thailand had an average of 3.52% (Alba et.al.1999). Indonesia had an average fiscal surplus of 0.36%, between 1979 and 1990 (Azis 1999).

6.2. Debt Maturity

Till the end of the 1980s, the emphasis in these economies was also on long-term domestic and foreign debt. In Korea, the 6th-30th chaebols registered a significant increase in the proportion of long-term debt to assets (and a corresponding decline in short-term debt to assets) between 1981 and 1988. This was accompanied by a steep reduction in the ratio of foreign debt to assets. In 1988, 55.7% of the Korean corporate debt was long-term. The proportion of short-term-to-total foreign debt in Korea was 30.87% in 1990 (Corsetti et.al. 1999, Lee et.al. 2000, Claessens et.al. 2000).

The story is similar for Thailand and Indonesia. In 1988, 58.1% of the Thai corporate debt was long-term. The ratio of short-term foreign debt had actually declined in Thailand, between 1980 and 1989, from 27.8% to 26%. In Indonesia, 52.4% of the corporate debt was long-term in 1992 and the fraction of aggregate short-term foreign
debt was at 13.4% in 1989 (World Bank 1998, Claessens et.al. 2000). This supports our hypothesis of a positive correlation between long-term domestic and foreign debt.

7. Conclusion

The key insights from our analysis may now be summarized as follows:

a) With incomplete contracts and asymmetric information, inefficient renegotiation can be prevented if parties (banks and firms) are made accountable to a hard state. Such a state can create investment incentives for optimal relationships (Groves subsidies) and make a binding commitment to non-renegotiation (long-term domestic and sovereign debt). In this sense, our hard state fares better than the anonymous community of citizens in Maskin and Tirole (1999).

b) There are two sources of co-ordination failure in our story, the resolution of which is our contribution to the big push literature. The first is the quality of information transmission and contracting institutions. If it is high, good firms and banks will form high-tech relationships. If it is low, the final equilibrium – relationships or low-tech transaction loans - depends on whether the state can subsidize or not. We show how to rank better firm-bank pairs for relationships, in terms of Groves subsidies, under private information. We also derive the conditions (intermediate sovereign ratings) under which the goals of the state and the private sector are aligned.

An alternative interpretation of our model is that industrialization depends on the interaction of two sets of initial conditions – information/contracting regimes and budget balances. The final outcome depends on these conditions – high-tech industrialization if either is good, low-tech traps if none are. This has two policy implications. One, if initial conditions are improved, the chance of spontaneous industrialization rises. Two, the state
with a good budget surplus, to start with, can defy initial information/contracting barriers to engineer a big push.

c) The results appear to be in accordance with the East Asian experience till the end-1980s, where the state borrowed foreign capital on behalf of firms, to co-ordinate the allocation of scarce funds through the banking sector. Given this similarity, our version of the hard state improves on existing models as follows: (i) it focuses on the role of the government’s budget constraint (ii) it picks out winners with type-specific subsidies. In East Asia, the winners were ranked in terms of their export performance. In our story, winners are ranked in terms of their investment efficiency in relationship loan markets. They emerge as winners because they earn higher total subsidies and profits.

d) An unfortunate consequence of our model is that, under state co-ordination, monitoring is redundant. After the government announces types, banks pair up with firms knowing precisely who they are. Thus the state virtually directs banks to lend, to their counterparts, in the corporate sector. They do not screen and find out for themselves. The surrogate first-best is achieved at a cost - the monitoring ability of banks gets stunted.

The task ahead is to remove government co-ordination and introduce financial liberalization. In the new regime, banks will find their existing stock of client-specific information garbled and screening ability stunted. To avoid credit rationing or excessive risk (Caprio 1994), banks and firms will have to signal themselves. This process might lead to a sharp reduction in the domestic and foreign debt maturity structures. Such an analysis can explain the dominance of short-term debt, prior to the Asian crisis. The traverse from a miracle to a potential crisis will then be complete.
Appendix A

Proof of Proposition 1: From the optimal investment levels $\gamma_j^*$ and $e_i^*$ in (2) and (3) respectively, we can construct a maximum joint surplus (MJS) function $S^*$, given by

$$S^*_R(\theta_i, c_j) = \left[\theta_i + \{\gamma_j^*(v_{ij})(1-\theta_i)\}[Y-I] - [1-\{\gamma_j^*(v_{ij})\}[1-\theta_i][I-L] - 
\left[ m - e_i^* \right] - \frac{c_j \gamma_j^*}{2} - (1-\theta_i) \frac{e_i^*}{2} .$$

$$\frac{\partial S^*_R(\theta_i, c_j)}{\partial \theta_i} = \left[1 - v_j\right][Y-L] + \frac{e_i^*}{2} > 0$$

(4)

(Ignoring $\frac{\partial S^*_R}{\partial e^*}$ and $\frac{\partial S^*_R}{\partial \gamma^*}$ by the envelope theorem).

$$\frac{\partial S^*_R(\theta_i, c_j)}{\partial c_j} = -\frac{\gamma_j^*}{2} < 0$$

(5)

(Ignoring $\frac{\partial S^*}{\partial \gamma^*}$ by envelope theorem).

The surplus from transaction loan, to a firm of type $\theta_i$, is

$$S_T = \theta_i(Y-I) - (1-\theta_i)(I-L) - m$$

Since relationship-specific investments are zero, $S_T(\theta) = \text{Max } S_T(\theta) = S^*_T(\theta)$, for all $\theta$.

$$\frac{\partial S^*_T}{\partial \theta_i} = (Y-L) > 0 .$$

Also, we note that

$$S^*_R(\theta_i, c_j) - S^*_T(\theta_i) = \frac{(v_{ij})^2(Y-L)^2(1-\theta_i)^2}{2c_j} + \frac{1}{2(1-\theta_i)} > 0, \forall \theta_i .$$

(7)

In other words, all firms prefer relationship loans to transaction loans. For any $c$, it follows from equation 4 that $S^*_R(\theta_1, c) > S^*_R(\theta_2, c) > \ldots > S^*_R(\theta_K, c)$ since
\( \theta_1 > \theta_2 > \ldots > \theta_K \). Also, for a particular \( \theta \), we know from equation (5) that 
\( S_R^* (\theta, c_1) > S_R^* (\theta, c_2) > \ldots > S_R^* (\theta, c_N) \) since \( c_1 < c_2 < c_3 < \ldots < c_N \). This means that higher the quality of the firm and/or bank, the greater is the joint surplus from such a relationship. Thus we get 
\( S_R^* (\theta, c_1) > S_R^* (\theta, c_2) > \ldots > S_R^* (\theta_N, c_N) \).

But does that make the optimal pairing \( (\theta_i, c_j) \), \( i = j \), \( \forall \theta_i \geq \theta_N \) and \( c_j \leq c_N \)? For that, we need the difference between the maximum joint surpluses from the relationship and transaction loans (eqn.(7)) to increase at an increasing rate, with an improvement in firm and/or bank quality. From (7), we get:

\[
(i) \quad \frac{\partial}{\partial \theta_i} \left[ S_R^* (\theta_i, c_j) - S_T^* (\theta_i) \right] > 0 \quad \text{iff} \quad \theta_i > 1 - \left[ \frac{c_j}{2v_H^2 \left( (2 - \gamma^2)Y - L \right)^2} \right]^\frac{1}{3} = \hat{\theta}(c_j) \quad \text{say.}
\]

\[
(ii) \quad \frac{\partial^2}{\partial \theta_i^2} \left[ S_R^* (\theta_i, c_j) - S_T^* (\theta_i) \right] > 0.
\]

\[
(iii) \quad \frac{\partial}{\partial c_j} \left[ S_R^* (\theta_i, c_j) - S_T^* (\theta_i) \right] < 0
\]

\[
(iv) \quad \frac{\partial^2}{\partial c_j^2} \left[ S_R^* (\theta_i, c_j) - S_T^* (\theta_i) \right] > 0.
\]

Thus, given any \( c_j \), the relative gain from relationship banking increases at an increasing rate as firm type goes up. Note that this threshold \( \hat{\theta}(c_j) \) is bank specific, with \( \hat{\theta}'(c_j) < 0 \). That is, the best bank (type-\( c_1 \)) will gain the maximum if it pairs up with the best available firm greater than \( \hat{\theta}(c_1) \), that is \( \theta_1 \). Similarly type-\( c_2 \) bank will pair-up with the best available firm greater than \( \hat{\theta}(c_2) \) i.e. \( \theta_2 \), since \( \theta_1 \) is no longer available given one-to-one matching. Thus, in the first-best, the top N firms will form relationships with the N
banks and the optimal pairing will be \( (\theta_i, c_j) \), \( i = j \), \( \forall \theta_i \geq \theta_N \) and \( c_j \leq c_N \). This one-to-one matching is stable in the sense that it is immune to the possibility of being blocked by any pair or even by any single firm or bank. Put differently, this pairing is Pareto optimal in the sense that no firm or bank can be made better off without making any other worse off. ■

Appendix B

Proof of Proposition 4: As we already know, a firm pays \( T(\tilde{c}, \tilde{\theta}) \) in a pooling equilibrium. Similarly, in a separating equilibrium with only transaction loans, it pays \( T(c, \theta) \). Any firm, which prefers pooling, gets an excess profit of \( T(c, \theta) - T(\tilde{c}, \tilde{\theta}) \).

Now, let the bank borrow the investible funds, \( I \), from the government. It pays \( X^s(c, \theta) \) in a separating equilibrium and \( X^p(\tilde{c}, \tilde{\theta}) \) in a pooling equilibrium. So, pooling gives it an excess profit of

\[
[T(\tilde{c}, \tilde{\theta}) - X^p(\tilde{c}, \tilde{\theta})] - [T(c, \theta) - X^s(c, \theta)] = [X^s(c, \theta) - X^p(\tilde{c}, \tilde{\theta})] - [T(c, \theta) - T(\tilde{c}, \tilde{\theta})]
\]

(16)

The total excess profit for each sub-average pair in a pooling equilibrium is

\[
[T(c, \theta) - T(\tilde{c}, \tilde{\theta})] + [X^s(c, \theta) - X^p(\tilde{c}, \tilde{\theta})] - [T(c, \theta) - T(\tilde{c}, \tilde{\theta})] = [X^s(c, \theta) - X^p(\tilde{c}, \tilde{\theta})] = (X^s - X^p)
\]

(17)

The intuition is that the bank pays the government less in a pooling equilibrium \((X^s - X^p)\), but gets less from the firm as well. The increase in the firm’s profits is negated by a matching fall in the bank’s profits. Note that, for each pair (more specifically, each bank) above the average \((X^s - X^p)\) is negative, since it prefers separation.
The net payoff for a government (including interest payment from banks but excluding the ‘other’ revenues), from all sub-average pairs in a pooling equilibrium, is:

$$\sum_{\theta < \tilde{\theta}, \epsilon > \bar{\epsilon}} \left( [X^S - X^P] - \epsilon + X^P \right) = \sum_{\theta < \tilde{\theta}, \epsilon > \bar{\epsilon}} X^S - \epsilon,$$

where \(\epsilon\) is a very small number.

Therefore, each sub-average pair retains a very small portion of the excess profits from pooling. Similarly, the payoff from the worst K-N firms is:

$$\sum_{\theta < \theta_{k_N}} \{ T(\tilde{c}, \tilde{\theta}) - \epsilon + [T(c, \theta) - T(\tilde{c}, \tilde{\theta})] \} = \sum_{\theta < \theta_{k_N}} T(c, \theta) - \epsilon$$

The total government payoff, under pooling (including pooling interest paid by above-average banks), is:

$$\sum_{\theta < \tilde{\theta}, \epsilon > \bar{\epsilon}} \left( [X^S - X^P] + X^P \right) + \sum_{\theta > \tilde{\theta}} \sum_{\theta < \theta_{k_N}} T(c, \theta) = \sum_{\theta < \tilde{\theta}, \epsilon > \bar{\epsilon}} X^S + \sum_{\theta > \tilde{\theta}} X^P + \sum_{\theta < \theta_{k_N}} T(c, \theta)$$

$$= R_P,$$ where the subscript ‘P’ refers to pooling.

Conversely, under separation, the above-average pairs would pay the bribes. From them, the government receives

$$\sum_{\theta > \tilde{\theta}, \epsilon < \bar{\epsilon}} (X^S + [X^P - X^S] - \epsilon) = \sum_{\theta > \tilde{\theta}, \epsilon < \bar{\epsilon}} X^P - \epsilon.$$ Its total payoff in a separating equilibrium (including interest paid by the sub-average banks and the worst [K-N] firms), with transaction lending, is:

$$\sum_{c > \epsilon} X^S + \sum_{\theta > \tilde{\theta}, \epsilon < \bar{\epsilon}} X^P + \sum_{\theta < \theta_{k_N}} T(c, \theta) = R_p$$

As in the pooling equilibrium, those (sub-average banks and unmatched firms) who do not bribe pay only the separating interest rates. This process of surplus transfers makes the government indifferent between pooling and separation.
At this point we reintroduce relationship banking. We claim that the government’s payoff from relationship banking is \( R_P - S_G \), where \( S_G = S_F + S_B \) stands for the Groves subsidies to firms and banks. Deducting subsidies to unmatched firms from the state’s separating payoffs would entail double counting, since they already appear as bribes under pooling. Therefore, in a static model, the government always prefers transaction lending since the payoff including the primary budget surplus, \( R_P + B \), exceeds that with relationship lending, \( R_P + B - S_G \).

The reason is that if the government charges an interest \( R_R \), under relationship banking, such that \( R_R - R_P > S_G \), it erodes incentives for sector specialization by banks (vide. equation 13). Under relationship banking in a static model, there is a conflict of interest between the government and the private sector.
References


