Economic analysis of corporate loan guarantee: model and policy recommendations

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Abstract

In this study, we develop a set of models to analyze corporate loan guarantee to better understand the Korean government's regulation policies. We find that corporate loan guarantees are efficiency-neutral under a set of ideal economic conditions characterized by perfect and symmetric information, no agency problems, and no governmental interference in private financial contracts. In reality, though, corporate loan guarantees have negative as well as positive effects on firms' behavior. Negative effects arise from principal-agent problems as well as government interferences in private financial contracts. In the presence of information asymmetry, a positive effect of corporate loan guarantee may result by making good use of the fact that the guarantor firm has more information than the lending bank with regards to the borrowing firm's investment project. Specifically, loan guarantee contracts can function as a signalling mechanism enhancing the efficiency in investment fund allocation.

1 Introduction

Up until recently, a major problem of the Korean economy has been the large debt among the chaebol (Korean conglomerate) affiliate companies. Loan guarantees as well as circular share holding and stock pyramid within chaebol firms has been blamed as being responsible for excessive borrowing and over-investment. In this paper we build a model that will help us better understand the nature and implications of corporate loan guarantee. Policy recommendations will be made accordingly.

Following the recent 1997 economic crisis, a flood of policy prescriptions have been emphasized in the media and by policy makers among which the most popular are the various demands to reduce corporate loan guarantees, to strengthen minority shareholder rights, and to improve the corporate governance mechanisms. Many observers criticize the practice of loan guarantees among corporate affiliates as having led to excess borrowing, massive debt, and over-investment. In response, the Korean government gradually strengthened regulations on corporate loan guarantees and more recently, prohibited the practice of corporate loan guarantees among the affiliate companies within the top 30 chaebols.

Upon reflection, however, one may ask whether corporate loan guarantees are in essence a bad thing? Corporate loan guarantee is a kind of option contracts. Under normal business conditions, corporate loan guarantees are ineffective. They however become effective when the borrowing firm is un-

der financial distress and is unable to repay its own debt. A corporate loan guarantee increases the credit rating of the borrowing firm as well as the probability of repayment of a bank loan. Corporate loan guarantees arise when a borrowing firm requests a loan from the bank with the backing of a guarantor firm that agrees to take on some or all of the repayment obligation. In return, the guarantor firm demands compensation, usually in the form of a fee from the borrowing firm for the loan guarantee service. An appropriate fee demanded by the guarantor firm from the borrowing firm should discourage any excess or inefficient borrowing backed by loan guarantees. Put differently, with appropriate economic compensation specified in the contract between the parties under voluntary conditions, corporate loan guarantees need not have adverse effects.

In the presence of asymmetric information between the bank and guarantor firm, corporate loan guarantees perform the function of transmitting signals and therefore in this sense have a positive effect in enhancing the efficiency of investment fund allocation.

When excess debt is associated with a corporate loan guarantee, it should be concluded that this is due to some kind of distortion in the contract. That is, in reality, for whatever reasons, the existence of inefficiencies due to distortions in contracts are manifest as side effects in the use of corporate loan guarantees. The weak protection of external investors, the underdevelopment of corporate management systems, the government's frequent inter-

vention in financial markets, and the deficiency in the law, all constitute fundamental causes for weaknesses and inefficiencies in the corporate management structure that are manifested through corporate loan guarantees.

The debt ratios of Korean chaebol firms are usually higher compared to conglomerate firms in advanced countries while their returns from investments are lower.[1] It would be premature, however, to claim that the main reason for inefficiencies is attributable to corporate loan guarantees. On the contrary, if the bank plays its proper role as an institution that supervises investment capital then debt contracts may in fact augment the responsibility of business managers and may help resolve agency problems.[2] Voluntary loan guarantee contracts cannot be blamed outright as the direct reason for excess investment. It is argued that large scale inefficiencies in corporate governance is brought by distortions in debt relief and in investment contract decisions, and it is with this that we need to begin our examination.

This paper looks at the effectiveness of corporate loan guarantees from an economics point of view, and accordingly suggests policy recommendation as regards the practice of corporate loan guarantees. Following the analysis of this paper, we find that the main reasons for distortions in the corporate loan guarantees are the agency problems derived from the contradictory action between the corporate managers and outside investors especially when

[1]For example, Hwang *et al.* (2000) reports that in Korea in 1997 the chaebols debt/equity ratio was over 350 per cent, which was higher compared to 166.5 per cent in the US, 209.6 per cent in Japan, and 87.2 per cent in Taiwan.

[2]See Diamond (1984) for more on the bank's monitoring function.

there are no restraining factors preventing this, such as appropriate laws and market disciplinary devices. Moreover, agency problems are further aggravated by government interference in financial markets by way of relief financing. Nevertheless, policy to increase efficiency need not prevent corporate loan guarantees all together. Rather, it should focus on improving the weaknesses in corporate governance and reducing agency costs. Furthermore, to discourage the bank's demand for excess guarantee, the bank's loan supervision and incentive structure should be strengthened.

In order to support the above assertions, we set up a model of a corporate loan guarantee contract that incorporates the incentive structures of the bank, the guarantor firm and the borrowing firm. The remaining part of this paper is composed as follows. To begin with, section 2 looks into the past pattern of corporate loan guarantees. Here, problems to be examined are identified after reviewing current papers on corporate loan guarantee regulations. In section 3, the basic model of this paper is introduced that does not incorporate either the functions or malfunctions of corporate loan guarantees. In section 4, we relax one of the assumptions of the basic model that the success of a guarantor firm's investment project is independent of the success of the borrowing firm's investment project. We show that despite this, the neutrality of corporate loan guarantees still holds firm. In section 5, we relax further assumptions of the basic model to investigate the mechanism that associates loan guarantees with excess borrowing and

over-investment. In section 6, it is shown that efficiency improves, in the presence of information asymmetry between the bank and the guarantor firm, when the loan guarantee contract acts as a signalling device indicating the value of the borrowing firm's investment project. In section 7, we make policy recommendations for regulation of corporate loan guarantees. All the proofs are deferred to the Appendix.

2 Scope of corporate loan guarantee, brief literature review

2.1 Unilateral patterns of corporate loan guarantee

Table 1 shows the amount of corporate loan guarantee among the top 30 Korean chaebol firms. According to the table, there has been a decrease in the amount of loan guarantee after 1995. Nevertheless, even up until 1997 corporate loan guarantee has remained rather high, and moreover, it is interesting to note that the top 3 firms within each chaebol have accounted for about 85 per cent of all corporate loan guarantees during the period 1995 to 1997.

Table 1: Corporate loan guarantee, top 30 Korean chaebols *(trillion won)*

	equity	loan guarantee	loan guarantee / equity	guarantee top 3 / total guarantee
1995	50.7	48.3	95 %	84 %
1996	62.9	35.2	56 %	86 %
1998	70.5	33.1	47 %	83 %

Source: Reconstructed from Lee (1998)

Given that the top 3 firms in each chaebol represent the bulk of corporate loan guarantee, the term "mutual" loan guarantee does not properly represent the practice of the corporate loan guarantees in Korea. Rather, the practice of corporate loan guarantees in Korea are mostly one sided in that the top 3 firms in each chaebol offer loan guarantee to the affiliated firms unilaterally. In this paper we take note of this point and look closer at the consequences of this one-sided loan guarantee.

2.2 Existing literature on Korean corporate loan guarantee

Regulations on the corporate loan guarantee began as early as 1992 with the Fair Trade Act and has persistently intensified since.[3]In 1997, following the outbreak of the financial crisis, the IMF requested for the reduction of corporate loan guarantees as a condition for providing relief funds to the Korean government. In 1998 further revisions to the Fair Trade Act banned any new corporate loan guarantees and demanded dissolution of all existing loan guarantees by March 31, 2000 amongst the top 30 chaebol groups. Despite these policy measures, the controversy surrounding corporate loan guarantees continuous to be as heated as ever.

Table 2 above summarizes the arguments for and against regulations on corporate loan guarantees. Those for regulations argue that corporate

[3]The Regulation on Monopoly and Fair Trade Act (The Fair Trade Act hereafter) was enacted in 1980 primarily to tackle problems of economic concentration amongst the chaebol. The Fair Trade Commission selects on an annual basis the top 30 chaebols, based on the size of their assets, as its main target of regulation.

Table 2: Arguments for and against regulations on corporate loan guarantees

Arguments for	Arguments against
1. bank loans are monopolized by chaebols	1. private, voluntary contracts
2. inefficient protection against withdrawal from the market	2. signalling function
3. adherence to existing corporate management structures	3. need for non-competitive finance

loan guarantees aggravate economic concentration, that the loan guarantees strengthen the links between affiliates and thus protects even weak firms from market discipline, and that the loan guarantee empowers the corporate leaders to govern the entire group of firms. These arguments do not, however, identify whether the above problems are originally due to the loan guarantees or due to more fundamental defects.

In Korea, loan guarantees became inefficient partly due to the government's intervention. Without the government's implicit support for financially distressed firms and banks, the guarantor firms would face weaker incentives to engage in loan guarantee contracts and the banks would not trust loan guarantees made by a weak guarantor firm. The government therefore acted as an additional element affecting the credibility and hence the endorsement of a loan guarantee. But this often led to inefficient loan allocation. If outside investors are legally well protected and markets for corporate management are properly developed, such inefficient loan guarantee

contracts are less likely to be struck. Weaknesses in the corporate governance structure, deficiencies in the financial sectors, and the government's interferences in the private financial contracts, are the original sources of problems that lead to the abuse of loan guarantee contracts, excess borrowing, and over-investment.

Those against regulations argue that the interference and banning of private free contracts is a violation of basic constitutional rights. Furthermore, as will be shown in this paper, it is argued that loan guarantees may function as a useful signalling device under information asymmetry. Some also add that loan guarantee contracts are financial in nature, and thus should not be regulated by trade laws.

These arguments, however, overlook the fact that in reality distortions in the price or fee for loan guarantee do exist. For example, consider a chaebol group leader who has a bigger proportion of shares and interests in the borrowing firm than in the guarantor firm. He then faces distorted incentive to offer a loan guarantee at a minimal fee, an example of the well-known transfer pricing which leads to inefficient loan guarantee contracts. We shall address this issue further in section 5.

It is difficult to find direct empirical evidences about the negative effects of corporate loan guarantees. However, some indirect evidences may be traced in the literature. Lee and Lee (1998) has shown that after controlling for such variables as firm size, growth rates, fixed assets, profitability,

industry efficiency, and other factors that are considered to affect the debt structure, big corporations tend to have larger debt-equity ratios. On the other hand, Lee (1998) tried to study whether debt-guarantees between affiliate firms cause the debt-equity ratio to rise using panel data of 26 out of the top 30 chaebols. According to him, corporate loan guarantees tends to raise the debt-equity ratio, after controlling for such variables as growth and profit potential, fixed asset ratio, firm size, cooperative tax burden, and others. Inferring from these two studies, one can draw a hint that corporate loan guarantees within chaebol affiliated firms have brought about excess debt and over-investment.

We now presents the basic model where the effects of corporate loan guarantees are neither positive nor negative. The model will provide the building blocks needed later when we look into two other variations of the model to explain the economic nature and consequences of corporate loan guarantees.

3 The basic model

Private loan guarantee contracts involve three different economic agents: the guarantor firms, the borrowing firms, and the lending banks. Borrowing firms secure loans from banks at a lower interest rate when backed by loan guarantee contracts. Guarantor firms are willing to sign a loan guarantee contract if they receive enough compensation from the borrowing firm in

the form of a guarantee fee. Banks face a smaller chance of default on loans made to the borrowing firms when there are loan payment guarantees by the guarantor firms.

We develop a basic model here and establish the neutrality of a loan guarantee contract under a set of ideal conditions. We then analyze the malfunctions and functions of the loan guarantees by changing the assumptions of the basic model in later sections. A two period model is used with the earnings structure in our model similar to that in Holmstrom and Tirole (1997). Let us introduce the assumptions.

Assumption 1: *(borrowing firm's investment)* The borrowing firm needs 1 unit of money to carry out an investment project. There is uncertainty in earnings following this investment. Return on a successful investment is R^b while a failure gives 0 returns. The probability of success is p^b, where $0 < p^b < 1$. It is verifiable *ex post* whether or not the investment project has been successful.

Assumption 2: *(guarantor firm's investment)* The guarantor firm also needs 1 unit of money to finance its own investment project. The investment generates an uncertain return in the second period. If the project is successful, it generates a return of R^g. Otherwise, it generates a return of 0. The success probability is p^g, where $0 < p^g < 1$. We further assume that $p^g R^g \geq 2$ is satisfied. That is, the expected return of the guarantor firm's

investment is at least as large as the cost of the guarantor firm and the cost of the borrowing firm combined. Also, it is verifiable *ex post* whether or not the investment project has been successful. The probability of success or failure of the guarantor firm's project is assumed to be independent of the outcome of the borrowing firm's project.

Assumption 3: *(return on alternative assets)* The rate of net return on alternative investments is exogenously determined. For convenience, this is set at 0. Thus, the total rate of return on alternative investments remains at 1.

Assumption 4: *(risk attitude)* Borrowing firms, guarantor firms, and lending banks are all assumed to be risk-neutral.

In the above, with $p^g R^g \geq 2$, the expected return from the guarantor firm's investment is assumed to be sufficient to cover the guarantor firm's debts as well as the loans made to the borrowing firm. We later consider the case when this assumption is relaxed.

The probability that the bank recovers its loan made to the borrowing firm increases from p^b to $p^b+(1-p^b)p^g$ when the loan is backed by a guarantor firm. The bank therefore has an incentive to reduce the interest rate on loans to the borrowing firm due to decreased default risk. In equilibrium, the bank earns zero economic profits, implying that the total amount payable by the borrowing firm drops from $C = \frac{1}{p^b}$ to $c = \frac{1}{p^b+(1-p^b)p^g}$. That is, the

equilibrium interest rate falls from $\frac{1}{p^b-1}$ to $\frac{1}{p^b+(1-p^b)p^g}-1$ in the presence of a loan guarantee contract.

We further assume that the guarantor firm receives a guarantee fee from the borrowing firm in the form of profit-sharing; the guarantee fee being a fixed proportion α of the borrowing firm's profit, where $0 < \alpha < 1$. This fee α is like an option fee on an option of corporate loan guarantee. In the case when there does not exist any agency problems,[4] the guarantor firm faces an incentive to sign a guarantee contract if the expected profit $\alpha p^b(R^b - c)$ is equal to or larger than the expected guarantee cost $(1 - p^b)p^g c$. That is, the following restriction on α should be satisfied:

$$\alpha \geq \frac{(1 - p^b)p^g c}{p^b(R^b - c)} \tag{1}$$

In addition, for there to be incentive to receive the loan guarantee, a borrowing firm will agree to the contract if expected income by engaging in the contract $(1 - \alpha)p^b(R^b - c)$ is bigger than or equal to expected income when there is no guarantee contract $p^b(R^b - C)$. Therefore, from the point of view of the borrowing firm, must satisfy the following inequality:

$$\alpha \leq \frac{(1 - p^b)p^g c}{p^b(R^b - c)} \tag{2}$$

Thus, with 1) and 2) satisfied, the guarantor and borrowing firms should

[4]Later in section 5, we consider the case when there are agency problems within the guarantor firm.

voluntarily settle at a loan guarantee fee α of $\frac{(1-p^b)p^g c}{p^b(R^b-c)}$. This equilibrium value of α is uniquely determined because of the following reasons. First, both p^b and p^g are common knowledge to the borrowing firm, guarantor firm and the bank, and hence asymmetric information does not exist. Second, all economic agents here are assumed risk-neutral. Third, perfect competition in financial markets prevail. Under perfect competition, information symmetry, and risk neutrality, the equilibrium option fee $\alpha$is determined as a knife-edge solution because the loan guarantee contract cannot create any new economic value. Differently put, this is a zero-sum game and thus the core of the game is a singleton.

Let's think about the case when corporate loan guarantees in fact have benefits and thus the core indeed exists as a region. If there is information asymmetry between the bank and guarantor firm about the profitability of the project to be undertaken by the borrowing firm then the loan guarantee contract may function as a signaling mechanism. This case is further analyzed in section 6. It should be clear that if the economic agent's attitudes toward risk are different, endorsements of loan guarantee will create risk-sharing and/or risk-exchange, and will therefore generate benefits. Finally, if financial markets are not competitive, the guarantee fee will not be determined uniquely. We shall not tackle these issues here as they are beyond the scope of this paper.

proposition 1 *When assumptions 1 through 4 are satisfied, investment*

projects with negative expected value will not be backed by a loan guarantee contract. On the other hand, investment projects with an expected positive economic value will be carried out whether or not they are backed by loan guarantee contracts (proof in Appendix).

Proposition 1 implies that when the assumptions of the basic model are satisfied, corporate loan guarantee contracts are neutral. Voluntary loan guarantee contracts do not cause inefficiencies in investments. This is because, in the context of a zero sum game, there are no economic agents who are willing to take the burden of any negative net return on a project. Furthermore, loan guarantee contracts do not enhance or diminish the efficiency of an investment. Hence, the neutrality of corporate loan guarantees is established.

But why did Korean banks prefer to make loans backed by a guarantee? In equilibrium, the borrowing firm is indifferent to the presence or absence of a loan guarantee contract. The guarantor firm is neutral too. However, when there is an interest rate cap regulation, we see that the bank may prefer a loan guarantee contract. For example, if the interest rate cap lies between $\frac{1}{p^b+(1-p^b)p^g} - 1$ and $\frac{1}{p^b} - 1$. then the bank will prefer a guaranteed loan to a loan without guarantee. This is because the bank cannot charge an interest of $\frac{1}{p^b} - 1$ which the bank needs to break even under the absence of loan guarantees. Considering that the Korean government practiced interest rate cap policies in the past, it is understandable why banks often favored

to make loans that were guaranteed than those that were not guaranteed.

4 Relationship between investments by guarantor and borrowing firms

The model presented thus far assumes independence between the outcome of investments made by the guarantor and borrowing firms. It is interesting to ask, however, what the consequences will be if both events are not independent. To answer this question we modify assumption 2 as assumption 2', while retaining the other assumptions of the basic model.

Assumption 2': *(guarantor firm's investment)* The guarantor firm again needs 1 unit of money to finance its own investment project, We assume that this is also supplied through bank loan. The investment generates an uncertain return in the second period. If the project is successful, it generates a return of R^g. Otherwise, it generates a return of 0. The success probability is p^g, where $0 < p^g < 1$. We further assume that $p^g R^g \geq 2$ is satisfied. Now, we assume that the outcome of the guarantor firm's project and the borrowing firm's project are not necessarily independent.

To denote the dependence, we set the joint success probability of the two investments as p^{gb}. Recall the outcomes of investment of the guarantor and borrowing firms were assumed to be independent previously, in assumption 2. With independence, we have $p^{gb} = p^g p^b$. Assuming away independence gives $p^{gb} \neq p^g p^b$. When the borrowing firm secures a loan guarantee, there

is an increased chance that the bank will have the loan repaid. Specifically, the probability of the bank receiving back the loan increases from p^b when there is no loan guarantee to $p^b + (p^g - p^{gb})$ when the loan is backed by a loan guarantee. Furthermore, since the bank earns zero profit in equilibrium, the cost of the borrowing falls from $C = \frac{1}{p^b}$ to $c' = \frac{1}{p^b + (p^g - p^{gb})}$. That is, the interest on loans fall from $\frac{1}{p^b} - 1$ to $\frac{1}{p^b + (1-p^b)p^g} - 1$.

On the other side, assuming that the borrowing firm agrees to pay a guarantee fee of a fixed proportion α, where $0 < \alpha < 1$, of the borrowing firm's profits, the guarantor firm will have incentive to sign the loan guarantee contract if the expected profit $\alpha p^b(R^b - c')$ is equal to or larger than the cost of the loan guarantee $(p^g - p^{gb})c'$, assuming that there does not exist any agency problems. That is, the following restriction on should be satisfied:

$$\alpha \geq \frac{(1 - p^b)p^g c'}{p^b(R^b - c')} \tag{1'}$$

On the other hand, for there to be incentive to receive guaranteed loans, a borrowing firm will sign the contract if expected income by engaging in the contract $(1 - \alpha)p^b(R^b - c')$ is bigger than or at least equal to the expected income when there is no loan guarantee contract $p^b(R^b - C)$. Therefore α must satisfy the following inequality:

$$\alpha \leq \frac{(1 - p^b)p^g c'}{p^b(R^b - c')} \tag{2'}$$

Thus, with 1') and 2') satisfied, we learn that the guarantor and borrowing firms should voluntarily settle at an option fee α of $\frac{(1-p^b)p^g c'}{p^b(R^b-c')}$. This is again uniquely determined in equilibrium because of common knowledge, risk-neutral behavior, and perfect competition in financial markets.

proposition 1': *When assumptions 1, 2',3 and 4 are satisfied, investment projects with a negative expected value will not be backed by a loan guarantee contract. On the other hand, investment projects with a positive economic value would be carried out whether or not they are backed by loan guarantee contracts. (proof, which is similar to that for proposition 1, is in Appendix).*

Proposition 1' implies that even when the investment outcomes are not independent the basic model suggests that corporate loan guarantee contracts are neutral. However, the guarantee fee may be higher or lower than the guarantee fee depicted in the basic model depending on the direction in which the two events are correlated to each other. We can easily verify that when the success events of the two projects are positively correlated, thus $p^{gb} > p^g p^b$ holds, then loan guarantee fees decrease. This is because in the case when the borrowing firm's investment project fails, the possibility of failure of the guarantor firm's investment project also increases. Of course, the banks protect themselves by raising the equilibrium interest rate on guaranteed loans.

On the contrary, when the success events of the two investment projects

are negatively correlated, thus $p^{gb} < p^g p^b$ holds, the equilibrium interest rate on guaranteed loans decreases and the loan guarantee fee increases. This is because, when the borrowing firm's investment project fails, the probability of the guarantor firm's success rises, and consequently the equilibrium interest rate on guaranteed loan should decrease and the equilibrium guarantee fee should increase.

We have seen that loan guarantee contracts are neutral and this important result of our basic model is not affected by the dependency of the guarantor and borrowing firms' investment projects. It follows that without any loss of generality, or at least for convenience sake, we may assume that the success probabilities of the two projects are independent of each other. We will therefore maintain assumption 2 rather than 2' in the sequel.

5 Malfunctioning of corporate loan guarantee

The basic model shows that corporate loan guarantees on their own are neutral and harmless. Then, one may ask why corporate loan guarantees have become synonymous with inefficiencies in Korea's financial markets. What are the main factors causing differences between the basic model and the real world? First, there exist weaknesses in corporate governance structures in reality. If the guarantor firm adequately protects its outside investors, it may demand an appropriate option fee. Thus, an inefficient investment project which cannot meet this fee will not be able to secure a loan guarantee

contract and thus will not be implemented.

Second, we can think of the widespread circular financing among the Korean chaebol affiliates. The executives of a chaebol through circular financing control the decision making process of its affiliate firms. This may result in socially inefficient choices, which are only profitable to the internal executive personnel at the expense of outside shareholders. It has often been voiced that contracting between two affiliate firms within a chaebol has been made through socially inefficient loan guarantee contracts. Recently, the Korean government has mandated that the chaebols dissolve the planning and coordinating offices (alternatively termed as executive office or restructuring centers) that are instrumental in the control of affiliated firms.

Third, the Korean government has often intervened to rescue failing firms and banks. Implicit governmental support during the event of financial distress encourages private agents to overestimate the value of a loan guarantee, which leads to distortions in loan guarantee contract and to overinvestment. What is known as the "too big to fail" legacy places large firms like the chaebol outside the control of market discipline. In the past, when chaebols and their affiliates faced the possibility of bankruptcy, the Korean government often bailed them out by providing some form of financial relief.

Fourth, there may be deficiency in the loan assessment and monitoring capacity of banks.[5] If the bank's loan assessment and monitoring capacity

[5]Refer to Lee (1996). Those that emphasize this point tend to argue that regulation on loan guarantees should not apply to the firms but to financial institutions.

functions properly, the bank will then take into account the default risk on loans and charge an appropriate interest rate premium. Then, there will be no particular reason for the bank to prefer lending through a guaranteed loan if banks maintain their right to decide freely the interest rate to be charged based on the credibility of the borrowing firm. This is true even if banks may suffer from deficient information producing capacity.

We continue our analysis by varying some of the assumptions of the basic model and investigate into the distortions and inefficiencies associated with corporate loan guarantees. The fourth reason for distortion is obvious and we shall not analyse this separately. We focus on the first three causes for distortion in the rest of this section.

5.1 The agency problem and over-investment

Agency problems may arise when the group executive simultaneously participates in the management decision making process of both the guarantor firm and the borrowing firm. In Korea, through debt guarantees, circular share holdings, and stock pyramids, the corporate executive usually involves in the management of both the borrowing firm and the guarantor firm giving rise to incentive distortions, which may lead to over-investment.

Proposition 1 tells that distortions leading to excessive loan guarantees arise when a loan guarantee contract is effected without the equilibrium conditions 1) and 2) being satisfied thereby resulting in a distorted guarantee fee . This distortion is possible when agency problems in the guarantor firm

exist. For example, agency problems arise when the managers take a larger share of the benefits from the loan guarantee with respect to their invested share (manager's stock value/total stock value), that is, in the case when benefits are not shared according to the proportion of shares held.

This kind of principal-agent problem can occur when the guarantor firm and the borrowing firm belong to the same corporation or business group under a single owner that runs both firms. In the case of the Korean chaebol, the owner family is usually the ultimate decision maker of the affiliate firms. It is quite often that the owner will draw personal benefits as a compensation for endorsing loan guarantees, and this then may lead to incentive distortions that may cause over-investment. To investigate into agency problems of the guarantor firm, we introduce assumption 5.

Assumption 5: *(presence of agency problem in guarantor firm)* The borrowing firm does not face any agency problem but the guarantor firm does. The cost of loan guarantee contracts is borne by both insiders (management shareholders) and outside investors in the guarantor firm in proportion to their shares held, but the benefits from the loan guarantees are enjoyed more than proportionately by the management of the guarantor firm.

Following assumption 5, we consider how the incentive for the guarantor firm to offer a guarantee contract will become affected. Now, when deciding whether to offer a loan guarantee, the management of the guarantor

firm will consider private gains as well as the benefits it may receive as a stockholder, potentially creating an incentive gap between the management and the outside shareholders. Consider the case when the borrowing firm's investment project satisfies $c < R^b < C$. Then the investment is inefficient since $R^b < C$ and $p^b R^b < 1$ are equivalent.

Without agency problems, proposition 1 shows that inefficient investment projects will not be implemented. This is because the equilibrium option fee α^* exceeds 1 if the investment project is inefficient. With agency problems as stated in assumption 5, conflict of interests arise between the outside shareholders and the inside corporate management in the guarantor firm, which may lead to the guaranteeing of inefficient investment projects thereby resulting in excess debt and over-investment.

The primary reason for this inefficiency is that the guarantor firm's management does not have 100 per cent stake and thus in the event of a loss the burden is shared together with other investors in proportion to shares held, while in the event of a success, the management appropriates a larger proportion of the benefits. This type of agency problem aggravates and becomes more pronounced as the management holds a smaller proportion of the total shares and as the outside investors are less adequately protected in the legal sense. [6] Proposition 2 summarizes this argument.

[6] Here, legal protection of outside investors' rights includes legal measures as well as the effectiveness of these measures; and include such issues as whether mail votes are admitted at shareholders meetings; and whether cumulative voting rights of the election of board members is practised. La Porta *et al.* (1998) reports that when external shareholders are

proposition 2 *When assumptions 1 to 5 are satisfied:*

2.1 Inefficient investment projects may be implemented through a loan guarantee contract which is formed by the initiative of the guarantor firm's internal management at the sacrifice of the guarantor firm's outside investors.

2.2 The possibility of inefficient loan guarantee contracts decreases with an increase of the internal management share-holding in the guarantor firm and with the strength of legal protection for outside investors in the guarantor firm.

The above proposition allows for the possibility of social inefficiencies through loan guarantee contracts when there exists agency problems within the guarantor firm. The smaller the agency problem, the less the possibility of inefficiency.

5.2 Circular financing among corporate affiliates and over-investment

At present, circular financing among Korean chaebol affiliates remains widespread. The model in this paper however only assumes two firms in a group. Thus, in this paper, we re-interpret circular financing as mutual financing.[7]

less protected legally, then the controlling shareholders tend to hold a higher proportion of the total shares on average. This is because the larger the proportion of shares held by the controlling shareholder, the more incentive they have to monitor the activities of the management. The high proportion of the controlling shares becomes an alternative way to solving the agency problem, thereby compensating for any inadequate legal protection of external investors.

[7] In reality, mutual financing in the form of mutual share-holding is prohibited.

Assumption 6: *(mutual financing between guarantor and borrowing firms)* The management of the guarantor firm holds a proportion β^g $(0 < \beta^g < 1)$ of the guarantor firm's total shares and at the same time holds another proportion β^b $(0 < \beta^b < 1)$ of shares of the borrowing firm. We further assume $\beta^b > \beta^g$, that is, the proportion of shares held of the borrowing firm is greater than that of the guarantor firm.

We have already mentioned that circular financing is common among Korean conglomerates. Here, we examine the case when ownership is higher in the borrowing firm than the guarantor firm. Generally, a larger amount of equity money is required to obtain a substantial share of larger firms than the amount of equity money to obtain the same share of smaller firms. Therefore, it is our conjecture that within chaebol affiliate firms, the proportion of shares held by the owner is larger in smaller firms than in the top 3 leading firms. As shown, the top 3 leading firms act as the guarantor of non-core firms. Therefore, we expect that the owner's share in the borrowing firm tends to be higher than that of the guarantor firm, justifying assumption 6. Also, it is often the case that when core firms build up a new firm, a substantial amount of the shares of the new firm is distributed to the shareholders of the core firm. Therefore, the owner's share in the newly established firms is expected to be comparatively high.

Let us see how the incentive structure changes when we consider assumption 6. In this case, when the guarantor firm considers whether to offer a

loan guarantee it takes into account not only the expected profits from providing the loan guarantee, but also the dividends from the borrowing firm. According to the assumption $\beta^b > \beta^g$, the profitability of the borrowing firm is of greater importance. In this case, it is possible that a loan guarantee is made that is not advantageous to the shareholders in the guarantor firm as a whole but only to the internal decision makers of the guarantor firm. This is the reason why distortion arises through loan guarantee contracts as the guarantor firm and the borrowing firm are intrinsically bound in circular financing. Put differently, circular financing has potential to distort loan guarantees.

proposition 3 *With assumptions 1 to 4 and 6 satisfied, there exists potential for an inefficient loan guarantee contract to become advantageous to the internal shareholders. As the internal shareholders hold relatively more shares of the borrowing firm, then α tends to 0. This although disadvantageous to the external shareholders is advantageous to the internal shareholder. In this manner, a loan guarantee that is socially inefficient may become effected (see proof in the Appendix).*

Intuitively, if the stakes are higher in the borrowing firm than in the guarantor firm, then the loan guarantee fee is likely to be set at a lowest possible rate. This way, the controlling shareholder (most likely, the owner-manager) can benefit despite the sacrifices borne by outside investors. This is an example of the well-known transfer pricing problem in the economics

literature. The result in proposition 3 well explains the Korean chaebol's past behavior that leading firms offer loan guarantee to affiliate firms free of charge.

5.3 Governmental support and over-investment

Assumption 2 of the basic model says that once the guarantor firm succeeds in its investment project, it can pay back its loan as well as the borrowing firm's. Thus, the bank will honor the guarantor firm's loan guarantee.[8] If, however, assumption 2 is not satisfied then the bank will discount the loan guarantee and thus the bank will not supply a loan sorely on the basis of a loan guarantee.

When assumption 2 is not satisfied, the banks will evaluate the success probability of the borrowing firm's investment project, and will offer guaranteed loan only when the success probability is higher than a certain minimum. Denoting p_c^b as this minimum critical value, it is determined from

$$\left(\frac{1}{p^g} + \frac{1}{p_c^b + (1-p_c^b)p^g}\right) = R^g \tag{3}$$

If the probability of success is less than p_c^b the bank will not make a loan regardless of whether it is backed by a loan guarantee or not and thus an inefficient project will not be implemented. On the other hand, if the

[8] Following assumption 2, $R^g > \frac{2}{p^g} \geq \frac{1}{p^g} + \frac{1}{p^b+(1-p^b)p^g}$ for all p^b. Therefore, there is complete confidence even when the probability of success of the borrowing firms investment p^b is low.

success probability is above p_c^b then the assumptions of the basic model are all satisfied. Our basic model does not allow for losses from socially inefficient investments to arise.

Nevertheless, government's support can distort the incentives regarding loan guarantee contracts. In the past, from the point of view of industrial and employment policies, the Korean government often supported guarantor firms when they could not meet the loan guarantee promises and thus when they were at the brink of bankruptcy. Also, the bank and the firms anticipated such action from the government. Then, an efficient project could be implemented backed by loan guarantee and by the government support despite its success probability being lower than p_c^b. To show this, we make assumption 7 below.

Assumption 7: *(government support for the guarantor firm)* The government will step in to relieve any financial distress suffered by a guaranteed debt by providing enough funding to rescue the guarantor firm from bankruptcy. Furthermore, this kind of support is expected by the bank and by the firms.

Under assumption 7, there arises excess guarantee and over-investment. When banks and the firms anticipate this kind of government support, both the bank's and firms' incentive structures become distorted, thereby leading to excess guarantee, excess borrowing, and over-investment. The following

proposition depicts this.

proposition 4 *Assumptions 1 to 4 and 7 are satisfied. Then, even if the borrowing firm's investment is expected to have negative returns, over-investment problems may be realized through inefficient investments induced by loan guarantee contracts. (proof in Appendix).*

The bank's incentives to evaluate loans carefully and to monitor the borrowing firm are weakened by the government's tacit debt guarantee, thereby deepening problems of excess guarantee and over-investment. In particular, the problem is worsened when the guarantor firm believes that the government will rescue the firm unconditionally from any risk of bankruptcy. Of course, in reality, government support is not as simple as described above, but considering that in the past bank losses due to bad loans have been recovered by special financing from the central bank, we find that our model has real life relevance.

When the size of the borrowing firm's investment project is a choice variable, the government's support distorts the borrowing firm's incentive in its choice of the project size as well. The borrowing firm tends to choose a somewhat larger investment project anticipating a bigger amount of the governmental support in the case of financial distresses. In sum, the government's support not only accelerates inefficient guarantee contracts but also has a side effect of increasing the scale of the inefficiencies. First, let us make some assumptions.

Assumption 1': *(borrowing firm's investment)* Let the size of the borrowing firm's investment project be I, and let the return from a successful implementation be $R^b(I)$, which satisfies the conditions below.

$$\frac{dR^b(I)}{dI} > 0, \frac{d^2R^b(I)}{dI^2} < 0, \; R^b(I) > 1 \tag{4}$$

These conditions set the marginal return from investment as positive and displaying diminishing returns. Funds to finance the investment project is 100 per cent borrowed from the bank. A successful project earns a return $R^b(I)$, while a failure earns 0. Regardless of the size of the investment, the probability of success is p^b, where $0 < p^b < 1$. Also, in the event of a successful investment, the return from investment is larger than its cost so that with limited liability the borrowing firm always faces an incentive to execute a proposed investment. The success or failure of the firm can only be verified *ex post*.

Assumption 7': *(guarantor firms and government support)* The government will step in to relief any financial distress suffered by a guaranteed debt by providing some partial funding such as to rescue the guarantor firm from bankruptcy. Again, this kind of support is expected by the bank and by the business firms. Here, we assume that the government's support to the guarantor firm $D(I)$ s in the amount of the guarantor firm's total liability less its income. Thus, the government's support is increasing in the

investment size.

The following proposition explicitly states the effect of the government's support on the size distortion of the borrowing firm's investment project.

proposition 5 *Suppose assumptions 1', 2 through 4, and 7' are satisfied. Let $D(I)$ be the amount of support for the guarantor firm by the government. Suppose that the government's support occurs only when the borrowing firm's investment project fails while the guarantor firm's project succeeds. Then, the borrowing firm's investment project is chosen to be larger in size than the socially optimal one.*

Through the above analysis, we have shown that the primary causes for the problems of excess guarantee and over-investment are the weak corporate governance structure, governmental support to failing firms and the consequent distortions in the incentive structure of the firms and banks. Due to distortions in the incentive structures, the guarantor firm will ask for lower compensation for loan guarantees and the bank tends to over-value the loan guarantee. In this case, even if the borrowing firm's investment project has an expected negative return, the loan guarantee contract can be struck. The governmental support has an additional defect in that it encourages a larger investment project to be chosen - that is, larger than that which is socially optimal.

The root of over-investment problems is not because loan guarantee con-

tracts are not banned but because there are incentive distortions which prohibit an appropriate guarantee compensation and a proper evaluation of the value of the loan guarantee. Once these defects are removed or remedied, the loan guarantee contracts in fact have potential to increase social efficiency. We will study this positive side of the loan guarantee contract under information asymmetry.

6 Loan guarantee contracts as a signalling device

Now let us introduce two types of investment projects on the part of the borrowing firm, each having different success probabilities. If the project is of a good type, which we denote as type A and has a success probability p_A, whereas the success probability for a bad type, or type B is denoted p_B: (note: $0 < p_B < p_A < 1$)

We assume that there is information asymmetry between the bank and the firms as regards who knows the type of the borrowing firm's investment project. Specifically, both the borrowing firm and the guarantor firm know the type of investment project to be undertaken by the borrowing firm, whereas the bank does not. We will now show how the loan guarantee contract can function as a signalling device for the type of the investment project.[9] Let us replace assumption 1 and 1' of the basic model with the following assumptions 1^* and $1'^*$ respectively. In addition, we further introduce

[9]See Freixas and Rochet (1997) Chapter 4 Section 6 and Chapter 5 Section 4 on collateral as a signaling device.

assumption 8.

Assumption 1^***:** *(borrowing firm's investment project)* The borrowing firm's investment project requires one unit of money to be implemented. The money will be procured 100 per cent in the form of bank loans. Return on investment is uncertain. If successful, the return is R^b, and if not, it is 0. The probability of success depends on the type of the investment project. It can be verified whether or not the investment project has been successful *ex post*.

Assumption $1'^*$**:** *(income from successful investment projects)* (1) The borrowing firm's revenue from a successful investment project, R^b, satisfies the following inequality (these inequalities are needed to prove the existence of a separating equilibrium):

$$\begin{gathered} p_B < p_A \\ \frac{1}{p_A} < R^b < \left(\frac{1+(1-p_B)p^g}{p_A+(1-p_A)p^g}\right)\frac{1}{p_B} \end{gathered} \tag{5}$$

(2) The guarantor firm can always pay back its debt as well as the guaranteed firm's debt to the bank if its investment project is successful, that is, we assume [10]

$$\begin{gathered} R^g > \frac{1}{p^g} + \frac{1}{p^b+(1-p^b)p^g}, \\ where p^b = p_A, or p^b = p_B \end{gathered} \tag{6}$$

[10]Note that a sufficient condition for inequality 6) to be satisfied is $R^g > \frac{2}{p^g}$

Assumption 8: *(information asymmetry)* The borrowing firm's investment type is known to the borrowing firm and the guarantor firm but not to the bank, thereby giving rise to an information asymmetry. The bank only has an a priori belief about the type of investment. The bank believes that the project is of a good type with probability π_A, and of a bad type with probabilityπ_B, where $0 < \pi_A,\ \pi_B < 1$ and $/pi_A + /pi_B = 1$.

If information needed to distinguish between a good type and a bad type is not available, the bank will set the probability of a success for the loan it offers to the borrowing firm at . The next proposition shows the potential for loan guarantees to function as a signalling device and thereby has capacity to solve the information asymmetry problem.

proposition 6 *Under assumptions* 1^*, $1'^*$, *and 2 through 4, and 8, there exists a separating equilibrium: (1) The guarantor firm is willing to sign the loan guarantee contract if the investment project of the borrowing firm is of type A, whereas the guarantor firm is not willing to sign the contract if it is of type B. (2) The bank will know that the borrowing firm's investment project which secure loan guarantees is of a good type and the bank will set a lower interest rate to loans made to such projects. (3) The borrowing firm with an investment project of a good type will enter into a loan guarantee contract, while the borrowing firm with an investment project of a bad type will not enter into a loan guarantee contract.*

Consequently, type A project will secure a loan guarantee with pref-

erential treatment that borrows at $\frac{1}{p_A+(1-p_A)p^g} - 1$. On the other hand, when the guarantee contract does not exist at all, the interest rate will be set uniformly at $\frac{1}{\pi_A p_A+\pi_B p_B} - 1$ irrespective of the project type. Then, the kind of borrowing to be backed by a loan guarantee will satisfy the following inequality for α:

$$(1-\alpha)p_A(R^b - \frac{1}{p_A+(1-p_A)p^g}) \geq p_A(R^b - \frac{1}{\pi_A p_A+\pi_B p_B}) \qquad (2'')$$

On the other hand, when the guarantor firm knows the type of the project of the borrowing firm and if the borrowing firm is of type A then a loan contract will be effected with α lying within the following range:

$$(1-p_A)p^g \frac{1}{p_A+(1-p_A)p^g} \leq p_A(R^b - \frac{1}{p_A+(1-p_A)p^g}) \qquad (1'')$$

If $\pi_A = 1$, then we find that the guarantee fee α satisfying both equations 1)" 2)" is $\alpha = \frac{(1-p_A)p^g c_A}{p_A(R^b-c_A)}$ (with $c_A = \frac{1}{p_A+(1-p_A)p^g}$.) The proof is similar to that in section 3 when equations 1) and 2) were considered.

Now consider the case when $\pi_A < 1$. Assume that the guarantor firm knows that the borrowing firm's project is of type A, but the bank does not. That is, there is information asymmetry between the guarantor firm and the bank. then the loan guarantee of the guarantor firm will perform two economic roles. First, from the point of view of the bank the success probability of a borrowing firm's investment increase from $/pi_A p_A + /pi_B p_B$

to p_A. This is because loan guarantees are only acquired by borrowing firms having type A projects. Specifically, loan guarantees become a signalling mechanism upon which banks can differentiate between the different types of borrowing firms. Second, the probability of repayment increases from p_A to $p_A + (1 - p_A)p^g$.

Between the two effects, the latter is related to the distribution of profit between the borrowing firm and guarantor firm, and does not contribute to creating a net social value. The former acts as a signalling mechanism and helps create social value. Due to the signalling effect, the maximum fee α that the borrowing firm is willing to pay will become larger than the minimum fee α that the guarantor firm demands. Hence, there exists a range of fee α that will establish a loan guarantee contract whereby the guarantor firm and borrowing firm may benefit.

If there are no loan guarantee contracts, and when type A cannot be differentiated from type B, there will be no investment made at all. This is an inefficient outcome since type A's investment project has a positive expected value. To sum, without a loan guarantee contract, it will not be possible to distinguish between good projects and bad ones when there is information asymmetry. If that is the case, either both projects are implemented or neither project is implemented, and consequently, social inefficiency arises in either case. Given information asymmetry between the bank and the firms, the loan guarantee contracts function as a credible signalling device

and therefore improve social efficiency: good projects are distinguished from the bad ones and only the good ones are funded.

7 Policy implications and concluding remarks

It has been confirmed by the above discussions that investments backed by loan guarantees may lead to the implementation of socially inefficient projects and over-investment, particularly when the fees and the value of a loan guarantee are not properly determined ie. when the incentive system is distorted. Furthermore, it has been made clear that if the causes distorting incentives are removed or controlled, a loan guarantee by itself would function well as a signal transmission mechanism under information asymmetry. Then, what should be done in order to control the causes distorting the incentive system to allow loan guarantees to function properly? This concluding section discusses the policy implications following the above analysis.

7.1 Corporate governance reform

The governance systems of big firms in Korea, especially in large chaebols, which were the principal targets of regulating loan guarantees have been extremely frail relative to corporate governance systems in advanced countries. Above all, there have been hardly any mechanisms through which managers pursuing their own private interests at the expense of the interests of outside

investors could be removed.[11] By means of cross investment among affiliate companies attached to chaebols, the executives (usually the founders and their immediate families) usually exercised substantial control of much more shares than they themselves had invested. Thus, the development of the discipline of corporate governance market particularly by M&A was not effective.

It was not until the IMF assistance and recommendations following the recent economic crisis of 1997, that restructuring began. Legal devices for the protection of external investors had been poor, and there had been little interest in this issue at any rate. For instance, the conditions of exercising minority shareholders rights were set up in favor of the managers, and there were no devices in place to protect the rights of minority shareholders such as cumulative voting or collective suit. Furthermore, the shares of internal management were usually not large enough to compensate for the weaknesses in legal protection. Table 3 below shows that when the shares by circular investment is excluded, the shares of the business leaders and their relatives constitute only a mere 10 per cent or less.

To contrast, Table 4 below indicates the comparison by nations of the average share of the top 3 shareholders of the top 10 private firms. The ratio for Korea is not that high compared with the advanced countries where

[11] Details concerning the weaknesses of Korean firms' management structure can be found in Chung (1998).

Table 3: Ownership structure of Large Corporations

	share of family executive (A)	share of affiliate firms (B)	Total internal share (A+B)
Average 1-5 firms	0.082	0.936	0.478
Average of top 30 firms	0.103	0.338	0.441

Source: The Fair Trade Commission, reconstruction from Lee (1998)

external investors have been well protected.[12] It follows from this that the agency problem in Korea should be rather serious among the biggest chaebols.

Table 5 shows the level of development of external capital markets in 1996. Korea has a low value of capital market value to sales ratio, and a high value of debt to sales ratio. The proportion of internationally listed companies to domestic listed companies is very low. This supports the argument that the weak corporate governance system has prohibited the development of external capital markets.

Korea is currently making reform efforts to remedy many of the existing problems in her corporate governance systems. Several measures have been introduced: setting up of institutions to supervise the managers, and the practice of cumulative voting to strengthen the rights of minority shareholders. Collective suits have also become more widespread.[13] It is expected that all the above would help external investors to hold in check any arbi-

[12]This criterion can underestimate the concentration rate of ownership of Korea and Japan. This is because this criterion does not consider the possibility of close connections between the principal owner and other owners within these two countries.

[13]See Hankook Il-bo (a Korean daily newspaper), December, the 7th, 1998.

Table 4: Average and median combined share of the top 3 shareholders, top 10 private firms

Country	Average	Median
Hong Kong	0.54	0.54
Malaysia	0.54	0.52
England	0.19	0.15
U.S.A	0.20	0.12
Average 18 Anglophone Cs.	0.43	0.42
Mexico	0.64	0.67
Philippine	0.57	0.51
Average 18 Francophone Cs.	0.54	0.55
Germany	0.48	0.50
Japan	0.18	0.13
Korea	**0.23**	**0.20**
Taiwan	0.18	0.14
Average 6 Germanic Cs.	0.34 0.34	0.33 0.33
Average 4 Scandinavian Cs.	0.37 0.37	0.33 0.33
Sample Average 49Cs	0.46	0.45

Source: La Porta *et al.* (1998)

trary managerial decisions thereby encouraging the development of external capital markets. Furthermore, we may appreciate the introduction of international accounting standards to promote the transparency of the firms' accounting systems, and the obligatory execution of consolidated financial statements to better reveal the exact financial state of the various affiliated firms amongst the chaebols.

It is stipulated that the holding company should own 50 per cent of subsidiary shares for its foundation and this may allow for the possibility

Table 5: Development of external capital markets

Country	Stock Market capitalization / sales	Stock Market capitalization / cash flow	total debt / sales	total debt / cash flow	listed worldwide / listed domestic
Hong Kong	0.66	4.01	0.31	2.50	0.12
Malaysia	1.46	6.82	0.24	1.45	0.23
Mexico	0.47	4.06	0.66	1.54	0.29
Philippines	1.61	5.17	0.29	0.86	0.14
Japan	0.63	13.80	0.34	6.99	0.50
Korea	**0.29**	-	**0.58**	-	0.09
Taiwan	2.21	14.94	0.26	2.16	0.20
Sweden	0.40	3.10	0.21	1.59	0.82
Average (38 Cs)	0.58	4.77	0.27	2.24	0.28

Source: La Porta *et al.* (1997)

that the manager of the holding company impinges upon the property rights of subsidiary's external investors.[14] Therefore, the condition for creating a holding company should be strengthened, as in the US., where holding companies are allowed to be founded only if they own 100 per cent shares of subsidiaries. Furthermore, instead of the existing stipulation which states that in the case where the total amount of guarantee is over 30 per cent of owned capital, approval must be granted by other shareholders, this 30 per cent upper line should be lowered so as to better protect external investors' interests at least in the transitional stage when corporate governance sys-

[14]The holding company system was traditionally not allowed in Korea and was only introduced recently in the Fair Trade Act (1998). But companies as groups have yet to satisfy some very restrictive conditions for eligibility. First, their debt/equity ratios must be lower than 100 per cent for the entire group of companies. Second, cross-debt guarantees must be eliminated. Third, the holding company must hold more than 50 per cent of stocks of subsidiary companies. Fourth, no grandson companies are allowed in related business areas. Finally, the joint holding of financial and non-financial firms is prohibited.

tems are being established.[15] We think that if these policies are established, the problem associated with excess guarantee would be solved without necessarily prohibiting guarantees.

7.2 Reform of banks' ownership and governance structure

Besides corporate governance, another cause of excess guarantee and overinvestment is the weakness of the banks' information producing capacity. During 1960's and 1970's, the period of Korea's rapid economic development, private banks became accustomed to policy driven financing which restrained the development of important functions such as loan assessment and monitoring. The extent of this problem can be seen in that even after the 1980's when privatization and liberalization began, the banks could not perform their essential role as financial intermediaries (in particular, the information producing function) and were confined to the so-called official financing. Until at least the outbreak of the recent economic crisis of 1997, although the share of private majority shareholders had been increasing, the economic environment was not appropriate to accommodate the banks' autonomous role.

Despite that regulation on interest rates have continuously been reduced, the government's intervention, tangible and intangible, still dominates the allocation of loans to the big corporations. As a result, the banks still have little incentive to invest in information producing capacity. This distortion

[15] Refer to Lee (1998).

has made banks concentrate on securities or loan guarantees, instead of aiming towards lessening the risk of a loan by enhancing their information producing activities such as screening and supervising the loans made.[16]

In order to solve these problems, we need to reform the ownership and governance structure through actual privatization of banks while giving them full autonomy. The public ownership of financial sectors cannot be justified.

Another reason for privatization results from the fact that the government's arbitrary intervention in the process of loan allocation and selection of bank managers should be brought to a halt in order to correct the out-of-date financing practices. As is generally known, it was external pressure such as politicians lobbying in loan allocation that brought about insolvent lending scandals, for example, the Hanbo scandal. Private majority shareholders care more about the profitability of banks than the government bureaucrats. The more the concern with profitability, the more incentive the banks will have to invest in loan examination and supervision capacity for the effective operation of their funds.

After having considered the above, we must mitigate upper line regulation of sole ownership of bank shares, and instead, more flexible regulation

[16]Unlike the model above, assume that the manager pursues activities that increase his personal benefit, that this decreases the success probability of a project, and that the bank can restrain this by supervising activities over operation of loans. Then, even in this case, supervising costs are usually higher than the benefits resulting from the lessened risk of loans, and hence banks would be more willing to lessen the risk of loans by loan guarantees rather than through active screening.

may be necessary such as obligation stipulation of prior approval of bank share in excess of a definite value.[17] Some worry that, in this case, the bank fund's appropriation problem might occur because corporate managers from non-financial sectors may emerge as the major shareholders of banks. Nonetheless, as has been mentioned earlier, if the corporate governance structure is reformed so as to control the arbitrariness of corporate executives, and banks are reformed so as to effectively protect the interests of external investors then this particular anxiety will become redundant.

We propose as a concrete prescription that, in the case of share acquisition in excess of a definite line, prior approval should be imposed considering the possibility of the concentration of economic power, and that prudential regulations should be strengthened over the operation of a bank's assets. Furthermore, the bank's internal supervising structure should be strengthened by making the best of "mandatory appointment of outside board members." We can consider additionally that official trade laws should regulate expedient credit offers to affiliates through unjust cross-trade stipulation.[18]

Along with the mitigation of regulation of the upper limit of ownership,

[17] See Park et al. (1997) on the necessity and the policy of mitigating regulations in relation to the bank ownership structure.

[18] Jwa (1997) argues that the radical solution of appropriation problem lies not so much in ownership regulation as in the introduction of competitive environment in the financial industry. If we create a competitive environment by lowering the entry barrier and abolishing various protection devices like implicit support of insolvent financial institutions, the stock value of banks with high possibility of appropriation should drop sharply. In short, provided there is an appropriate environment where the market discipline can operate, with all the mitigation of bank ownership regulation, we may then be at ease about the appropriation problem.

we may point out that government intervention, explicit or implicit, should be minimized in the selection of the bank's top managers as well as in determining interest rates. In particular, if the banks are running under normal solvent conditions, it would be effective for the shareholders to take an active part in the bank's management. Supposing the ownership-governance structures are reformed as above then the bank's lending process will follow the benefit principle, and they will estimate the value of a loan guarantee based on the exact information about the repayment capacity of the borrowing firm. In due course, excess guarantee and over-investment problems, which occur from the over evaluation of guarantees may therefore be avoided.

Currently, the so-called "public fund" has resulted in the rise of government's ownership share of banks. Consequently, the privatization of banks has gotten even more difficult.

7.3 Abolishment of the government's support

Problems of excess guarantee and over-investment occur if there is a belief that the government will support a firm in financial distress. This belief has been formed by observing the government's help with relief funding during several financial scandals and the restructuring of bankrupt firms.

The argument that corporate loan guarantees play the role of exit barriers preventing the withdrawal of insolvent companies attached to a chaebol, due to debt-connections as well as cross guarantees, should become invalid if banks' ownership and governance structures are reformed and the govern-

ment's support eventually removed.

7.4 Evaluation on the current regulation mechanism

We now evaluate the current regulation mechanism from the view point of the arguments made above. Specifically, the extent to which the current mechanism contributes to remedy the distortions in incentive structure in the long term and short term, is the focus of our evaluation.

First, in the short term, measures prohibiting new corporate loan guarantees and the abolishing of all repayment guarantees is a positive step in that this should help remove the practise of excess guarantee, excess borrowing and over-investment. Exceptions allowed are loan guarantees in the process of mergers and the selling for industrial restructuring, export finance, technological development, and so on, We admit that some strong external shock may be required since distortion around corporate loan guarantees is based on strong expectation about the behavior of groups as well as the government

However, it is unreasonable that the government should prompt firms to dissolve all loan guarantees without an exception, and the long-term effect does not seem to be promising. Excess guarantee and over-investment problems originate from poor governance of firms and banks and through distortions in the incentive structure due to the government's implicit support. That notwithstanding, as we have seen in this paper, loan guarantee contracts on their own can be beneficial as a signalling instrument. Actually,

even in the US. corporate loan guarantees are common among subsidiary companies under the umbrella of a holding company.[19]

Considering that the financial sector has been under government control which resulted in the underdevelopment of the bank's loan assessment and monitoring functions, loan guarantees as a signalling device have become increasingly important. When external financial institutions do not have sufficient information about the type of investment projects of borrowing firms, the loan guarantee contract offered by a guarantor firm that has more or better information may help resolve this information asymmetry, thereby enhancing the possibility to finance relatively more efficient projects. But it is also true that corporate loan guarantees as practiced by the chaebols has been more detrimental than beneficial. We should however point to the beneficial feature of loan guarantees, in the hope that government controlled finance and governance structure are reformed as these are the primary sources of the problems.

Regulation can bring about better results if those responsible for setting up regulations possess appropriate information and are knowledgable about whether a loan guarantee may be beneficial or not. But this is indeed difficult if not almost impossible, and the person in charge of setting up regulations may have little incentive to do exactly this. Accordingly, proper regulation mechanisms in the long term may be required to induce interest groups to

[19] See Choi (1998).

set up efficient loan guarantee contracts through the enhancement of legal protection of external investors and through the establishment of the autonomous management of banks, as well as the removal of the government's implicit support, and not through the current indiscriminate prohibition. In addition, the government should legalize and encourage the preparation of combined or consolidated financial statements to allow banks to properly evaluate the value of a loan guarantee more exactly.[20]

7.5 Conclusion

According to our study, corporate loan guarantees by themselves do not lead to over-investment problems under an environment that allows for the fair evaluation of its value. Rather over-investment due to loan guarantees take place when there exist distortions in the incentive structures, which hinder the exact evaluation of the cost and benefit of corporate loan guarantees. For example, a vulnerable governance structure in the guarantor firm makes for the lower evaluation of costs below its proper value and over-valuing of private benefits. Moreover, in Korea, the government's implicit support had distorted the banking sector's incentive to monitor and supervise lending, and usually encouraged the over-valuation of loan guarantees. That is, the government's explicit as well as implicit intervention and the hinderance of the formation of independent and autonomous business practices made

[20] In reality, with high circular investment among affiliated firms among the chaebols, combined financial statements based on effective managerial dominance and not on a formal equity connection is arguably better. See Cho (1998).

banks dependent on collateral or guaranteed loans which had potential to re-allocated resources away from firms having good reputation and investment opportunities.

So, policy to enhance efficiency should not only attempt at reducing the amount of corporate loan guarantees but should focus on reforming the distorted incentive structures. This study therefore suggests that the abolishment of the government's implicit support for big firms and insolvent financial institutions, and the encouragement of autonomous management of banks should help overcome excess borrowing and over-investment problems. Moreover, under certain conditions as stated in the sections above, corporate loan guarantees can be beneficial as a signalling device revealing information about the project type of a firm. The government should provide an environment that does not distort incentives and should also restrain from direct and indiscriminate regulation on loan guarantees.

The model in this paper is limited in that it cannot incorporate into its analysis the relative shares of managers explicitly. We may hint that when affiliation is made easier through repayment guarantees and circular investment then the relative share of managers will be determined endogenously. This issue, however, is left for further study where loan guarantee and circular investment problems may be simultaneously considered.

8 Appendix

Proof of proposition 1

If the borrower's net present value is negative (positive) then $R^b < (>)$ $\frac{1}{p^b}$. However, since $\frac{c}{R^b-c} = \frac{1}{(p^b+(1-p^b)p^g)R^b-1}$ by $c = \frac{1}{p^b+(1-p^b)p^g}$, if $R^b < (>)$ $\frac{1}{p^b}$, we can derive that $\frac{c}{R^b-c} > (<) \frac{p^b}{(1-p^b)p^g}$ with $\frac{(1-p^b)p^g c}{p^b(R^b-c)}$ greater (smaller) than 1. Therefore, from 1) and 2), sufficient payment can be offered to give enough incentive to both the guarantor firm and to the borrowing firm, and thus the loan guarantee contract will (not) become effected for positive (negative) net present value.

Proof of proposition 2

Let s^g be the proportion of managers in the guarantor firm, and k be the measure of weakness of protection on external investors. If $k = 0$ then protection of external investors is perfect and as k increases, the protection weakens. This assumption can be interpreted as follows. If the manager of the guarantor firm owns s^g portion of asset, then only s^g of the total cost for the loan guarantee is incurred, while receiving more than s^g of the profits from the loan guarantee. In fact, the weaker the protection of external investors, the more the net excessive profit to the manager of the guarantor firm. On the other hand, $s^g(1+k) \leq 1$, since the net excessive profit cannot exceed the total profit, assuming that the managers of the guarantor firm

possesses $s^g(1+k)$.

Now, with regards to the principal-agent problems between the managers and investors, the decision to offer a loan guarantee becomes the prerogative of the manager and not the stockholder. Assume that the guarantor firm obtains a fee portion α, with $0 < \alpha < 1$, of profits of the borrowing firm in the event of a successful project. In distributing profits, the manager will profit proportionately more than other investors, and therefore the contract is likely to be endorsed even if the stockholder losses as a whole.

This can be formulated as follows. Because of the principal-agent problem, the manager of the guarantor firm will offer a loan guarantee contract only if his expected income $s^g(1+k)\alpha p^b(R^b - c)$ is not smaller than the expected cost $s^g(1-p^b)p^g c$. That is, α takes the following restriction:

$$\alpha \geq \frac{(1-p^b)p^g c}{p^b(R^b - c)} \frac{1}{1+k} \qquad (1^{**})$$

On the other hand, for there to be incentive to ask for a loan guarantee, the borrowing firm should have an expected income $(1-\alpha)p^b(R^b - c)$ when borrowing is backed by a loan guarantee which is not equal to or larger than $p^b(R^b - C)$, the expected income in the case of no loan guarantee. That is to say, the incentive contract is the same as before. Hence, we again have

$$\alpha \leq \frac{(1-p^b)p^g c}{p^b(R^b - c)} \qquad (2^{**})$$

To satisfy 1**) and 2**) and under voluntary contracting, α should lie in the range $\left[\frac{(1-p^b)p^g c}{p^b(R^b-c)}\frac{1}{1+k}, \frac{(1-p^b)p^g c}{p^b(R^b-c)}\right]$. In our basic model, without the principal-agent problem, the option fee α is determined uniquely as $\alpha = \frac{(1-p^b)p^g c}{p^b(R^b-c)}$. Now, even though α lies in $\left[\frac{(1-p^b)p^g c}{p^b(R^b-c)}\frac{1}{1+k}, \frac{(1-p^b)p^g c}{p^b(R^b-c)}\frac{1}{1+k}\right)$, which is smaller than the previous value (ie. the payment for the guarantee is smaller) the contract may be effected voluntarily.

From proposition 1, $\alpha = \frac{(1-p^b)p^g c}{p^b(R^b-c)}$ is more desirable to the society, since it encourages only efficient contracts while prohibiting inefficient ones. From this point of view, the principal-agent problem increases the possible interval of α to $\left[\frac{(1-p^b)p^g c}{p^b(R^b-c)}\frac{1}{1+k}, \frac{(1-p^b)p^g c}{p^b(R^b-c)}\frac{1}{1+k}\right)$. Let us refer to this interval as the 'inefficiency region.' The width of this interval may be interpreted as the measure of distortion due to the principal-agent problem.

Now consider how the inefficiency region changes according to s^g and k. First, as s^g increases, the region shrinks. This is due to the condition $s^g(1+k) \leq 1$. Next, given that legal protection improves then as k decreases $1/(1+k)$ increases, and therefore the inefficiency region shrinks.

Proof of proposition 3

When the internal investor provides the loan guarantee, expected income becomes

$$\beta^g p^g R^g + \beta^g \alpha p^b (R^b - c) + \beta^b (1-\alpha) p^b (R^b - c) - \beta^g (1-p^b) p^g c \qquad (7)$$

The first part represents the dividend of the guarantor firm's profit, and the second part is the dividend of the price of the guarantee payable by the borrower. The third part is dividend to the stockholder of the borrowing firm, and the fourth part is his own portion of the obligation from the guarantee. The expected income in the case without any guarantee is

$$\beta^g p^g R^g + \beta^b p^b (R^b - C) \tag{8}$$

The first part is the same above, and the second part represent dividends received by the stockholder of the borrowing firm.

We get 9) by subtracting 8) from 7);

$$p^b (R^b - c)(\alpha - \overline{\alpha})(\beta^g - \beta^b) \tag{9}$$

where $\overline{\alpha}$ is given as in 1) and 2) of the basic model.

In the basic model, there are no problems of circular financing ie. $\beta^g > 0$, $\beta^b = 0$ and for equation 9) to be larger or equal to 0, α should be larger or at least equal to $\overline{\alpha}$. However, if the internal investor of the guarantor firm has investments (or interests) in the borrowing firm as well, and affects the decision makings process of both firms, the conditions may change. That is, when equation 9) is greater than or equal to 0 and there is incentive to effect the contract on the part of the internal investor then $\alpha < \overline{\alpha}$ if $\beta^b > \beta^g$ and/or $\alpha > \overline{\alpha}$ if $\beta^g > \beta^b$. With circular financing, the internal investor

always has incentive to sign up a loan guarantee contract.

Proof of proposition 4

Assume that the borrowing firms success probability is slightly lower than p_c^b. If there is government support and the economic actors in the private sector expects this, then the bank will loan even to such borrowing firms. Let D be the amount of subsidy, then the minimum value $p_c^{b\star}$ of p^b is 100 per cent credible. We get

$$\left(\frac{1}{p^g} + \frac{1}{p_c^{b\star} + (1 - p_c^{b\star})p^g}\right) \tag{6'}$$

Comparing to equations 6), we can learn that $p_c^{b\star} < p_c^b$ Therefore, the bank now have distorted incentive to make the loan to the socially inefficient investment project.

Proof of proposition 5

Since we assumed the government subsidy $D(I)$ is same as the total profit of the guarantor less its total liabilities, $D(I) = (\frac{1}{p^g}) + (\frac{I}{p^b + (1-p^b)p^g}) - R^g$, if there are no tacit subsidies from the government, the managers of the borrowing firm will choose the investment that maximizes expected income $p^b R^b(I) - I$, and we have the condition:

$$p^b R^{b\prime}(I) - 1 = 0 \tag{10}$$

On the other hand, in the presence of tacit subsidy from the government, the managers of the borrowing firm can obtain an expected income of $(1-p^b)p^gD(I)$ from the government. Therefore, the total expected income of the borrowing firm is $p^bR^b(I)+(1-p^b)p^gD(I)-I$ and the maximizing condition is:

$$p^bR^{b\prime}(I)+(1-p^b)p^gD'(I)-1=0 \qquad (10')$$

$$-> \ p^bR^{b\prime}(I)+\frac{(1-p^b)p^g}{p^b+(1-p^b)p^g}-1=0$$

We note that the investment amount from equation 4) which satisfies 10)' is larger than that which satisfies equation 10).

Proof of proposition 6

When the manager of the borrowing firm is of type B, to have incentive to provide a guarantee on the part of the guarantor firm, the following inequality should hold.

$$(1-p_B)p^g\frac{1}{p_A+(1-p_A)p^g} \leq \alpha p_B(R^b-\frac{1}{p_A+(1-p_A)p^g}) \qquad (1''')$$

If the bank is 100 per cent certain that the manager of the borrower is of type A, then the rate becomes the prime rate, $\frac{1}{p_A+(1-p_A)p^g}-1$. Therefore, when the bank cannot distinguish a firm as either type A or type B, it will charge more than the prime rate.

In this case, equation 1"') illustrates the condition that needs to be satisfied for the guarantee firm to have incentive to provide a loan guarantee to the firm with the largest prime rate. From the point of view of the guarantor firm, in this situation, the guarantor firm will not guarantee any type B firm as there is no incentive to do so. Hence equation 1"') is a necessary condition for loan guarantees. However, when R^b satisfies equation 5), since $p_B R^b < \frac{p_B+(1-p_B)p^g}{p_A+(1-p_A)p^g}$, α should be larger than 1 in equation 1"'). And the guarantor firm will not male loan guarantees to type B firms.

On the other hand, if the borrowing firm is of type A, the guarantor firm has incentive to offer a loan guarantee, where α is in the interval

$$(1-p_A)p^g \frac{1}{p_A+(1-p_A)p^g} \leq \alpha p_A(R^b - \frac{1}{p_A+(1-p_A)p^g}) \qquad (1"")$$

With the above equation, the right hand side is continuous in α and R^b respectively. And if α is equal to 1 and R^b also equal to $1/p_A$, then the inequality may be replace by an equals sign. By assumption $R^b > 1/p_A$ and$\alpha = 1$ makes 1"") a strict inequality. Thus, under the assumption $p_A R^b > 1$, we can find that an α less than 1 exists that satisfies 1""), because the RHS is continuous in α. And therefore, the guarantor firm has incentive to offer a loan guarantee to the firm of type A.

To summarize, the bank regards a project as type A when the borrowing firm obtains a guarantee, and the interest rate on the loan is $\frac{1}{p_A+(1-p_A)p^g} - 1$, which will lead to inefficiencies under such non-separatable equilibrium.

References

[1] Cho, J. (1998), "Background and Explanation of Consolidated Financial Statements," *Regulation Studies*, vol. 7 (in Korean).

[2] Choi, D. (1996), "Corporate Governance Structures of Selected Countries," in K. Chung, ed., *Corporate Governance Structures of the Korean Firms in 21st Century*, Security and Financial Research Institute, Seoul National University (in Korean).

[3] Chung, K. (1998), "What's Wrong with the Korean Corporate Governance Structures?" The Korean International Economics Society 1998 Summer Meetings (in Korean).

[4] Diamond, D. (1984) "Financial Intermediation and Delegated Monitoring" *Review of Economic Studies*, 51, 393-414.

[5] Freixas, Xavier & Jean-Charles Rochet (1997) Microeconomics of Banking, MIT press.

[6] Holmstrom & J. Tirole (1997), "Financial Intermediation, Loanable Funds, and the Real Sector," *Quarterly Journal of Economics*, 112, 663-691.

[7] Hwang, In-hak and Jung-hwan Seo (2000), "Corporate Governance and Chaebol Reform in Korea," *Seoul Journal of Economics*, vol. 13, 360-389.

[8] Jwa, S. (1997), "Restructuring the Financial Industries," *Restructuring the Financial Industries in Korea*, Hyundai Economic and Social Research Institute (in Korean).

[9] La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1997), "Legal Determinants of External Finance," *Journal of Finance*, vol. 52, 1131-1150.

[10] La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert W. Vishny (1998), "Law and Finance," *Journal of Political Economy*, 106, 1113-1155.

[11] Lee, B.K. (1998), Loan Guarantee of the Korean Group Firms: Practices and Directions for Improvement, Korea Economic Research Institute (in Korean).

[12] Lee, B.W. (1996), "Fair Trade Act and Reduction in Loan Guarantee among Corporate Affiliates," *Regulation Studies*, vol. 5, 131-167 (in Korean).

[13] Lee, J., and Y. Lee (1998), "Characteristics of Debt Structure of the Korean Firms: Chaebol Firms vs Non-chaebol Firms, 1981-1996," The Korean Econometric Society 1998 Winter Meetings (in Korean).

[14] Lee, Keun (1998), "Corporate Governance in Korean Chaebols," mimeo.

[15] Lee, W. (1993), "Financial Consequences of Debt Repressing Policy," *Financial Studies*, vol. 7, 249-284 (in Korean).

[16] Ministry of Finance and Economy, IMF Policy Guidelines, Korean Government (in Korean).

[17] Park, K. and S. Kim (1997), "A Study on Financial Holding Company," Korea Financial Research Institute (in Korean).

[18] Scharfstein, David (1998), "The Dark Side of Internal Capital Markets : Evidence from Diversified Conglomerates," NBER Working Paper 6352.

[19] Shleifer, Andrei (1998), "State versus Private Ownership," *Journal of Economic Perspectives*, 12, 133-150.

[20] Won, S. (1996), Financial Regulation, and Profitability and Stability of Banks," Ph.D Thesis, Department of Economics, Seoul National University (in Korean).