Collective Relationship Banking & Private Information Monitoring in Korea

by

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Abstract: The structure of conglomerates embedded in the strong vertical ownership network in East Asia was believed to be a driving force for the economic success but was also blamed for the recent financial crisis in Asia given the fallacy – too big to collapse. This paper introduces a notion of collective relationship banking (*CRB*) as a mechanism for monitoring private information and investigates the likelihood of such banking relationship when the borrowing firms have heterogeneous vertical ownership structure using a Korean firm level panel dataset. Policy concerns are then addressed since the post-crisis corporate restructuring may create a more concentrated banking relationship with a few dominant banks.
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1. Introduction

Throughout the last few decades, there has been a plethora of literature focused on either the structure of conglomerates (*Keiretsu/Chaebol*) in East Asia in explaining the fast economic growth (Cho, 1994; Lee *et al.*, 2002) or the banking structure for the recent crisis in the region (Agenor *et al*., 1999). Traditionally, the vertical relationship between large holding companies and their subsidiaries in the real sector was believed to be a driving force for the economic success in the region. Hence, many of the advocates for Asian Tiger style growth claimed the rest of the world had much to learn from their economic success.

However, the recent financial crisis in the region put a question mark against hitherto supposedly invincible Tigers. Since the turn of the new millennium, much emphasis has been placed on identifying what went wrong in the Asian financial system in the 1990s. When the regional economy is in good shape, the research focus has been on the real sector (*non-financial*). However, when the economy started to get in trouble, some blamed the financial sector, namely the banking system (Agenor et al. 1999) whilst others have focussed on the real sector in crisis (Haggard et al. 2003), more or less in isolation. However, the real sector and the financial sector should not be regarded as two separate fields of investigation.

The novelty of the paper lies in linking the structure of the real sector and the banking sector using the firms' banking behaviour with a new notion of '*Collective Relationship Banking (CRB)*'. This paper empirically investigates the banking relationship whereby banks provide loans to borrowers (*firms*) with heterogeneous vertical relationships. A '*Relationship Banking (RB)*', is defined as successive long-term contracts between firms and banks. In addition, when a subsidiary firm has a banking relationship with the same principal bank of the respective holding company's, it is denoted as '*Collective Relationship Banking (CRB).*' By contrast, if a subsidiary deals with a bank different from that of its holding company's, it is called '*Independent Relationship Banking (IRB).*' However, it is worth noting that both collective relationship banking (*CRB*) and independent relationship banking (*IRB*) are relationship banking (*RB*) in nature.

Whether the relationship banking is established collectively or independently makes sharing of the private information between banks and firms different. When the

subsidiaries are heavily owned by the group holding companies (*Chaebols*), they do have an advantage of sharing private information at little extra costs as explained by Hart and Moore's (1990) transaction cost theory. The transaction costs are commonly believed to be lower when transactions are carried out within a firm than through the market. A group of companies networked through holding company's vertical ownership structure is considered as a broader boundary of a '*firm*' and anything outside of this vertical ownership network as the market. On the other hand, the holding companies provide a vehicle for indirect monitoring of the subsidiaries' business activities (Cerasi and Daltung, 2003). These two sub-channels of relationship banking (*RB*) are the main focus of the analyses.

The asymmetry of private information between lenders and borrowers often creates problems of adverse selection and moral hazard as *ex ante* screening in approving loans and *ex post* monitoring of outstanding loans becomes costly for lenders. Thus, one of the main roles of banks is to reduce the information cost for financial intermediation (Diamond, 1991; Boot, 2000) [1] and relationship banking has been one way to resolve problems of asymmetric information alongside credit rationing (Stiglitz and Weiss, 1981). In doing so, relationship banking commonly aims at the accumulation of soft information over time (Berger and Udell, 2002).[2] When dealing with small firms, which are vulnerable with less transparent information, the information gap between insiders and outsiders becomes larger and relationship banking can play an important role in narrowing this gap.

In this context, a strong vertical relationship among borrowing firms, such as vertical ownership structure between a holding company and its subsidiaries, can mitigate the incentive problems by reducing the information cost via delegated monitoring through holding companies (Cerasi and Daltung, 2003). Moreover, risk diversification tied to a holding company is key to the model as the borrower's risk diversification can moderate banks' exposure to non-performing loans (NPLs) (Diamond, 1984). Collateral or guarantees by diversified holding companies are usually considered to be credit-worthier than those provided by their subsidiaries as

[1] For the present, the term *bank* and *financial intermediary* are used synonymously.
[2] Soft information is not usually verifiable and relies on a credit officer's subjective judgement whilst hard information is based on more verifiable evidence such as firm's balance sheets, income statements, and so on.

diversified investment portfolios of holding companies allow lower risk to lenders (*banks*).

In investigating the structure of conglomerates (*Keiretsu/Chaebol*) to identify the engine for growth, the degree of vertical relationship can vary depending upon the firms' performance and subsequently may affect their relationship banks. The extent of holding companies' ownership stake in their subsidiaries has been a strategic decision of the group. The asymmetric information sharing structure among (a) holding companies (*Chaebols*) and (b) their subsidiaries[3] often takes the form of vertical ownership and in many cases, an identical bank is used for the group of firms who are in the vertical ownership network. Here, the relationship banking is not only a single firm-bank specific relation but also a collective relationship banking (*CRB*) which provides an alternative channel for private information.

The paper is organised into five sections. Section 2 reviews relation-based governance in banking. Section 3 presents empirical methods for the choice of collective relationship banking. Section 4 presents new evidence from the results of the empirical analysis conducted on the panel data of the top 10 largest Korean holding companies and their subsidiaries between 1994-2002. Section 5 concludes with some policy implications and possible future research.

2. Relation-based governance in banking

Financial intermediaries arise from the need to overcome the consequences of informational asymmetries between lenders and borrowers (Hauswald and Marquez, 2000). One way to overcome informational asymmetries is to impose strict monitoring and screening of borrowers. Diamond (1984), Ramakrishnan and Thakor (1984), and Allen (1990) have emphasized the different aspects of monitoring and screening in banking, which essentially advocate the relation-specific nature of information sharing in financial intermediation.[4]

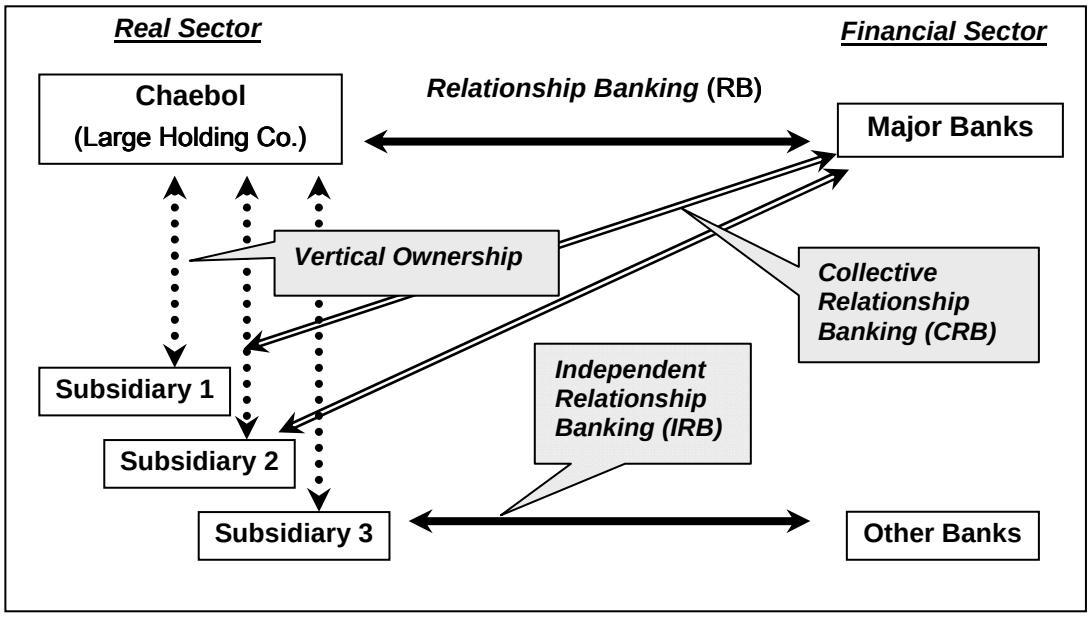
Most literature on relationship banking has so far referred to and explained a single relation between a firm and a bank with successive long-term contracts

[3] These subsidiaries are not necessarily small and medium size enterprises (SMEs) although they are usually smaller in asset size terms compared to their respective holding companies.
[4] Financial intermediation refers to all financial institutions including banks. However, financial intermediation and banking are often used interchangeably in this paper.

(Thakor, 2000). However, relationship banking becomes more than a single dimensional relation in East Asia where a group of companies within the network of a *Keiretsu* or a *Chaebol* establish their banking relationship collectively.

Hence, the notion of relationship banking in this paper refers to two kinds of banking relationships: (a) a successive long-term contracts between a firm and a bank as relationship banking (*RB*) commonly used in the previous literature, and (b) a collective long-term relationship between a group of firms and a bank as collective relationship banking (*CRB*). The primary focus of investigation in this paper is on collective relationship banking (*CRB*) as illustrated in Figure 1.

Figure 1. Overview of Banking Relationship



The deposit market typically takes the form of indefinite contracts without much restriction unless the customer specifies time-deposit terms and conditions. On the other hand, the loan market commonly takes a series of time-limited contracts according to the life of firms' investment projects. This asymmetric length of deposit and loan contracts creates incentives for banks to tie the two markets together by offering loans to those with deposit accounts at the same bank.[5] This paper assumes

[5] Due to the tied nature between deposit and loan markets, interest rates in these two markets are usually determined via mark-down or mark-up from the inter-bank money market rates set by the monetary policy.

firms' banking relationship in both deposit and loan markets, although the latter is more likely to decide the banking relationship when the two markets are tied together.

The benefits of tied contracts for the banks are (a) to monitor the risks indirectly through the firms' deposit account activities and (b) to maintain the banks' balance sheet more stable by having both assets and liabilities tied together. Special attributes of banks are believed to include having access to private or inside information about borrowing firms that is not available to other institutions or investors (Fama, 1985), whereby relationship banking has advantages for such private information.

Boot and Thakor (1999) show information differentiation captures the degree of specialisation in relationship building. In addition, Hauswald and Marquez (2000) claim that there is no reason to assume that banks have equal access to information *ex ante*. Therefore, both of the literature suggest that the banking relationship changes in the process of accumulating information. Shin and Kolari (2003) investigated the hierarchy of the credit market in Japan and indicated that firms with information problems are more likely to carry a higher proportion of relationship loans from main banks than non-main banks.

Bank failures during economic downturns seem to arise because banks are not always in a position to obtain full information about their borrowers. The information regarding the competitiveness of respective subsidiaries can be even less readily available due to the firm's listing type and often more complex due to the industry characteristics. However, the holding companies have the advantage of being more directly involved with these subsidiaries via vertical-ownership and may hence, have superior knowledge of the subsidiaries compared to their banks.

In the aftermath of the recent financial crisis in Asia, there has been a substantial consolidation of the banking sector as shown in Table 1 whereas in the real sector holding companies have been reducing their ownership within and across subsidiaries. Here, a question arises if there is any particular pattern in the bilateral structure between the real and the financial sectors. On the banking side, as Villas-Boas and Schmidt-Mohr (1999) claimed, more competition may lead to more screening under asymmetric information because banks compete more intensively for the most profitable and creditworthy customers that are now more scarce. On the

other hand, firms with less favourable prospects now need to compete more in searching and negotiating borrowing terms.

Table 1. Number of Commercial Banks in Korea

Korean Banks	***Dec-76***	***M&A***	***R***	***T***	***A***	***Peak***	
						Dec-97	***Dec-03***
Nationwide	5	-9	0	+3	+9	**16**	**8**
Regional	10	-4	0	0	0	**10**	**6**

N.B: M&A: mergers and acquisition; R: revocations; T: transformations; A: authorisation of new entities.

Source: Financial Supervisory Service

In firm-bank specific relationships, considering firms as buyers (*borrowers*) of loan products at certain prices (*loan rates*), the bargaining position of the firm against the banks regarding the loan products can be enhanced by forming a group of firms with strong vertical relationship. Hence, collective relationship banking (*CRB*) is considered to be one way for firms to enhance their market power, whilst horizontal mergers are a common solution for banks to raise their market power (Focarelli and Panetta, 2003). Furthermore, collective relationship banking may have a positive impact on welfare with strong buyers (*borrowers*), who may force their suppliers (*banks*) to reduce prices (*loan rates*) as suggested in Galbraith's (1954) countervailing market power.

The level of direct information disclosure may vary with a firm's true state of business and/or the types of the corporate listings. Even if subsidiary firms do not have an incentive to disclose information directly, their vertical relationship with holding companies can provide information indirectly. In other words, vertical ownership structure offers delegated monitoring for banks, as holding companies publish consolidated financial statements. The delegated monitoring in this bilateral structure may eventually lead both the real (*firms*) and the banking (*banks*) sectors into successive oligopoly (Waterson 1984; Salinger 1988; Abiru et al. 1998) via the information reinforcing mechanism.

Regarding the monitoring intensity, Carletti (2004) claims that the multiple-bank lending suffers from duplication of effort and sharing of monitoring benefits

compared to single-bank lending.[6] The search and switching cost theories to banking claim that borrowing from multiple banks should restore competition among banks and consequently improve corporate incentives (Von Thadden, 1992; Padilla and Pagano, 1997). On the other hand, Dewatripont and Maskin (1995) argue that a relationship bank may refinance unprofitable projects and thus reduce corporate incentives to prevent default.[7] However, the theories mentioned above and their predictions are not consistent with the empirical evidence.

In a more general and legal context, Dixit (2004) claims that relation-based governance has the advantage of obtaining private information and therefore, state regulation can be supplemented by private sector monitoring. His argument can be suitably applied to the case of banking sector, where banks do not have full information of the complex and diversified real sector neither do the relevant state regulators of banking. Hence, the private monitoring or delegated monitoring through relationship banking and/or collective relationship banking can be regarded as delegated risk managers in order to supplement the state regulation.

A large proportion of Japanese and Korean companies are established under some sort of vertical relationship with holding companies and their banking behaviour has been driven by either (a) collective relationship banking (*CRB*) or (b) independent relationship banking (*IRB*). However, there has not been any research carried out to identify the causes of different channels in banking relationships.

3. Empirical methods

Given the dominant position of the large holding companies in Korea, one could expect a collective banking relationship with the principal bank appointed by their holding companies to prevail. However, the descriptive summary of the banking relationship shown in Tables 2 show an equal split between *CRB* and *IRB*. Hence, the primary objective of the investigation is to characterise the probability of collective relationship banking when the borrowing firms have heterogeneous vertical

[6] Multiple-bank lending when a firm borrows from several banks for a project and single-bank lending when a firm borrows from a single bank instead.
[7] Dewatripont and Maskin (1995) analyse the case of a single monitoring only with endogenous level of monitoring.

ownership structure and explain what happens to the banking structure when the vertical relationship among their borrowing companies changes.

Table 2. Overview of Companies by Group

Group Dummy	*Holding Co.*	*Total Asset Size of the Holding Co.*	*Avg Asset Size per Subsidiary*	*No. of Sub' Co's*	*No. of CRB*	*No. of IRB*	*No. of SW*
G14	Samsung	71.9	1.198	60	40	18	2
G13	LG	58.1	1.186	49	15	31	3
G15	SK	43.4	0.835	52	14	38	-
G9	Hyundai Motor	42.9	2.258	19	9	10	-
G6	Hanjin	24.0	1.714	14	10	3	1
G5	Hanhwa	10.3	0.468	22	18	4	-
G12	Kumho	9.9	0.762	13	3	10	-
G4	Doosan	8.5	0.447	19	5	14	-
G8	Hyundai	7.0	0.636	11	7	4	-
G3	Dongah	6.7	1.117	6	2	4	-
G16	Ssanyong	5.3	0.331	16	9	7	-
G2	Daewoo	4.9	0.445	11	2	9	-
G7	Hyosung	4.9	0.377	13	6	4	3
G1	Daelim	4.6	0.354	13	7	6	-
G10	Hyundai Oil	3.8	1.900	2	2	-	-
G11	Kohap	1.8	0.600	3	1	2	-
	Total	**308.0**	**0.954**	**323**	**150**	**164**	**9**

N.B.: *Asset size in trillion Korean won as of Dec. 2002 & the No. of subsidiaries throughout the sample period.*
Source: Financial Supervisory Service & Korea Information Service

The probability of collective relationship banking $P_{it} = P(y_{it} = 1)$ is the binary dependent variable and the firm characteristics X_{it} represent the explanatory variables. Therefore, the model takes the following form of the most commonly used discrete choice probability:

$$P_{it} = P(y_{it} = 1) = E(y_{it} = 1 | X_{it}) = F\left(X_{it}'\beta\right), \quad i = 1,...,N \quad t = 1,...,T \tag{1}$$

where $y_{it} = 1$ if collective relationship banking (*CRB*)

$y_{it} = 0$ if independent relationship banking (*IRB*)

The observed dependent variable is binary, taking the value of one if the individual subsidiary chooses collective relationship banking at the time, t, and zero otherwise, i.e. independent relationship banking. The sample for the model takes the

individual subsidiary firms $(N = 323)$ observed over a 9 year period $(T = 9)$ as an unbalanced panel of $N \times T\,(= 2222)$ with a row vector of K explanatory factors of the subsidiary firms' characteristics, X_{it}.

One should note that only a very small proportion, 9 out of 323 firms had actually changed their relationship banks during the sample period.[8] This lack of variance over time with such small switching in banking relationship (*SW*) does indicate the fixed effects model is not appropriate. In addition, little information from dynamic models is expected, which will be discussed later.

A consistent estimator for β is to estimate the partial effects of the elements of X_i on the response probability $P(y_t = 1 | X_t, \alpha)$ at the average of α in the population ($\alpha = 0$). Then, the response probabilities are specified conditional only on X_i as follows for all t:

$$P(y_{it} = 1 | X_{it}) = P(y_{it} = 1 | X_i), \quad \forall t \tag{2}$$

This population-average model is useful as the main interest is in the average across the distribution of α_i. This is also often known as generalised estimating equations (GEE) model or GEE population-averaged model. Given the lack of variance in banking relationship over time, this population averaged logit model appears most appropriate.

An alternative model to the above GEE population-averaged model is a complementary log-log population-averaged model. Complementary log-log models are often used when the probability of an event is very small or very large. This is because the model can fit an asymmetric sigmoid function to the probability between 0 and 1 unlike the logit or probit models, which are symmetric.

Therefore, assuming that the sample data has more or less an equal probability of an event, little difference between the results from GEE population averaged logit model and complementary log-log population-averaged model is expected. There is a clear advantage of the latter being less restricted model and it is worth checking

[8] Switching of banking relationship is denoted as SW in Tables 2 & 3.

whether the results from these two models differ. The log likelihood function for this model is:

$$\ln(L) = \sum_{i=1}^{N}\sum_{t=1}^{T}\left[w_i \ln F\left(X_{it}'\beta\right) + (1-w_i)\ln\left(1-F\left(X_{it}'\beta\right)\right)\right] \qquad (3)$$

where $F(\cdot) = 1-\exp(-\exp(\cdot))$ while w_i denotes optional weights.

3.1 Dynamic consideration

As mentioned above, a significant proportion of the firms in the sample remain with the same relationship bank over the sample period. Table 2 and 3 summarise the banking relationship by group holding companies and by industries, indicating 314 out of 323 firms remain with the same relationship bank. This naturally leads to an investigation of state dependence and/or persistence of banking relationship in the dynamic framework. However, the lack of variance in choice of banking relationship over time, *T*, suggests that the dynamic model has little information to add, especially when relationship banking by definition, means a long-term (*persistent*) relationship between a firm (*borrower*) and a bank (*lender*).

Therefore, the results of dynamic estimation are reported only as a reference to how the lagged dependent variable captures all the effects due to the persistence of banking relationship. Subsequently, a cross-sectional logit estimation for each year is presented to illustrate how insignificant the differences in the estimation results are from one year to another. Moreover, case studies for those firms which switched their banking relationship (*SW*) is presented in a later section.

3.2 Data and descriptive evidence

The data were collected from the corporate archive provided by The Korea Information Service (KIS), Inc., which contains comprehensive and up-to-date corporate information on over 310,000 Korean companies, including financial statements and ownership structures. The top 10 largest holding companies (*Chaebols*) between 1994 and 2002 were included in the analysis, which comprise 16 holding companies taking the changes in rankings over time into consideration. The 16 holding companies were selected based on "The Annual Reports on the Top 35

Large Holding Companies' Major Banking Activities" published by the Financial Supervisory Service (FSS).[9]

The assets of the companies related to top 10 chaebols represent more than 30% of the Korean GDP and those related to top 35 chaebols would bring this figure up to almost 80%. However, the top 10 largest chaebols are used in the analysis as they represent a large enough proportion of the Korean economy and more reliable time series data across the subsidiaries for the top 10 largest chaebols as missing data are frequent for the smaller chaebols and their subsidiaries.

Having discarded incomplete sample observations, an unbalanced panel was constructed from 323 subsidiaries of the above 16 holding companies for the 9 year period and are used in the analysis.[10] The 9 year period between 1994 and 2002 is long enough to cover most business cycles.[11] Furthermore, the sample period has the benefit of stretching over pre- and post-financial crisis.

Looking across the columns of Table 2, one can notice that holding companies with larger number of subsidiaries tend to be larger in the aggregate sense (e.g. the correlation coefficient of 0.898 between number of subsidiaries and the total asset size of a holding company). The subsidiaries of the larger holding companies are relatively large in average asset size too (e.g. the correlation coefficient of 0.458 between the average asset size of a subsidiary and the total asset size of a holding company). In other words, larger holding companies seem to diversify their business portfolio across subsidiaries, which are also relatively large compared to those belonging to smaller holding companies.

Table 2 shows that some groups have more subsidiaries adopting collective relationship banking (e.g. Hanhwa, Hanjin, and Samsung) whereas other groups have more subsidiaries adopting independent relationship banking (e.g. Daewoo, Doosan, Kohap, LG, and SK). However, it is not obvious what determines these group specific effects. An immediate proposition could have been the group size effect, i.e. the larger

[9] By the FSS regulation, the top 35 large holding companies in Korea should report their main annual banking relationship to the FSS.
[10] The Korea Electric Power Corporation (KEPCO) and the POSCO Co. LTD. (POSCO) are not included in the sample as they were initially established as state-owned companies for electricity generation and steel manufacturing respectively.
[11] Most business cycles in Korea fluctuate between 5 to 10 years given the 5 year strategic industrial and technology policies and the long-term economic cycle per decade.

the group is, their subsidiaries are more likely to adopt collective relationship banking to benefit from economies of scale. However, there is no clear correlation between the size of the holding company's aggregate assets and the proportion of the collective relationship banking per group (correlation coefficient of -0.031 between the total asset size of the holding co. and the CRB proportion in Table 2).

The 323 subsidiaries in the data operate their business across 13 different industries as listed in Table 3 according to the KSIC's (Standard Industrial Classification) main industry classification.[12] Subsidiary firms are widely spread over the 13 industries but one of the most significant industries is manufacturing (IND2) with 101 firms (31.3% of 323 companies) followed by business and research support and service (IND11) with 56 firms (17.3% of 323 companies). Nearly half of the firms used in the analysis are accounted for by these two industries.

The next three significant industries are: retail and wholesale (IND5); transportation (IND7), and financial services and insurance (IND9) with each one representing roughly 10% of the firms included. Regarding financial services, it is worth noting that the Korean holding companies do not own group banks as their own subsidiaries unlike in the Japanese Keiretsu system.[13] Although the banking ownership has been liberalised in Korea so that foreign investors can become shareholders of the Korean banks, the large holding companies (chaebols)' stake in the domestic commercial banks used to be regulated and appears still insignificant.

3.3 Variables in context

The dependent variable of collective relationship banking (*CRB*) and the following explanatory variables are included in the binary choice models as listed in Table 4: (a) major shareholding by the group company (*OWN*); (b) net income to asset ratio (*NIAR*); (c) age of the company (*AGE*); (d) industry dummies (*IND1 to IND13*), which reflect individual firm characteristics and its industry environment; (e) holding company group dummies (*G1 to G16*), and (f) firm creation dummy(*TM*) which indicates whether the firm is created as a result of take-over or mergers.

[12] The KSIC code is similar to the 5-digit SIC Code in the US. The industry dummy here refers to the first digit main section classification.
[13] In Japan, Keiretsus often has their own designated banks within the group, which makes the relationship banking further reinforced by the group interest.

The above explanatory variables are the most representative assessment measures for the credit ratings in Korea. A typical credit scoring exercise by lenders (*banks*) include: (a) repayment ability and quality of collateral and guarantees (*reflected in OWN and G1-G16 group dummies*); (b) firms profitability (*reflected in NIAR*); (c) firm's general reputation (*business survival in terms of AGE*), and (d) overall business prospects (*reflected in IND1-IND13 industry dummies and the firm creation dummy TM*). The respective proxy variables, as shown in the parentheses, are used in the analyses.

For the vertical ownership structure (*OWN*), the major shareholding in subsidiaries by the respective group companies in aggregate is used. Holding companies may increase or decrease its stake in the respective subsidiaries depending upon: (a) their strategic potential for the holding company group, i.e. how complementary it is to the overall group's business, and (b) future business prospects. Hence, the holding company's involvement in the respective subsidiaries via vertical ownership can indicate positive business potentials. As discussed earlier, the vertical ownership structure creates an indirect monitoring of the subsidiaries' business since they share the private information through in-house vertical contracts of buying and selling as well as the hard information in the consolidated financial accounts.

As a performance indicator of each subsidiary, net income to asset ratios (*NIAR*) was used. They vary drastically from –479.26 to 372.46 over the period before and after the financial crisis in Asia. The age of the firms since establishment was included in the analysis to capture the effect of long-term reputation. Although the average age of the firms included is about 18 years old, the analysis covers those from 0 year old for newly start-up companies to 71 years old for well-established ones with substantial business history.

Firms are widely distributed across 13 different industries. However, the mining (*IND1*) and other public and private repair services (*IND13*) industries have only one firm each in the data. Hence, the models with industry dummies exclude these two industries whilst the largest industry group, manufacturing (*IND2*) is used as a reference group. Dis-aggregating manufacturing (*IND2*) into the next level (second digit) of the KSIC code could have been an alternative idea but due to the

limited observation size in the other industries, the industry dummy has been kept at the first digit level.

Given the nature of sample data construction, firms are distributed across 16 different chaebol groups. Since Samsung group (*G14*) is the largest group with 60 subsidiaries, it is used as a reference group in the analysis with group dummy variables. Some groups have a relatively smaller number of subsidiaries such as Hyundai Oil (*G10*), Kohap (*G11*), and Dongah (*G3*) but all 16 groups are included in the analysis.

The firm creation dummy variable, *TM,* is included in order to see differences in the choice of relationship banking (*CRB vs. IRB*) between firms created as a result of take-overs or mergers (*TM*) and those created as new firms, given the persistence of banking relationship. For instance, those taken over or merged into a new holding company may have independent relationship banking as they remain with the previous banking relationship that is not necessarily the same as its new holding company's principal relationship bank. About 31% of the companies in the sample are established as a result of take-overs or mergers and acquisitions.

4. Empirical results

Following the structure of the models discussed in the previous section, the standard population averaged models are used given the limited number of switching in banking relationship and fixed effects are not considered.

4.1 Ownership structure

Assuming all other conditions are equal for subsidiary firms, collective relationship banking provides incentives to both borrowing firms as well as lending banks as the performance of these firms can be indirectly monitored by group companies, principally by the main holding company.

Larger holding company stake (OWN) in a subsidiary informs the public that the subsidiary is strategically important to the holding company in the long-run for the interest of the group. Given this information about subsidiaries' strategic importance within the holding company's network, these firms have outside options for their loan other than collective relationship banking (*CRB*) since often they find more

favourable borrowing terms from an independent relationship bank. In other words, it is not necessary for them to stick to the collective relationship banking (*CRB*) for bargaining loans but they can find more competitive loans offered from independent relationship banks.

However, one could argue that the strategically better positioned firms within the group can also get a competitive deal from collective relationship banking. Then, the question is which argument is more dominant in the context. Certainly the empirical results in Tables 5 and 7 suggest that firms with a smaller holding companies' stake offer limited outside options for loans and rely on collective relationship banking, which lenders consider as a mechanism for indirect monitoring.

Table 5. PA Models with Industry and TM Dummy Variables

Dependent Variable: (CRB_{it})	*Population Averaged Logit*		*Complementary Log-log Population Averaged*	
	Coef (S.E)	***Z***	***Coef (S.E)***	***Z***
OWN_{it}	-.0011	-2.11**	-.0008	-2.49***
	(.0005)		(.0003)	
$NIAR_{it}$	.0007	2.02**	.0004	2.06**
	(.0003)		(.0002)	
AGE_{it}	.0090	3.56***	.0054	3.87***
	(.0025)		(.0014)	
$IND3_{it}$	-2.9040	-2.82***	-2.4538	-2.35***
	(1.0314)		(1.0437)	
$IND4_{it}$	-.2765	-.53	-.1904	-.51
	(.5233)		(.3698)	
$IND5_{it}$	-.0370	-.09	-.1123	-.39
	(.4163)		(.2911)	
$IND6_{it}$	-.5500	-.70	-.6576	-1.07
	(.7849)		(.6146)	
$IND7_{it}$	-.1362	-.32	-.0566	-.19
	(.4210)		(.2918)	
$IND8_{it}$	-.5799	-.90	-.3676	-.76
	(.6479)		(.4817)	
$IND9_{it}$	-.5993	-1.56	-.6540	-2.23**
	(.3841)		(.2930)	
$IND10_{it}$	-.9670	-.78	-1.0048	-.99
	(1.2375)		(1.0165)	
$IND11_{it}$	.0855	.25	-.0546	.24
	(.3352)		(.2302)	
$IND12_{it}$	-2.8567	-2.59***	-2.3049	-2.19**
	(1.1018)		(1.0524)	
TM_{it}			-.7758	-3.90***
			(.1991)	
Constant	.1451	.71	-.0146	.10
	(.2043)		(.1523)	
	$\chi^2(13) = 36.32$***		$\chi^2(14) = 55.49$***	
No. of groups	321		321	
No. of obs	2178		2178	

Standard errors are in the parentheses.

,,*** Z-values significant at the 5%, 2.5%, and 1% levels respectively*

,,*** χ^2 -values significant at the 5%, 1%, and 0.1% levels respectively*

N.B.:

1) *Only the population averaged effects are estimated as industry dummies are time invariant.*
2) *As industries with only on firm observation (IND1 and IND13) are dropped, the total number of observation is 2178 instead of 2191.*
3) *For the inclusion of a firm creation dummy (TM),only the result of complementary log-log population average is presented due to a non-convergence in population average logit.*

Table 7. PA Model with Group and TM Dummy Variables

Dependent Variable: (CRB_{it})	*Population Averaged Logit*		*Marginal Effects at the mean $\overline{X}$ (Y=.5026)*
	Coef (S.E)	*Z*	*dy/dx*
OWN_{it}	-.0012	-1.84*	-.0003*
	(.0007)		(.0002)
$NIAR_{it}$	.0008	1.83*	.0002*
	(.0004)		(.0001)
AGE_{it}	.0101	3.16***	.0025***
	(.0032)		(.0008)
$G1_{it}$	-.5404	-.83	-.1324
	(.6484)		(.1527)
$G2_{it}$	-2.5671	-2.93***	-.4482***
	(.8753)		(.0770)
$G3_{it}$	-2.1848	-2.37***	-.4084***
	(.9201)		(.0968)
$G4_{it}$	-1.8748	-3.06***	-.3808***
	(.6122)		(.0852)
$G5_{it}$	.5292	.84	.1297
	(.6329)		(.1493)
$G6_{it}$	-.0484	-.07	-.0121
	(.6882)		(.1720)
$G7_{it}$	.0121	.02	.0030
	(.66648)		(.1662)
$G8_{it}$	-.6507	-.93	-.1580
	(.6961)		(.1594)
$G9_{it}$	-.8254	-1.49	-.1974
	(.5526)		(.1214)
$G10_{it}$	5.7981	.33	.0506
	(17.4377)		(.0642)
$G11_{it}$	-2.0480	-1.63	-.1390
	(1.2562)		(.1358)
$G12_{it}$	-2.4392	-3.34***	-.4402***
	(.7296)		(.0732)
$G13_{it}$	-1.5616	-3.67***	-.3500***
	(.4254)		(.0792)
$G15_{it}$	-1.8473	-4.26***	-.3979***
	(.4332)		(.0731)
$G16_{it}$	-.7218	-1.21	-.1744
	(.5965)		(.1347)
TM_{it}	-1.2102	-4.26***	-.2902***
	(.2841)		(.0630)
Constant	1.1732	3.75***	-
	(.3133)		
$\chi^2(19)$	71.10***		
No. of groups	323		
No. of obs	2191		

Standard errors are in the parentheses.
,,*** Z-values significant at the 5%, 2.5%, and 1% levels respectively*
,,*** χ^2 -values significant at the 5%, 1%, and 0.1% levels respectively*
N.B.: Samsung Group (G14) is used as a reference group.

One could also argue that strategic interests measured by the holding companies' vertical ownership levels represent subsidiary firms' actual performance at present. However, the data show no significant evidence of this argument as the

correlation coefficient between the holding companies' ownership level in their subsidiaries (*OWN*) and the performance of their subsidiaries measured by net income to asset ratios (*NIAR*) is only 0.0159. Hence, the paper adopts the notion of strategic interests of holding companies as independent of the subsidiary firms' performance.

4.2 Evolution of the firm and Performance

Coefficients of firm creation dummy (*TM*) in Tables 5 and 7 are significantly negative. This suggests that the firms became a subsidiary of the group via takeovers or mergers tend to be in independent relationship banking as they may have remained with the previous relationship banking before becoming a group subsidiary. The persistence in banking relationship can explain this result which will be further discussed in the section later.

Subsidiaries' age is positively associated with the collective relationship banking (*CRB*). In principle, firms with experience in the long-run can search for the best loan contracts offered in the market. However, collective relationship banking seems to be preferred as banks in Korea often ask for secured assets as collaterals or third party guarantees. These requirements are more easily met when both a holding company and its subsidiaries deal with the same bank and collaterals and third party guarantees are more readily provided for long-term subsidiaries.

Then, one may question why this desirable quality of the firm's long run survival does not provide outside options of independent relationship banking (*IRB*). Perhaps, the notion of persistence in banking relationship would answer the question as it appears that the persistent firms, irrespective of whether strategically important to the holding group or not, appear to opt for collective relationship banking. One should also make a clear distinction between qualities perceived via its survival in the business, i.e. *AGE*, which and via its strategic position within the holding group, i.e. *OWN*. The former is associated with the persistence whilst the latter reflects the strategic importance within the holding group. One may argue for the reverse causality whereby collective relationship banking enhances the survival of subsidiaries on average. It is plausible but there is no clear evidence for the argument as firms in collective relationship banking also go bankrupt or exit the market.

In the same principle, profitable subsidiaries are more likely to bank collectively with the holding companies. In general, higher loan rates are offered towards borrowers with risky assets to offset their potential loss in non-accrual interest payments and the loan provisions in case of default. However, collective relationship banking can facilitate collaterals and third party guarantees for profitable firms.

4.3 Industry and group specific effects

Given only one observation each in the mining industry (*IND1*) and the other public and private repair services (*IND13*), these two observations in *IND1* and *IND13* are dropped and the most representative industry of manufacturing (*IND2*) with over 30% of the firms in the sample is used as a reference group for industry specific effects. With the manufacturing sector as a reference group, the results on industry dummies should be interpreted in relation to the banking behaviour of the manufacturing sector. Furthermore, industry dummy variables are time invariant for the period of investigation. Therefore, only the population averaged models are presented in Table 5.

The coefficients on utilities (*IND3*) and sports and entertainment (*IND12*) show most significantly different from that of manufacturing (*IND2*). The results suggest that subsidiaries in these two industries are less likely to choose collective relationship banking than those in manufacturing. One can explain the reason why these industries differ from manufacturing or any other industries is that they are the industries related to the holding company not because of the natural core business link but because of the holding company' diversification. Obviously, those industries linked to the core business of manufacturing and sales of goods produced, would easily set up their relationship banking as the respective holding company does.

Although the coefficient of financial services and insurance (*IND9*) is insignificant in the population-averaged logit, it is significant in the complementary log-log population-averaged model.[14] The marginal effect of financial services and insurance (*IND9*) in Table 6 after the estimation of complementary log-log

[14] We do not consider a model with both industry dummies (*IND2*-*IND12*) and group dummies (*G1*-*G16*) since the estimation did not achieve convergence.

population-averaged model also shows significant. The rest of the industry dummies show no significant influence on the choice of collective relationship banking although most of them are marginally in the negative side, i.e. less likely to be in collective relationship banking compared to those firms in the manufacturing sector.

Table 7 presents the group specific effects on collective relationship banking which have all negative signs. In other words, subsidiaries of these groups are less likely to adopt collective banking compared to those of Samsung group (*G14*). This result is consistent with the descriptive summary in Table 2 as Samsung group clearly stands out with 40 subsidiaries in collective relationship banking (*CRB*) as opposed to 18 subsidiaries in independent relationship banking (*IRB*). Perhaps, the effect of free-riding on group's reputation is more significant with Samsung (*G14*) as the subsidiaries can largely benefit from collective relationship banking as the group reputation is extremely high. On the other hand, the groups less likely to induce collective relationship banking compared to the reference group, are Daewoo (*G2*), Dongah (*G3*), Doosan (*G4*), Hyundai Motor (*G9*), Kumho (*G12*), LG (*G13*), and SK (*G15*).

4.4 Persistence in baking relationship

Table 8 and 9 show that firms seldom change their relationship banks whether it is collective (*CRB*) or independent relationship (*IRB*). This strongly indicates that the banking relationship has persistence, i.e. state dependence in nature. The three base models without industry, group and firm creation dummies are used to test the persistence of relationship banking by including the lagged dependent variable (CRB_{t-1}) and the results are presented in Table 8.

Although the lagged dependent variable of collective relationship banking is considered for the dynamic model, the results are reported only as a reference in the paper since the lagged dependent variable captures most effects due to the persistence in the banking relationship as indicated. Hence, firms are more likely to remain in the same banking relationship over time once they are in either collective relationship banking (*CRB*) or independent relationship banking (*IRB*). With little dynamic change in the banking relationship, standard population averaged models without the lagged dependent variable (CRB_{t-1}) has been in focus in the earlier section.

Although the dynamic consideration does not add much information as it is already clear that there is strong persistence in banking relationship with only 9 companies that switched the banking relationship. Nonetheless, this result from dynamic consideration reaffirms the importance of long-run banking relationship for information sharing and monitoring as discussed in the previous literature review section (see Ramakirshnan and Thakor, 1984; Allen, 1990). In order to test the robustness of the results in Table 8, a cross-sectional logit estimation was conducted for each year and the results are shown in Table 9. There are marginal changes in coefficients and their significance over time but reaffirms no significant dynamic fluctuation but a strong persistence in relationship banking instead.

4.5 Switching cases

Although the number of companies that switched their relationship banking during the sample period is extremely small, investigating these 9 companies out of total 323 companies in the sample appears to be an interesting and useful exercise. The previous analyses so far in the paper, sufficiently explain the reasons why subsidiary firms choose collective relationship banking instead of independent relationship banking in the static framework. However, the case studies on those switched the banking relationship add value in the dynamic sense and suggest future research opportunities as switching of banking relationship may increase.

Due to the limited number of companies that switched banking relationship, it is impossible to find any appropriate econometric specification to bring out the particular characteristics and generalise them.[15] It is already noted from the previous sections that neither the fixed effects logit model nor the path dependent models in the dynamic sense could explain much about the banking behaviour over time. Therefore, the following case studies were carried out to detect any idiosyncratic characteristics in the firms that switched banking relationship. However, one should look at these studies as only individual firm specific cases without making any premature generalisation.

[15] All the econometric specifications are applied to the sub-sample of those 9 companies which switched banking relationship. However, none of the results show any significance as expected due to the small number of observations.

There were 9 companies in total who switched their banking relationship during the sample period: (a) 6 companies switched from independent relationship banking (*IRB*) to collective relationship banking (*CRB*); whilst (b) 3 companies switched the other way around. Although it is difficult to find a clear pattern that separates those who switched from independent relationship banking (*IRB*) to collective relationship banking (*CRB*) and *vice versa*, a descriptive summary of the 9 companies was produced for an overview in Table 10 and the individual cases are discussed further hereunder.

In attempt to find out any common factors for switching in banking relationship, some common benchmark factors for credit rating are summarised in Table 10: (a) the historic profitability of the firm prior to the switch, i.e. *NIAR* prior to the switch; (b) the average profitability of the firm prior to the switch, i.e. average *NIAR*; (c) the average vertical ownership stake by the holding company prior to the switch, i.e. average *OWN*; (d) the firms age as of 2002, i.e. *AGE*; (e) the group holding company that they belong to, and (f) the industry sector that they belong to. These factors are based on an extension of the key explanatory variables used in the previous models.

The first thing to notice from Table 10 is that these firms are not running a profitable business given the predominantly negative net income to asset ratios (*NIAR*). Furthermore, their business environments are deteriorating or remain extremely bad prior to the switch in many cases as shown in their *NIAR* movement. Given the persistence of banking relationship, it seems natural to observe switching cases when the business is deteriorating or uncertain. This is often the time when firms seek for more project financing and hence search around for alternatives and switch for the better and/or the best.

It seems difficult to form any opinion with respect to the holding companies' ownership levels as they range between 2.58% and 100% without any particular pattern. However, the age factor seems to suggest that younger companies are more likely to switch as all but one are below the average firm age of 18 and they rather noticeably skewed towards left (younger firms) given the age range between 0 and 71. One could also argue that firms in the early stage of business development can shop around for the better fit in terms of loans and project finance.

For group and industry specific effects, it would be inappropriate to comment as they are only a few firms in the respective groups or industries. Although LG group and manufacturing sector appear to be more frequent than others, a large number of firms in LG group and the manufacturing sector suggest that they should be investigated as individual firm specific cases.

Switching from independent to collective relationship banking

The discussion hereunder mainly focuses on the further firm specific issues that are not discussed in the above section such as the background of the firm establishment such as takeovers and mergers: (a) a new firm created; (b) a firm taken over by another firm via mergers and acquisitions (M&As), and (c) a firm created via spin-off or de-mergers.

Keoyang Shipping (ID78) is a relatively young shipping company established only in 1990 and has subsequently made a rapid expansion by purchasing a series of large vessels between 1990 and 1995 but it was taken over by Hanjin group in 1995. Since the takeover, the company went through a substantial restructuring and consolidation by closing down redundant businesses. The switching into collective relationship banking (*CRB*) appears to be encouraged by the takeover.

Hyosung Ebara Environment Engineering (ID95) is a young environmental engineering company recycling wastes and constructing related facilities in 1997. Concerns for this company is that the financing is mostly in short-term borrowings and the non-listed joint-venture setup with a Japanese partner makes lenders find difficult to evaluate the fair value of their projects. Having emphasised the importance of monitoring and sharing private information in banking in the long-run, this company certainly does not provide enough private information in the long-run.

Unlike the other firms listed in Table 10, LG Cable (ID155) is a relatively old firm at 33 years but has experienced major restructuring over time. In the early 1990s in particular, the company started to transform into an international firm by investing in a British firm, Heat Trace, and setting up joint-ventures in various locations in Asia such as Malaysia, Vietnam, and China. It seems that a series of such major expansion led the company to switch relationship banking into CRB.

LG Energy (ID163) is a power generation company involved in both electricity and gas. It was established in 1996 by public funding and went into joint-

venture with Powergen (British) in 1999 but Powergen withdrew its stake in 2000 leaving LG group as a major shareholder whilst its expansion in Bugok Combine Cycle in Korea was in progress. Shortly after this event, its relationship banking has been changed in 2001 and project financing long-term corporate bonds were issued.

Dacom Multimedia Internet (ID168) was established as a result of spun-off from LG Traffic Information Inc. in 1999. It is an internet multimedia service company which had an extremely bad start as the band-wagon effect of internet business has finally started to show negative signs. The industry was over-crowded and has experienced reshuffling via several takeovers and exits. Although no further information is available for the breakdown of the firm's borrowings, it must have been in trouble securing loans given the negative business environment of internet multimedia services and hence seemed to have switched the banking relationship into CRB.

There has been a series of mergers between Samsung Investment Trust (ID238), JP Morgan, Tongyang Investment Trust, Samsung Securities, Samsung Life Insurance since long and finally Samsung Investment Trust Management was named in 2000. Immediately after that, its banking relationship was switched to collective relationship banking in 2001.

From the above six cases, one could easily argue that one of the important factors which influences switching of banking relationship is corporate restructuring either through mergers and acquisitions, takeovers, or de-mergers or sales of the stake. In particular, foreign partners' level of stake seems to play an important role in switching the banking relationship. Capital intensive industries seem to put firms in a more vulnerable banking relationship when faced by financial difficulties, which may have caused switching.

Switching from collective to independent relationship banking

As in the cases of switching from *IRB* to *CRB*, the discussion below focuses on the further firm specific issues and the section tries to discuss what causes the difference in the direction of switching: (a) from *IRB* to *CRB*; and (b) from *CRB* to *IRB*.

Hyosung Ino Tech (ID87) was established as a joint-venture between Hyosung and Dryvit System Inc. (US) in 1987 producing insulation and sound-proof panels.

Then, the Hyosung group took over the stake from Dryvit System in 1994 and has subsequently changed its name from Hyosung Dryvit Co., Ltd. to Hyosung Ino Tech Co., Ltd.. Subsequently, the company recorded a significant decline in profits prior to the switch and has been heavily relying on short-term borrowings.

Hyosung Ebara (ID94) is a manufacturing company of pump related products including energy pipes for nuclear and hydropower generation. It was established with foreign capital in 1989 and merged into Hyosung group in 1995. Yet again, the change in foreign capital seems to have triggered the switching of banking relationship. It is worth noting that the above two companies' switching cases seem to be affected by the departure of foreign partners coupled with their subsequently deteriorating profitability.

Care Camp.Com (ID223) provides online pharmaceutical/medicare information services and retail/wholesale of pharmaceutical/medical products. Two things to notice here: 1/ for such a young company, it made a positive net income to asset ratio (*NIAR*) after only one year of establishment only to be followed by losses, and 2/ the industry is not a part of mainstream business of the group but a mere dotcom trial which faces potential industry restructuring before achieving steady profits.

With only 3 firms in the case of switching from CRB to IRB, it becomes even more difficult to make any conclusive remarks on the switching. However, the changes in the foreign stake seem to definitely have an impact on the changes in banking relationship. With the recent liberalisation of foreign ownership in the local Korean companies, more firms with a foreign stake are expected and the degree of foreign ownership will provide an interesting topic to further investigate for banking relationship.

5. Conclusions

This paper identified main factors determining banking relationship between firms and banks which are about reducing the asymmetric information gap. Lenders are believed to be not always in a position to know the true state of their borrowers' quality of investment projects. Banks often look for this information indirectly via the vertical relationship between borrowers whereby holding companies undertake the

responsibility of delegated monitoring. This indirect monitoring becomes more useful when the information is not fully revealed and/or uncertain.

The empirical results provide evidence that subsidiaries with relatively smaller stake by holding companies are more likely to choose collective relationship banking as it allows indirect monitoring via holding companies. Indirect monitoring plays a crucial role when firms do not have outside options for lenders as it enhances information level with holding companies' indirect monitoring. Hence, collective relationship banking seems to be a preferred choice.

Positive scores in usual credit rating criteria such as firms' profitability and age seem to work in favour of collective relationship banking as they can reinforce the bargaining for preferential rates in a collective sense. There is also evidence for industry specific effects on the choice of relationship banking. However, above all, the persistence of collective relationship banking appears to be one of the most significant factors suggesting that accumulation of private information overtime through the long term relationship matters most.

Given the concerns over further banking crises in the global context, the results suggests that long-term relationship banking provides advantages and disadvantages for both borrowing firms and lending banks. If the indirect monitoring mechanism is working well as suggested above, banks can avoid unnecessary risks of relationship loans. Otherwise, alternative ways are needed to compensate the ailing private monitoring. With increasing concerns over the private sector corporate governance following the recent scandals such as Enron and Worldcom, indirect monitoring needs further regulatory consideration.

On the other hand, the main results driven by monitoring borrower's risks and accumulating private information raises additional concerns with respect to small and medium size enterprises (SMEs) that do not belong to large holding companies' network. These SMEs are often in less profitable businesses and have no reputation due to the limited size and the age of the firm, as a result it is difficult for them to find banks with appropriate loan conditions especially, when the economy is in a downturn.

A unique approach to link the vertical ownership structure in the real sector (*non-financial firms*) and their banking behaviour broadened the scope of relationship

based monitoring in banking. From a policy perspective, there has been a series of debates regarding vertical integration and restraints in many industries. However, the policy makers' approach towards abuse of market power needs careful consideration given the above idiosyncratic feature in relationship banking and monitoring. In particular, concerns arise as much claimed corporate restructuring to downsize Korean chaebols via de-mergers may encourage collective relationship banking and hence create a more concentrated banking structure with a few dominant banks.

The paper tried to shed some light on feasible ways for regulators and/or banks to remedy imperfect information in the context. It does not claim for a major reform of policy but would like to provide some economic rationale for a new direction in the event of changing structure of conglomerates and associated banking industry structure when relationship banking is prevailing irrespective of whether they are collective or independent.

Appendix

Table 3. Company Breakdown by Industry

Industry Dummy	*Industry*	*No. of Co's (%)*	*No. of CRB*	*No. of IRB*	*No. of SW*
IND1	Mining	1 (0.3%)	-	1	-
IND2	Manufacturing	101 (31.3%)	55	43	3
IND3	Utilities (electricity, gas, water, etc.)	16 (5.0%)	1	14	1
IND4	Construction	17 (5.3%)	8	8	1
IND5	Retail and wholesale	30 (9.3%)	16	13	1
IND6	Hotel and food service	7 (2.2%)	3	4	-
IND7	Transportation	29 (9.0%)	15	13	1
IND8	Telecommunication	11 (3.4%)	3	7	1
IND9	Financial services and insurance	38 (11.8%)	15	22	1
IND10	Real estate conveyance and leasing	3 (0.9%)	1	2	-
IND11	Business and research support and service	56 (17.3%)	31	25	-
IND12	Sports and entertainment	13 (4.0%)	1	12	-
IND13	Other public and private repair services	1 (0.3%)	1	-	-
	Total	**323 (100%)**	**150**	**164**	**9**

N.B.: *Estimations with the industry dummy variables had dropped the observations in IND1 and IND13 due to the sample size in the sub-group.* Source: Korea Information Service

Table 4. Descriptive Summary

Variables	*Type*	*Operational Definition*	*Mean*	*Std. Dev.*	*Min*	*Max*
Dependent Variable						
CRB_{it}	B/D	1 = Collective relationship banking; 0 = otherwise	.516	.500	0	1
Independent Variables						
OWN_{it}	L/C	Major shareholding by the group company (%)	33.159	32.055	0	100
$NIAR_{it}$	C	Net income to asset ratio	-.768	21.498	-479.26	372.46
AGE_{it}	L/C	Age of the company	17.827	14.208	0	72
Industry Dummies						
$IND1_{it}$	B/D	1 = mining; 0 = otherwise	.004	.064	0	1
$IND2_{it}$	B/D	1 = manufacturing; 0 = otherwise	.341	.474	0	1
$IND3_{it}$	B/D	1 = Utilities; 0 = otherwise	.056	.230	0	1
$IND4_{it}$	B/D	1 = construction; 0 = otherwise	.063	.243	0	1
$IND5_{it}$	B/D	1 = retail and wholesale; 0 = otherwise	.091	.288	0	1
$IND6_{it}$	B/D	1 = hotel and food service; 0 = otherwise	.025	.155	0	1
$IND7_{it}$	B/D	1 = transportation; 0 = otherwise	.085	.279	0	1
$IND8_{it}$	B/D	1 = telecommunication; 0 = otherwise	.022	.147	0	1
$IND9_{it}$	B/D	1 = financial services and insurance; 0 = otherwise	.125	.331	0	1
$IND10_{it}$	B/D	1 = conveyance and leasing; 0 = otherwise	.010	.099	0	1
$IND11_{it}$	B/D	1 = business support and service; 0 = otherwise	.135	.342	0	1
$IND12_{it}$	B/D	1 = sports and entertainment; 0 = otherwise	.040	.195	0	1
$IND13_{it}$	B/D	1 = other public and private repair services; 0 = otherwise	.002	.042	0	1
Group Dummies						
$G1_{it}$	B/D	1=Daelim; 0=otherwise	.037	.190	0	1
$G2_{it}$	B/D	1=Daewoo; 0=otherwise	.039	.193	0	1
$G3_{it}$	B/D	1=Dongah; 0=otherwise	.023	.148	0	1
$G4_{it}$	B/D	1=Doosan; 0=otherwise	.056	.230	0	1
$G5_{it}$	B/D	1=Hanhwa; 0=otherwise	.071	.257	0	1
$G6_{it}$	B/D	1=Hanjin; 0=otherwise	.051	.221	0	1
$G7_{it}$	B/D	1=Hyosung; 0=otherwise	.041	.198	0	1
$G8_{it}$	B/D	1=Hyundai; 0=otherwise	.036	.187	0	1
$G9_{it}$	B/D	1=Hyundai Motor; 0=otherwise	.055	.228	0	1
$G10_{it}$	B/D	1=Hyundai Oil; 0=otherwise	.008	.090	0	1
$G11_{it}$	B/D	1=Kohap; 0=otherwise	.009	.094	0	1
$G12_{it}$	B/D	1=Kumho; 0=otherwise	.045	.207	0	1
$G13_{it}$	B/D	1=LG; 0=otherwise	.154	.361	0	1
$G14_{it}$	B/D	1=Samsung; 0=otherwise	.173	.378	0	1
$G15_{it}$	B/D	1=SK; 0=otherwise	.149	.357	0	1
$G16_{it}$	B/D	1=Ssangyong; 0=otherwise	.053	.223	0	1
Firm Creation Dummy						
TM_{it}	B/D	1=Taken over or Merged; 0=otherwise	.305	.461	0	1

Number of companies:	$I = 1,\ldots, 323$
Number of years:	$T = 1,\ldots, 9$
Total number of observation (unbalanced panel):	$NxT = 2222$

N.B.:
1. Some of the figures may differ from those in Tables 2 & 3 as they were constructed from the firm-level cross-sectional data whilst Table 4 is based on the entire panel N x T.
2. Binary (B), Likert (L), Continuous (C), and Discrete (D)

Table 6. Marginal Effects after the PA Estimations with Industry and TM Dummy Variables

Dependent Variable: (CRB_{it})	***Population Averaged Logit (dy/dx)***	***Complementary Log-log Population Averaged (dy/dx)***
OWN_{it}	-.0003**	-.0003***
$NIAR_{it}$	.0002**	.0002**
AGE_{it}	.0022***	.0018***
$IND3_{it}$	-.4566***	-.4403***
$IND4_{it}$	-.0727	-.0605
$IND5_{it}$	-.01414	-.0363
$IND6_{it}$	-.1362	-.1856
$IND7_{it}$	-.0387	-.0185
$IND8_{it}$	-.1429	-.1116
$IND9_{it}$	-.1489	-.1914****
$IND10_{it}$	-.2218	-.2554
$IND11_{it}$	.0162	.0181
$IND12_{it}$	-.4421***	-.4160***
TM_{it}	-	-.2372***
Y predicted at the mean	.467	.451

Standard errors are in the parentheses.
,,*** Z-values significant at the 5%, 2.5%, and 1% levels respectively*
,,*** χ^2 -values significant at the 5%, 1%, and 0.1% levels respectively*

Table 8. Dynamic Estimation

Dependent Variable: (CRB_{it})	***Random Effects Logit***		***Population Averaged Logit***		***Complementary Log-log Population Averaged***	
	Coef (S.E)	***Z***	***Coef (S.E)***	***Z***	***Coef (S.E)***	***Z***
CRB_{it-1}	10.874	14.66***	10.865	14.63***	6.788	15.90***
	(.742)		(.742)		(.427)	
OWN_{it}	-.004	-.38	-.004	-.38	-.004	-1.30
	(.011)		(.011)		(.003)	
$NIAR_{it}$	-.006	-.52	-.006	-.52	-.001	-.06
	(.012)		(.012)		(.006)	
AGE_{it}	-.016	-.60	-.016	-.60	.004	.46
	(.027)		(.027)		(.009)	
Constant	-4.593	-5.74***	-4.591	-5.73***	-4.923	-10.42***
	(.800)		(.801)		(.473)	
$\chi^2(4)$	229.68**		228.81***		252.98***	
Log likelihood	-56.10					
No. of groups	316		316		316	
No. of obs	1879		1879		1879	

Standard errors are in the parentheses.
,,*** Z-values significant at the 5%, 2.5%, and 1% levels respectively*
,,*** χ^2 -values significant at the 5%, 1%, and 0.1% levels respectively*

Table 9. Cross-sectional Logit Estimation for Each Year

Dependent Variable: (CRBi)	**1994** *Coef (S.E)*	**1995** *Coef (S.E)*	**1996** *Coef (S.E)*	**1997** *Coef (S.E)*	**1998** *Coef (S.E)*	**1999** *Coef (S.E)*	**2000** *Coef (S.E)*	**2001** *Coef (S.E)*	**2002** *Coef (S.E)*
OWN$_i$	-006	-.008	-.006	-.004	-.004	-.010**	-.008*	-.010***	-.009**
	(.005)	(.005)	(.005)	(.005)	(.005)	(.005)	(.004)	(.004)	(.004)
NIAR$_i$	-.021	-.007	-.023	.018	.008	.019*	.021***	.010*	-.001
	(.028)	(.014)	(.022)	(.022)	(.008)	(.011)	(.009)	(.006)	(.003)
AGE$_i$	.011	.004	.004	.014	.016	.012	.016*	.010	.010
	(.013)	(.012)	(.012)	(.011)	(.011)	(.011)	(.009)	(.009)	(.009)
Constant	.157	.357	.323	-.013	-.074	.146	-.031	.226	.162
	(.344)	(.327)	(.338)	(.317)	(.335)	(.313)	(.271)	(.274)	(.287)
$\chi^2(3)$	3.32	3.48	3.26	4.19	5.26	10.35*	15.45**	14.89**	9.34*
Log likelihood	-125.85	-133.11	-139.08	-152.78	-153.76	-165.48	-198.08	-208.08	-200.33
No. of obs	185	197	205	224	226	247	299	312	296

Standard errors are in the parentheses.
*,**,*** *Z-values significant at the 5%, 2.5%, and 1% levels respectively*
*,**,*** χ^2 *-values significant at the 5%, 1%, and 0.1% levels respectively*

Table 10. Summary of Switching in Banking Relationship

Co. ID	*NIAR prior to the switch*	*Average NIAR prior to the switch*	*Average OWN prior to the switch*	*Age as of 2002*	*Group (Industry)*	*Changes in Corporate Structure*
Switched from IRB → CRB						
ID78	3 consecutive years of decline	-1.87	88.3	12	Hanjin (Transportation)	Recent take-over by Hanjin group
ID95	2 consecutive years of decline	-11.74	60	5	Hyosung (Construction)	Joint-venture set-up with a Japanese partner
ID155	No particular pattern around 0 to 1	.92	2.58	33	LG (Manufacturing)	Overseas expansion via joint-venture increased foreign debts
ID163	4 consecutive years of decline	2.59	40	6	LG Utilities (Energey)	Departure of a foreign partner - Powergen
ID168	Extremely bad start	-168.06	100	2	LG (Telecomm)	Multi-media internet business with little capital
ID238	2 consecutive years of loss although improved	-4.20	65.43	4	Samsung (Financial services and Insurance)	A series of mergers with foreign and domestic partners
Switched from CRB → IRB						
ID87	5 consecutive years of decline	-1.03	100	15	Hyosung (Manufacturing)	Hyosung group took over from a US partnet, Dryvit System Inc.
ID94	One year decline	3.62	33.50	13	Hyosung (Manufacturing)	Merged into Hyosung group from foreign partners, Ebara and Flowserve
ID223	One year decline	-14.31	54.45	2	Samsung (Retail and wholesale)	Newly set-up online pharmaceutical information service company

References

Abiru, M., Nahata, B., Raychaudhuri S. and Waterson, M. (1998). 'Equilibirum structure in vertical oligopoly', *Journal of Economic Behaviour and Organization*, 37, pp. 463-480.

Agenor, P., Miller, M., Vines, D. and Weber, A. (1999). *The Financial Crisis – Causes, Contagion and Consequences*, Cambridge: Cambridge University Press.

Allen, F. (1990). 'The market for information and the origin of financial intermediation', *Journal of Financial Intermediation*, 1, pp. 3-30.

Arellano, M. and Bond, S. (1991). 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *Review of Economic Studies*, 58, pp. 277-297.

Berger, A. N. and Udell, G. F. (2002). 'Small business credit availability and relationship lending: The importance of bank organisational structure', *Economic Journal*, 112 (477), pp. F32-F53.

Boot, A. (2000). 'Relationship banking: What do we know?', *Journal of Financial Intermediation*, 9, pp. 7-25.

Boot, A. and Thakor, A. (1999). 'Can relationship banking survive competition', *Journal of Finance*, 55(2), pp. 679-713.

Carletti, E. (2004). 'The structure of bank relationships, endogenous monitoring and loan rates', *Journal of Financial Intermediation*, 13, pp. 58-86.

Cerasi, V. and Daltung, S. (2003). 'Diversification and delegation in firms', Financial Markets Group Discussion Paper No. DP403, London School of Economics, London, http://fmg.lse.ac.uk/pdfs/dp403.pdf.

Chamberlain, G. (1980). 'Analysis of Covariance with qualitative data', *Review of Economic Studies*, 47, pp. 225-238.

Chamberlain, G. (1984). 'Panel data', in Griliches, S. and Intriligator, M. (ed.), *Handbook of Econometrics*, Amsterdam: North-Holland.

Cho, S. (1994). *The Dynamics of Korean Economic Development*, Washington DC: Institute for International Economics, London: Longman (distributor).

Dewatripont, M. and Maskin, E. (1995). 'Credit and efficiency in centralised and decentralized economies', *Review of Economic Studies*, 62(4), pp. 541-555.

Diamond, D. (1984). 'Financial intermediation and delegated monitoring', *Review of Economic Studies*, 51(3), pp. 393-414.

Diamond, D. (1991). 'Monitoring and reputation: The choice between bank loans and privately placed debt', *Journal of Political Economy*, 99, pp. 689-721.

Dixit, A. K. (2004). *Lawlessness and Economics-Alternative Modes of Governance*, Princeton, N.J.: Princeton University Press.

Fama, E. (1985). 'What's different about banks?', *Journal of Monetary Economics*, 15, pp. 29-36.

Galbraith, J. K. (1954). 'Countervailing power', *American Economic Review*, 44(2), pp. 1-6.

Greene, W. (2003). *Econometric Analysis, 5th edition*, Upper Saddle River, N.J.: Prentice Hall.

Haggard, S., Lim, W. and Kim, E. (2003). *Economics Crisis and Corporate Restructuring in Korea: Reforming the Chaebol*, Cambridge: Cambridge University Press.

Hart, O. and Moore, J. (1990). 'Property Rights and the Nature of the Firm', *Journal of Political Economy*, 98(6), pp. 1119-1158.

Hauswald, R. and Marquez, R. (2000). 'Relationship banking and competition under differentiated asymmetric information', Centre for Financial Institutions working paper series No.00-13, Wharton School Centre for Financial Institutions, University of Pensilvania, Philadelphia, http://fic.wharton.upenn.edu/fic/papers/00/0013.pdf.

Lee, C. H., Lee, K. and Lee, K. (2002). 'Chaebols, Financial Liberalization and Economic Crisis: Transformation of Quasi-Internal Organization in Korea', *Asian Economic Journal*, 16(1) , pp. 17-35.

Padilla, A. J. and Pagano, M. (1997). 'Endogenous communication among lenders and entrepreneurial incentives', *Review of Financial Studies*, 10, pp. 205-236.

Ramakirshnan, R. and Thakor, A. (1984). 'Information reliability and a theory of financial intermediation', *Review of Economic Studies*, 51, pp. 415-432.

Panetta, F. and Focarelli, D. (2003). 'Are mergers beneficial to consumers? Evidence from the Italian market for bank deposits', Bank of Italy Working Papers: CEIS Tor Vergata – Research Paper Series No.10, Bank of Italy, Rome, http://ssrn.com/abstract=286992.

Salinger, M. (1988). 'Vertical Mergers and Market Foreclosure', *Quarterly Journal of Economics*, 103(2), pp. 345-356.

Salinger, M. (1989). 'The Meaning of 'Upstream' and 'Downstream' and the Implications for Modelling Vertical Mergers', *Journal of Industrial Economics*, 37(4), pp. 373-387.

Shin, G. H. and Kolari, J. W. (2003). 'Do Some Lenders Have Information Advantages? Evidence from Japanese Credit Market Data', *Journal of Banking and Finance*, 28, pp. 2331-2351.

Stiglitz, J. and Weiss, A. (1981). 'Credit Rationing in Markets with Imperfect Information', *American Economic Review*, 71, pp. 393-410.

Thakor, A. V. (2000). 'Relationship Banking', *Journal of Financial Intermediation*, 9, pp. 3-5.

Villas-Boas, J. M. and Schmidt-Mohr, U. (1999). 'Oligopoly with Asymmetric Information: Differentiation in Credit Markets', *RAND Journal of Economics*, 30(3), pp. 375-396.

Von Thadden, E. L. (1992). 'The commitment of finance, duplicated monitoring and the investment horizon', CEPR Financial Markets Paper No.27, CEPR, London.

Waterson, M. (1984). 'Bilateral Monopoly', in *Economic Theories of the Industry*, Cambridge: Cambridge University Press.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data*, Cambridge: MIT Press.