THREE ESSAYS ON THE ROLE OF BANK LENDING

By

Eun Sup Sim

THESIS

Submitted to
KDI School of Public Policy and Management
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY
IN PUBLIC POLICY

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CHAPTER 1

WHAT DO HOUSE PRICES AND INCOME INEQUALITY TELL ABOUT FINANCE AND GROWTH ?

ABSTRACT

This paper analyzes the dynamic effects of credit supply on economic growth and the short- and long-term relationship between house prices and income inequality in 18 OECD countries. It was found that increased income inequality expands credit supply in the short term but reduces credit supply in the long term. Increasing house prices contribute positively to greater credit supply and drive economic growth. However, when house prices are higher than long-run equilibrium levels, credit supply can negatively contribute to economic growth. Finally, income inequality has a negative influence on the effect of credit supply on economic growth when it is at a higher phase than the long-run equilibrium level. These results suggest that when an excessive increase in house prices and income inequality occurs, it is necessary to consider the possibility that increasing credit supply may not boost economic growth is necessary.

I. INTRODUCTION

Financial development has been accepted to promote investment and expenditure by relaxing the financial constraints faced by the main agents of the economy (Goldsmith, 1969; King and Levine, 1993). Levine (2005) finds that financial development contributes to economic growth through five main financial functions: production and allocation of information, efficient monitoring and exertion of corporate governance, management of risk, efficient mobilization of savings, and improvements in the exchange of goods and services. Research prior to the global financial crisis (Rajan and Zingales, 1998; Beck et al., 2000; Rioja and Valev, 2004) agreed that financial development leads to economic growth, but some studies since the crisis indicate that financial development does not necessarily contribute positively to economic growth. Cecchetti and Kharroubi (2012, 2015) demonstrate that much collateral and supply of finance is distributed to parts of the economy with lower productivity in developed countries with relatively higher financial development. Moreover, outstanding employees cluster around the financial industry, thus causing a decrease in technological innovation and productivity in the economy as a whole. This finding implies that financial development actually hinders economic growth, and it provides a counter argument to the belief that the contribution of the financial industry increases as the economy grows (Rioja and Valev, 2004).

A number of studies on the financial crisis found that when credit is limited to specific industries, it may lead to asset price bubbles, which may lead to systemic failure when they finally burst and worsen the instability of the economy (Minsky, 1982; Shin, 2010; Muellbauer, 2010). Shin (2010) provides a theoretical model to explain that the instability of the real economy arising from the process of asset price boom and burst is

caused and intensified by internal systemic factors, such as market risk management techniques and evaluation systems including Value at Risk (VaR) and Asset-Liability Management (ALM). In particular, the importance of the real estate sector was reaffirmed during the 2008 global financial crisis. Herring and Wachter (1999) argue that the supply of real estate assets is limited in the short term and short selling is impossible, and is thus fragile to optimistic view. They also claim that the supply of real estate assets causes great financial instability. Muellbauer (2007, 2010, 2013) emphasizes that in the interdependence between the financial and the real sector, the household sector plays a more important role than the investment-centered corporate sector.

Since the global financial crisis, concern regarding income inequality (or income distribution) has increased. With respect to the effect of financial development on income inequality, previous research suggests that financial development directly offers investment opportunities to small businesses that lack collateral, provides higher human capital formation through education of low-income groups, and indirectly helps mitigate income inequality by providing jobs to unskilled workers through investment (Demirguc-Kunt and Levine, 2009). Greenwood and Jovanovic (1990) and Clarke et al. (2006) argue that increased financial supply exacerbates inequality just before the economy reaches maturity, but the economy contributes to improving inequality once it is matured. Nevertheless, although the majority of research supports the positive effect of mitigating income inequality by reducing informational barriers or high transaction costs faced by small firms (Beck et al., 2008), some studies (ILO, 2008) stress that increased economic volatility and the side effects of an economic crisis can cause a relatively large shock to low-income groups.

Many studies suggest that increased income inequality escalates indebtedness in the private sector and may possibly lead to a financial crisis, which negatively affects economic growth. Previous research on economic crises (Stiglitz, 2009; Rajan, 2010; Fitoussi and Saraceno, 2009; Perugini et al., 2015) indicates that the main cause of a financial crisis is intensified inequality. Kumhof and Ranciere (2010) and Iacoviello (2008) empirically found that increased household debt is related to intensified inequality. Kumhof et al. (2013) propose a theoretical framework that endogenously determines the increase in the income of higher-income groups and borrowing in the lower-mid group and increase in the likelihood of a financial crisis. Perugini et al. (2015) demonstrate the relationship between financial crisis and inequality through an analysis of 18 OECD countries from 1970–2007. They argue that the previous perspective that distribution of income has no bearing on macroeconomic stability should be reconsidered, and that monetary and financial policymakers should pay more attention to income distribution to improve stability in the financial system.

Galor and Zeira (1993), Piketty (1997), and Berg and Ostrey (2011) argue that increased income inequality inhibits economic growth because it disrupts the formation of human capital in low-income groups. Barro (2000) states that while deepening the inequality in income harms economic growth in mature economies, it promotes growth in underdeveloped countries.

Angeles (2015) shows from evidences that corporate lending contributes positively to economic growth, while household debt increases the possibility of a financial crisis, which implies that although credit expansion promotes economic growth, there is the drawback that a financial crisis may also occur as a result. In addition, corporate lending increases economic growth by allowing firms to purchase raw materials and build up capital, but

household debt does little to help growth as most are only used for consumption-smoothing, with the exception of tuition loans which help develop human capital.

Research introduced so far can be summarized as follows: the level of credit supply is highly correlated to income inequality and house prices, and the effect of credit supply on economic growth can differ according to income inequality and house prices. Whereas previous studies focus mostly on the partial relationship between the two variables, this paper closely examines the short- and long-term relationships among economic growth, credit supply, house prices and income inequality. That is, in consideration of economic growth, credit supply, house prices, and income inequality as endogenous variables that interact with one another, this study examines the existence of long-run equilibrium relationships among the variables and the short-term effects using panel time-series analyses such as cointegration test and error correction model (ECM). In particular, this study considers interdependence and heterogeneity among countries, and thus the empirical analysis is conducted around the pooled mean group estimator (PMG).

An empirical analysis of the long- and short-term relationships among economic growth, credit supply, house prices, and income inequality shows that, in the long run, credit supply is dependent on the level of economic growth, house prices, and income inequality; house prices are determined by income inequality; and income inequality is affected by credit supply. Increased income inequality expands credit supply in the short term but reduces it in the long term. Increased house prices contributes positively to greater credit supply and drives economic growth. Conversely, credit supply negatively contributes to economic growth when house prices are higher than the long-run equilibrium level. This effect is likely due to the procyclicality caused by the interaction between credit supply and house prices. Consequently, income inequality has a negative influence on the effect of

credit supply on economic growth when it is at a higher phase than the long-run equilibrium level. With this result, this paper provides detailed evidence to the argument by Angeles (2015) that household debt is strongly correlated to financial crisis, and the argument by Cecchetti and Kharroubi (2012, 2015) that in developed countries financial development may hinder economic growth. Hence, when variables which are closely linked to an increase in household debt are above their long-term equilibrium levels, credit supply adversely affects economic growth in the short-run.

This paper is organized as follows. In section 2, the hypotheses are presented and developed. Section 3 analyze the long-run equilibrium relationships and short-term effects among economic growth, credit growth, house prices and income inequality through panel time-series analyses. Section 4 examines the influence of house prices and income inequality on the effect of credit supply on economic growth, followed by a conclusion in Section 5.

Ⅱ. HYPOTHESIS DEVELOPMENT

Based on studies by Angeles (2015) and Cecchetti and Kharroubi (2012, 2015) which present differing views from the previous, traditional ones regarding the impact of credit expansion on economic growth, this study starts with the assumptions that the effect of credit supply on economic growth varies according to income inequality (income distribution) and house price levels. This assumption is more likely to occur when credit supply is closely related to household sectors than to corporate sectors, because household demands for funds have a close relationship with the shortage of living expenses driven by low income and home ownership.

As income inequality deepens, banks face a new environment in which there is an increased demand for loans from low-income groups, who need funds to pay for their daily expenses. However, it is clear that banks benefit from an increased level of credit supply from high-income groups as their savings increase. As a consequence of more savings and loan demands, an overall increase in the level of credit supply can be anticipated. This coincides with the argument that increased income inequality is a cause of increased household debt as seen in previous research (Stiglitz, 2009; Rajan, 2010; Fitoussi and Saraceno, 2009; Perugini et al., 2015).

Previous studies present contradicting stances on whether income inequality has an effect on house prices. Herring and Wachter (1999) show that, unlike other assets, houses are in limited supply in preferred residential areas, and short selling is difficult. Therefore, houses are vulnerable to upward pressure on prices, and income inequality increases the reservation prices of high-income groups, which have superior financing capacity. Many empirical studies (Gyourko et al., 2013; Moretti, 2011) also argue that widening the income

gap increases regional house price differentiation. However, Määttänen and Terviö (2014) argue that greater income inequality does not cause house prices to increase overall; rather, it decreases house prices on average. Acknowledging regional differences in house prices due to increased income inequality, price increases in preferred residential areas is expected. In this case, borrowing for house purchases should increase for mid- to high-income groups.

Whereas increased savings in high-income groups improves the lending capacity of financial firms, the higher financing demand of low-income groups which have a deteriorated repayment capacity increases the credit risk of a bank loan. If banks apply strict lending standards in such circumstances, in other words, decreased loan opportunities for low-income families with less repayment capacity, existing loan customers in the upper-middle group will enjoy improved credit accessibility. Therefore, the benefits of improved lending capacity are likely to reach the upper middle class. In this case, an improvement in bank credit supply extends income inequality. This is particularly worse in an environment where sufficient demand by the upper-middle class exists for loans to buy homes. However, if the upper-middle class demands financing below the supply capacity of banks, banks will inevitably ease their lending standards and expand their targets to low-income groups.

H1. Increased income inequality triggers credit expansion and raises the price of homes.

As income inequality increases, the improvement in the credit supply capacity of financial institutions due to the increase in savings of high-income groups benefits mainly the existing customer base and further intensifies income inequality.

A number of studies including that of IMF (2009, 2011) show a high correlation between house prices and household debt. Given that an increase in asset prices increases the collateral value, rising collateral value promotes credit supply. However, credit

expansion may lead to a bubble through the interaction between asset price. Muellbauer (2007, 2010) emphasizes the importance of the housing market in macroeconomics by highlighting the change of credit supply driven by financial firm's capital change having close relationship with the housing market. Shin (2010) also presents a theoretical model in which asset prices interact with credit supply to endogenously generate rising and falling phases.

If credit supply interacts with house prices to endogenously cause or deepen the change in house prices, then when houses are priced above their long-term equilibrium levels credit supply helps form an asset bubble or distribute resources in less productive areas, and thus it is difficult to expect a positive effect of credit supply on the economy.

H2. Increased house price generally contributes to greater credit supply.

In consideration of the endogenous procyclicality caused by the interaction between credit supply and asset price, the contribution of credit to economic growth is limited or negative in times of positive deviation from the long-run house price.

As seen in Hypothesis 1, increased credit supply deepens income inequality as it benefits only the existing players, and hence as suggested by Barro (2000) and Berg and Ostrey (2011), income inequality adversely affects economic growth. If this is the case, an increase in credit supply would impair economic growth, as it is diverted to less productive areas of the economy such as providing loans for low-income to cover their living expenses.

H3.As improvement in the credit supply capacity of financial institutions further intensifies income inequality according to Hypothesis 1, the contribution of credit to economic growth is limited or negative in times of positive deviation from the long-run income inequality.

Ⅲ. PANEL TIME-SERIES ANALYSIS

1. Data

To analyze the short- and long-term relationships among economic growth, credit supply, house prices, and income inequality, the annual panel time-series data from 18 developed countries, including the United States and the United Kingdom, from 1981 to 2010 was used. The panel time-series analysis is useful because it complements country-specific time-series analyses that have statistical weaknesses, such as sample size restriction. The variables used are gross domestic product(GDP per capita), Credit-to-GDP ratio, House Price Index (HPI), and the GINI Index.

GDP per capita and Credit-to-GDP ratio were obtained from the World Bank's World Development Indicator (WDI) database. House Price Index was obtained from the house price database of the Federal Reserve Bank of Dallas which includes the long-run residential property price index researched by the Bank for International Settlements. GINI index was taken from the Standardized World Income Inequality Database, a time-series database based on the results of the Luxembourg Income Study, which provides a standardized way to compare across countries. GDP per capita, Credit-to-GDP ratio and House Price Index are the real variables. Four variables, including the GINI Index, are natural log-transformed.

In this study, 18 developed countries were selected with thorough consideration of the availability of long-term time-series data such as house price and a high levels of financial development in the target countries. The study was partially limited to developed countries to obtain long-term time-series data. Nevertheless, it allows for variations caused

by differences in level of economic and financial development to be controlled. As this study uses annual data from 30 year span(1981 to 2010), it provides an excellent environment to analyze the effect of credit supply on economic growth in a developed financial market. Beginning in 1980, countries witnessed a global increase in financial market liberalization, which inevitably led to greater market efficiency. However, macro-economic shocks such as financial crises of different magnitudes were also observed.

Table 1-1. Summary Statistics of Variables

	Ln(GDP)	Ln(Credit)	Ln(GINI)	Ln(HPI)
Mean	10.89	4.479	3.336	4.284
Median	10.37	4.504	3.343	4.288
Maximum	15.23	5.428	3.632	5.109
Minimum	9.38	3.031	2.956	3.205
Std. Dev.	1.37	0.505	0.151	0.387
Observations	540	540	540	540

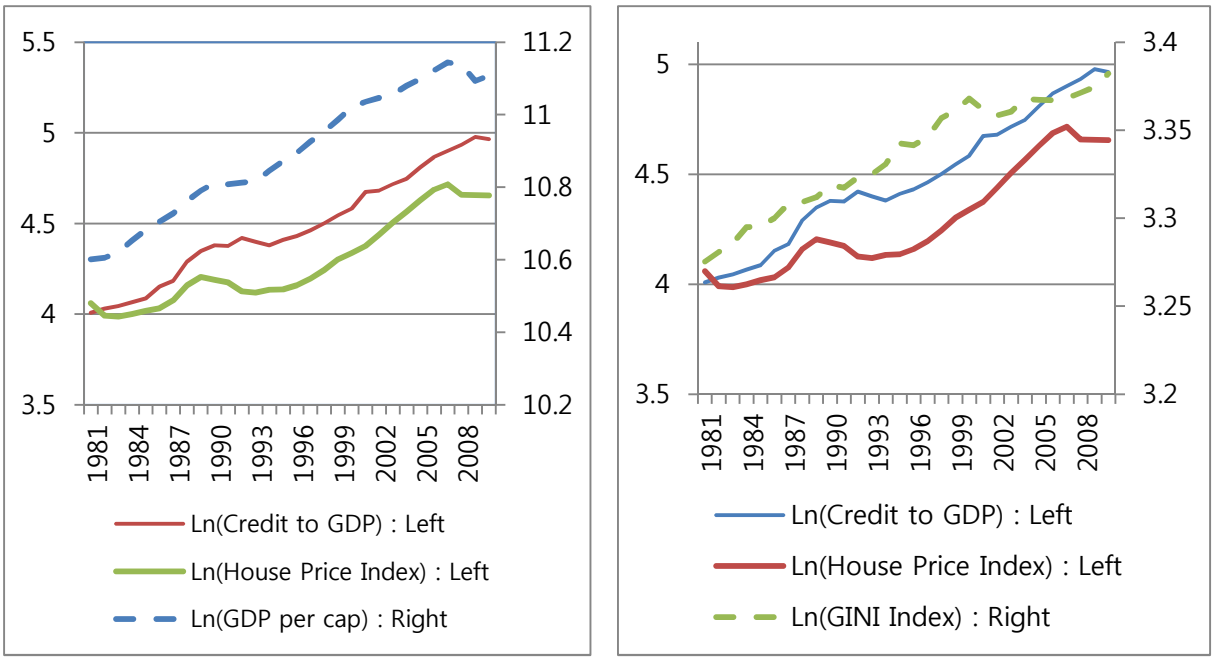

Figure 1-1. Trends over 30 years among variables(mean value)

2. Unit Root Test and Panel Cointegration Test

In the panel time-series analysis, macroeconomic variables such as GDP per capita, Credit-to-GDP ratio, House Price Index, and GINI index are tested for non-stationarity. The following panel model is estimated:

$$\Delta y_{it} = \underbrace{\alpha_i}_{constant} + \underbrace{\phi_i t}_{trend} + (\rho_i - 1) y_{it-1} + \sum_{j=1}^{p} \phi_{ij} \Delta y_{it-j} + e_{it}$$

$$H_0 : \rho_i - 1 = \gamma_i = 0 \quad \text{for all } i$$
$$H_a : \rho_i - 1 = \gamma < 0 \quad \text{for all } i \quad \text{(LLC, Breitung, Hadri*)}$$
$$H_a : \rho_i - 1 = \gamma_i < 0 \quad \text{for all } i \quad \text{(IPS, ADF-fisher)}$$

Table 1-2. Results of the Panel Unit Root Test (p-value)

	Common unit root process			Individual unit root process	
	LLC	Breitung	Hadri	IPS	ADF-Fisher
Ln(GDP)	0.916	0.987	0.000	0.598	0.701
Ln(Credit)	**0.049**	0.630	0.000	0.765	0.795
Ln(HPI)	0.060	0.073	0.000	0.115	0.084
Ln(GINI)	0.191	0.295	0.000	0.314	0.213

Note : For unit root verification, the test that includes individual effects and individual linear trends was used. For the automatic selection of lag length, Schwarz's method, the Newey–West automatic bandwidth selection, and the Bartlett kernel method were used.

As presented in Table 1-2, five panel unit root verification tests show that all series are non-stationary. The processes used are LLC, Breitung and Hadri, which assume a common unit root process, and Im, Pesaran, and Shin and ADF–Fisher verification, which assume an individual unit root process. Although the LLC verification of Credit-to-GDP ratio rejects the assumption of the existence of a unit root, it is shown to be a non-stationary time-series in all other tests. These results suggest the possibility that a simultaneous

correlation exists in the Credit-to-GDP ratio variable (O'Connell, 1998). The four variables become a stable time-series at the 1% level in the first-order differential.

With the unit root tests, confirmation that variables are I(1) and non-stationary was possible, and thus further verifications were conducted to test whether the linear combination of variables form stationarity. The following cointegration ECM model of Westerlund (2007) is implemented:

$$\begin{aligned}\Delta \ln hp_{it} = {} & \mu_i + \phi_i t + \alpha_i \{\ln hp_{it-1} - \beta_i \ln gdp_{it-1} \\ & - \gamma_i \ln ctgdp_{it-1} - \delta_i \ln gini_{it-1}\} \\ & + \tau_{1i} \Delta \ln hp_{it-1} + \tau_{2i} \Delta \ln gdp_{it-1} \\ & + \tau_{3i} \Delta \ln ctgdp_{it-1} + \tau_{4i} \Delta \ln gini_{it-1} + \epsilon_{it}\end{aligned}$$

The above model reflects different constant terms and trend terms for each i, and it assumes an independence of error terms for different *i* and *t*. The coefficient estimate $\hat{\alpha}$, which refers to adjustment speed, is less than zero if cointegration exists, and is equal to zero if no such relationship exists. Westerlund (2007) presents a group average test statistic that sets the alternative hypothesis that a cointegration relationship is present at least for one *i*, and a panel test statistics that verifies the alternative hypothesis that cointegration exists for all *i*. The same model is applied to Credit-to-GDP ratio, GINI index, and GDP per capita, but no cointegration relationship occurs in almost all models. However, a bootstrap method can be used if interdependence exists among the cross-sections of the panel (Persyn and Westerlund, 2008). The possibility of a cointegration relationship among Credit-to-GDP ratio, House Price Index, and GINI index exists using this method, as shown in Table 1-3. For Credit-to-GDP ratio, a cointegration relationship seems to exist in both cases regarding the addition of aconstant term. However, for GINI index and House price index, models

including and excluding the constant term, respectively, show the possibility of a cointegration.

Table 1-3. Results of the ECM Panel Cointegration Test

Constant: *o* & Trend: *x*

	Gt	Ga	Pt	Pa
Ln(GDP)	0.970	0.960	0.950	0.910
Ln(Credit)	**0.010**	0.410	0.140	0.240
Ln(HPI)	0.550	0.580	0.440	0.300
Ln(GINI)	**0.030**	0.310	0.190	0.470

Constant: *x* & Trend: *x*

	Gt	Ga	Pt	Pa
Ln(GDP)	1.000	1.000	0.940	0.940
Ln(Credit)	**0.000**	0.230	**0.050**	**0.050**
Ln(HPI)	0.240	**0.050**	0.240	0.200
Ln(GINI)	0.720	0.870	0.800	0.850

3. Granger Causality Test

To analyze the lead–lag relationship among variables, a Granger causality test was conducted. Figure 1-2 shows the relationship between the pairwise Granger causality test, which assumes common coefficients, and the pairwise Dumitrescu–Hurlin panel causality test, which assumes individual coefficients.

The tests assuming common coefficients show that the variables granger-cause one another in the following manner. GINI Index causes House Price Index; House Price Index causes GDP per capita and Credit-to-GDP Ratio; credit supply causes economic growth and income inequality; and economic growth causes House Price Index. In the tests assuming individual coefficients, income inequality may cause economic growth; economic growth causes credit supply; and credit supply causes income inequality.

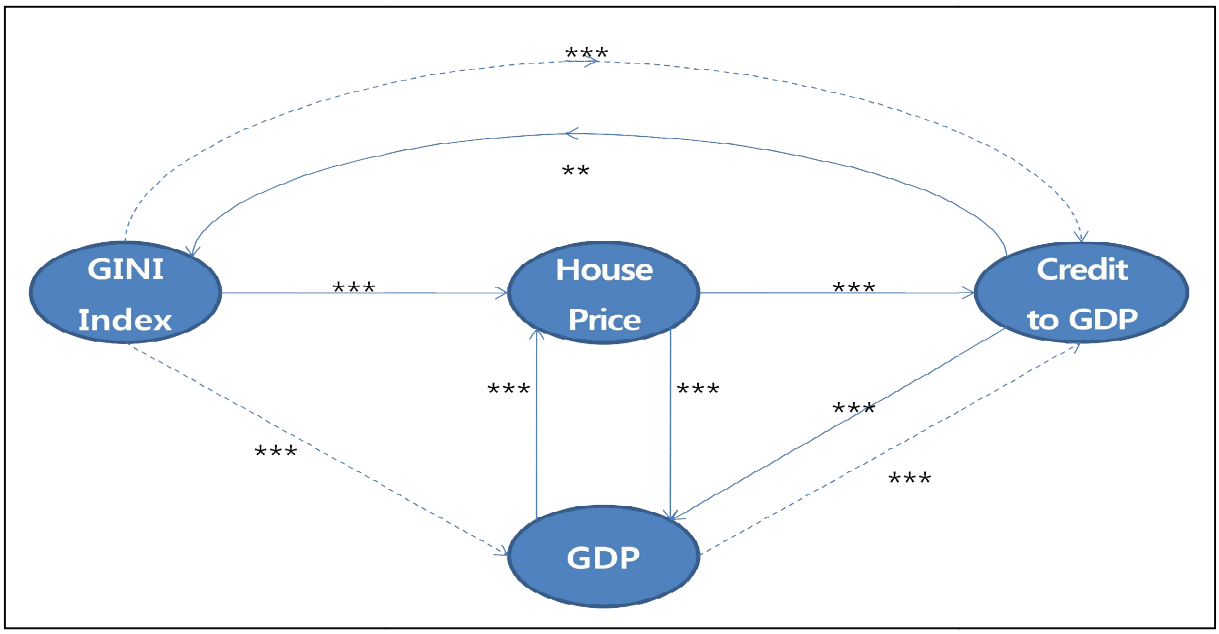

Figure 1-2. Result of the Granger Causality Test

Note: *** and** denote 1% and 5% significance levels, respectively, and the dotted lines indicate significance only for the pairwise Dumitrescu–Hurlin panel causality tests.

4. Results of The Error Correction Model Estimation

An Error Correction Model (ECM) is estimated for Credit-to-GDP Ratio, House Price Index, and GINI Index which reject the null hypothesis that no cointegration exists in the cointegration test. The estimation for the model enables us to identify short- and long-term relationships among the variables. The dynamic fixed effect model (DFE) and the pooled OLS model (POLS) are estimated according to the inclusion of constant term, and the pooled mean group model (PMG) (Pesaran et al., 2000) is estimated regardless of the inclusion of a constant term. Both DFE and POLS models assume that the parameters, which represent short- and long-term relationships, are the same, whereas the PMG model assumes that the parameters for a long-run equilibrium relationship are the same but different for each panel group that represents a short-term relationship. PMG sets 18

estimation equations for each panel group and applies a seemingly unrelated regression. Therefore, PMG estimation is preferred if a simultaneous correlation exists among the panel groups.

ECM estimation for Credit-to-GDP Ratio

The ECM estimation model for Credit-to-GDP Ratio is as follows:

$$\begin{aligned}\Delta \ln ctgdp_{it} = (\mu_i) + \alpha_i\{&\ln ctgdp_{it-1} - \beta_i \ln hp_{it-1} \\ &- \gamma_i \ln gdp_{it-1} - \delta_i \ln gini_{it-1}\} \\ &+ \tau_{1i}\Delta \ln hp_{it-1} + \tau_{2i}\Delta \ln gdp_{it-1} \\ &+ \tau_{3i}\Delta \ln ctgdp_{it-1} + \tau_{4i}\Delta \ln gini_{it-1} + \epsilon_{it}\end{aligned}$$

Table 1-4. Results of the ECM panel cointegration estimation:Δln(Credit-to-GDP Ratio)

	PMG (1)	DFE (2)	PMG (3)	POLS (4)
$\hat{\alpha}$	**-0.1733*** **	**-0.1611*** **	**-0.0655*** **	**-0.0636*** **
$\hat{\beta}$	**0.6053*** **	**0.8287*** **	**0.9680*** **	**0.8899*** **
$\hat{\gamma}$	**0.8748*** **	**0.7561** **	**0.0565*** **	0.0220
$\hat{\delta}$	**-0.7069*** **	**-1.2924** **	-0.0229*	0.2359
$\widehat{\tau 1}$ or Mean($\widehat{\tau 1}$)	**0.2484**	**0.1620** **	**0.0202**	**0.2863*** **
$\widehat{\tau 2}$ or Mean($\widehat{\tau 2}$)	0.1241	0.1592	0.3794	0.2234
$\widehat{\tau 3}$or Mean($\widehat{\tau 3}$)	-0.1955	-0.0343	-0.0623	-0.0286
$\widehat{\tau 4}$ or Mean($\widehat{\tau 4}$)	0.2326	0.3636	0.2722	0.1861
R^2	-	0.1544	-	0.1574

DFE and PMG estimates are used for models that include constant terms, and POLS and PMG estimates are used for those that exclude constant terms. The results are shown in Table 1-4, which indicate that long-run equilibrium relationships exist, and that they deviate from the equilibrium applied adjustment speed of 17% at the most, depending on the model

used. In the long-term relationship, House Price Index and GDP per capita are in a positive relationship with Credit-to-GDP Ratio in most models including PMG. This finding shows that higher house prices and income contribute to credit expansion. From the Models (1) and (2) including constant terms, a negative relationship between GINI Index and Credit to GDP ratio can be witnessed. Also present in the short-term relationship is the positive effect of house price and income growth on credit growth. For the income inequality index estimated from the GINI Index, it could be said that greater income inequality increases credit growth in the short term, while it reduces credit portion in the long term. In other words, in the above estimation model, the coefficient ($\widehat{\tau 4}$) showing the short-term relationship between income inequality growth and credit growth has an opposite sign of the coefficient ($\hat{\delta}$), which represents the long-term relationship.

PMG (1) model estimates consider panel group interdependence and heterogeneity, and allow for the differences in coefficients across countries. House price growth (Δln(House price index)) coefficients ($\widehat{\tau 1}$) are statistically significant in seven countries and positive in five of them. Income growth (Δln(GDP per capita)) coefficients ($\widehat{\tau 2}$) are significant in ten countries and positive in eight of them. Income inequality growth coefficients ($\widehat{\tau 4}$) are significant in six countries and positive in five of them.

ECM estimation for House Price Index

The ECM estimation model for house price is shown as follows:

$$\begin{aligned}\Delta \ln hp_{it} =& \alpha_i \{\ln hp_{it-1} - \beta_i \ln gdp_{it-1} \\ & - \gamma_i \ln ctgdp_{it-1} - \delta_i \ln gini_{it-1}\} \\ & + \tau_{1i} \Delta \ln hp_{it-1} + \tau_{2i} \Delta \ln gdp_{it-1} \\ & + \tau_{3i} \Delta \ln ctgdp_{it-1} + \tau_{4i} \Delta \ln gini_{it-1} + \epsilon_{it}\end{aligned}$$

Table 1-5. Results of the ECM panel cointegration estimation : Δln(House Price Index)

	PMG (1)	POLS (2)
$\hat{\alpha}$	**-0.0457*** **	**-0.0383*** **
$\hat{\beta}$	**0.0503** **	0.0626
$\hat{\gamma}$	0.1007	0.1410
$\hat{\delta}$	**1.0438*** **	**0.9556*** **
$\widehat{\tau 1}$ or Mean($\widehat{\tau 1}$)	0.8045	**0.4244*** **
$\widehat{\tau 2}$ or Mean($\widehat{\tau 2}$)	0.0094	**0.3554*** **
$\widehat{\tau 3}$or Mean($\widehat{\tau 3}$)	-0.2475	0.0173
$\widehat{\tau 4}$ or Mean($\widehat{\tau 4}$)	0.0313	-0.1771
R^2	-	0.3752

The model excludes the constant term because the cointegration test results are reflected. As the constant term is excluded, the POLS model is estimated instead of DFE, and the PMG model is estimated considering the simultaneous correlation among the panel groups. The results are shown in Table 1-5.

Income (GDP per capita) displays a positive and significant relationship with house price in the long run, and a positive and relatively strong relationship in the short term (0.3554). A greater level of income inequality increases house price in the long term but has no effect in the short term. House prices have a relatively large continuity (0.4244), but the adjustment speed for a long-run equilibrium relationship shows a small value that falls short of 5%.

Furthermore, panel cross-country PMG estimation results that show coefficient estimates displaying short-term relationships confirm that increasing credit has a significant

effect on house price growth only in three of the countries. Moreover, a greater level of income inequality has a negative effect on house price growth in four countries.

ECM estimation for the GINI index

The ECM estimation model for the GINI index is as follows.

$$\begin{aligned}\Delta \ln gini_{it} = \mu_i + \alpha_i\{&\ln gini_{it-1} - \beta_i \ln hp_{it-1} \\ &- \gamma_i \ln gdp_{it-1} - \delta_i \ln ctgdp_{it-1}\} \\ &+ \tau_{1i}\Delta \ln hp_{it-1} + \tau_{2i}\Delta \ln gdp_{it-1} \\ &+ \tau_{3i}\Delta \ln ctgdp_{it-1} + \tau_{4i}\Delta \ln gini_{it-1} + \epsilon_{it}\end{aligned}$$

The cointegration test results are implemented, and the DFE and PMG estimates, including the constant terms, are calculated. The results are shown in Table 1-6.

Table 1-6.Results of the ECM panel cointegration estimation:Δln(GINI Index)

	PMG	DFE
$\hat{\alpha}$	**-0.0888****	**-0.0985*****
$\hat{\beta}$	-0.0079	-0.0315
$\hat{\gamma}$	-0.0518	0.0508
$\hat{\delta}$	**0.0721*****	0.0538
$\widehat{\tau 1}$ or Mean($\widehat{\tau 1}$)	0.0102	0.0188
$\widehat{\tau 2}$ or Mean($\widehat{\tau 2}$)	**-0.1818**	-0.0584
$\widehat{\tau 3}$or Mean($\widehat{\tau 3}$)	0.0721	-0.0044
$\widehat{\tau 4}$ or Mean($\widehat{\tau 4}$)	0.0222	**0.3460*****
R^2	-	0.1838

In the DFE estimation, no statistically significant long-run relationship with other variables is found. However, in the PMG estimation, Credit-to-GDP Ratio is shown to have a positive relationship with GINI index. In other words, increasing credit may extend the level of

income inequality. The adjustment speed for a long-run equilibrium is less than 10%. For short-term relationships, rather than being influenced by other variables, past levels of income inequality seems to continue relatively well (0.3460). In the cross-country panel PMG estimation results for coefficients that represent short-term relationships, nine countries show statistically significant economic growth rate coefficients ($\widehat{\tau 2}$), seven of which show that increasing economic growth rate reduces the income inequality levels in the short term. Five countries show coefficients that are significant for house price growth and credit growth, but the signs are mixed.

The ECM estimates on Credit-to-GDP Ratio, House Price Index, and GINI Index are summarized in Figure 1-3. These results match exactly when GDP per capita is excluded. The ECM estimation is not conducted on GDP per capita as no cointegration is found when comparing causality through the Granger causality test.

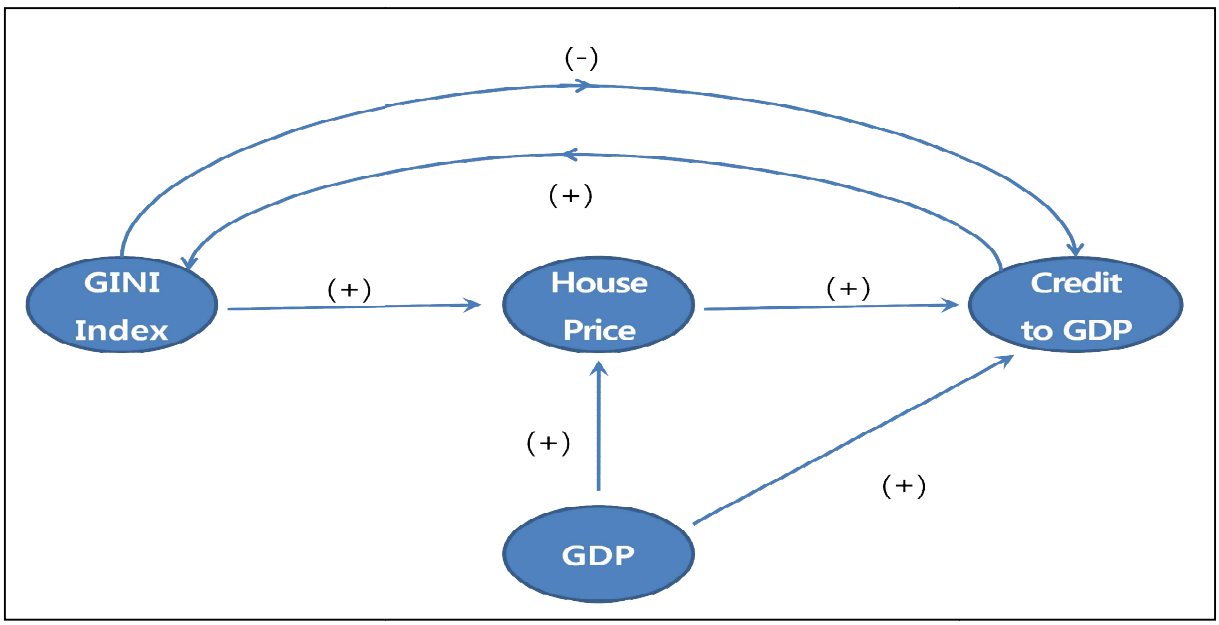

Figure 1-3. Long-run Relationship Chart from the ECM Estimation

IV. CONTRIBUTION OF FINANCE TO ECONOMIC GROWTH

This chapter analyzed the effect of financing on economic growth. Although many studies support the view that financial development promotes economic growth, others argue that this view is poorly evidenced (Favara, 2003) and that financial development actually hinders growth (Cecchetti and Kharroubi, 2012, 2015). This chapter shows that the effect of financing on economic growth depends on the levels of Credit-to-GDP Ratio, House Price Index, and GINI index. According to the analyses conducted in Chapter 3, Credit-to-GDP Ratio, House Price Index, and GINI Index have a significant linear relationship with GDP per capita in the long term. The following model is used to analyze how the effect of credit supply on economic growth varies when Credit-to-GDP Ratio, House Price Index, and GINI Index are in excess or below the long-run equilibrium relationship.

$$\Delta Y_{i,t} = \alpha + \beta * \Delta Y_{i,t-1} + \lambda * \Delta X_{i,t} * (D_{i,t}) + \delta * Z_{i,t} + \varepsilon_{i,t}$$

Table 1-7. Summary Statistics of the Variables (2)

	Mean	Std. Dev.	Minimum	Maximum
ΔLn(GDP)	0.0175	0.0229	-0.0911	0.0923
ΔLn(Credit)	0.0330	0.1174	-0.8449	1.3538
ΔLn(HPI)	0.0205	0.0735	-0.4754	0.2352
ΔLn(GINI)	0.0037	0.0203	-0.0763	0.1027
Ln(Population growth)	1.7148	0.0818	1.5119	2.0335
Ln(Investment rates)	3.1283	0.1867	2.6185	3.5769
Ln(Education levels)	2.2808	0.1758	1.7244	2.5724
Trade Openness	59.7717	32.9883	11.8349	172.372

Source: Investment/GDP, Population Growth, Trade Openness, and Education Level (average years of primary and secondary schooling) variables were collected from Ostry et al. (2014).

The dependent variable (ΔY) is the log-transformed differential of GDP per capita, and ΔXis the differential that includes the endogenous explanatory variables Credit-to-GDP Ratio, House Price Index, and GINI Index. The variables are converted to stable time-series through differences. D indicates dummy variables that show whether Credit-to-GDP Ratio, House Price Index, and GINI Index are in excess or below the long-run equilibrium level. Long-run equilibrium levels are calculated from the estimated equation in section 3. Z is an explanatory variable that represents the factors affecting economic growth, namely, investment rates, population growth, trade openness, and education levels.

The dynamic panel model estimation uses lagged dependent variables as explanatory variables, and causes the problem of a biased estimator. Therefore, many methodologies to correct this issue have been developed. Studies on economic growth generally use the generalized method of moments (GMM) estimates. However, Flannery and Hankins (2013) show through Monte Carlo simulations that DFE and system GMM(SGMM) estimates perform equally well if the main purpose is to estimate endogenous explanatory variables. Therefore, using Credit-to-GDP Ratio, House Price Index, and GINI Index as explanatory variables, this study performed DFE and SGMM estimations. The results are shown in Table 1-8.

In the DFE estimation of Model (1), the results are statistically insignificant for the effect of Credit-to-GDP Ratio on economic growth. In the SGMM estimates of Model (2), economic growth rate (Δln(GDP per capita)) decreases as Credit-to-GDP Ratio increases.

In particular, Models (3) and (4) show that the negative effect of increased credit on economic growth rate is evident when house prices are above the long-run equilibrium level. The coefficient for Model (4) at -0.1442 is much greater than that for Model (2) at -0.0162.

Table 1-8. Results of the estimation : Dep. Variable is Δln(GDP per capita)

Model	DFE (1)	SGMM (2)	DFE (3)	SGMM (4)	DFE (5)	SGMM (6)
$\Delta\ln(\text{GDP per capita})_{t-1}$	0.2474***	0.2539***	0.2441***	0.2556***	0.2483***	0.2563***
Δln(credit to GDP)	-0.0077	-0.0162**				
Δln(house price)	0.1199***	0.1242***	0.1199***	0.1234***	0.1198***	0.1245***
Δln(GINI index)	0.0531	0.0737	0.0463	0.0646	0.0521	0.0716
Δln(credit to GDP) * D(ln(HP) > LR value)			-0.0985***	-0.1442***		
Δln(Credit to GDP) * D(ln(HP) < LR value)			-0.0011	-0.0059		
Δln(credit to GDP) * D(ln(GINI) > LR value)					-0.0103	-0.0228**
Δln(credit to GDP) * D(ln(GINI) < LR value)					-0.0059	-0.0111
ln(population growth)	-0.0585***	-0.0770***	-0.0487***	-0.0650***	-0.0589***	-0.0780***
ln(Investment to GDP)	0.0162*	0.0302***	0.0228**	0.0395***	0.0160*	0.0296***
ln(education rate)	-0.0353***	-0.0156	-0.0372***	-0.0155	-0.0352***	-0.0157
Trade openness	-0.0000	-0.0002***	-0.0000	-0.0001**	-0.0001	-0.0002***
Within R^2	0.3277	-	0.3474	-	0.3279	-
Obs(groups)	504(18)	504(18)	504(18)	504(18)	504(18)	504(18)

This finding asserts that the effect of increasing credit on economic growth differs greatly according to house price levels. Models (5) and (6) show a negative effect of increased credit on economic growth rate when income inequality is above the long-run equilibrium level. Combining the results of Chapter 3 on the relationship between income inequality and

credit, which indicates that greater income inequality leads to reduced credit in the long run but induces higher credit levels in the short term, with the above results, this finding implies that such an short-term increase in credit affects economic growth negatively when income inequality is well above its long-run equilibrium level.

The effect of house price growth on economic growth rate is shown to be around 11%–12%. However, the results do not confirm the significance of the level of income inequality, whereas income inequality granger-causes economic growth in the results conducted through the Granger causality test.

For the added control variables that explain economic growth, the effect of population growth on economic growth rate is negative, and investment rate has a positive relationship with economic growth as expected. However, education level and trade openness have coefficients with signs that were either not expected or insignificant. The reason for this finding may be due to the limitation of this study which only analyzed the short-term effects in 18 OECD countries.

V. CONCLUSION

An analysis of 18 OECD developed countries confirms that a long-run equilibrium relationship among economic growth, credit supply, house prices, and income inequality is present. That is, both rising house prices and income increase credit, while widened income inequality decreases credit. House prices increase with income and income inequality, and income inequality increases with increased credit supply. The estimation results of the effect of credit supply on economic growth show that an increase in credit percentage has a

negative effect on economic growth. The results also confirm that this effect is greater when house price and income inequality are above the long-run equilibrium level.

As discussed above, credit supply, house prices, income inequality, and economic growth form a close relationship with one another. This finding implies a need to consider the effect that overshooting or undershooting in a specific area has on other areas when establishing macro-stabilization policies. Rather than making policies based on the absolute size of the credit supply itself, the fact that the effectiveness of credit supply in economic growth may vary with the levels of house price and income inequality should also be considered. When an excessive increase in house prices and income inequality exists, consideration of the possibility that increasing the credit supply may not boost economic growth is necessary.

As this study focuses on the effect of credit supply on annual economic growth rate, it does not comprehensively explain the fact that economic growth is witnessed in the mid-long term. An interesting area for future research would be to include the outbreak of a crisis as a variable in the analysis, since a drawback of increased credit supply on economic growth can be seen as a financial crisis (Angeles, 2015).

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CHAPTER 2

THE DIFFERENT EFFECTS OF BANK MONITORING ON FIRM VALUE DEPENDING ON DEFAULT POSSIBILITY AND OWNERSHIP STRUCTURE

ABSTRACT

This paper examines the effect of bank financing on corporate value through the study of KOSPI listed companies from 2003 to 2013. It use the bank loan ratio as a proxy variable for the level of bank monitoring. The analysis results showed that a higher bank loan ratio negatively affected firm value for financially troubled companies with an interest coverage ratio below 1. And for companies with a centralized ownership structure where controlling shareholders have 35% or more shares, a higher bank loan ratio positively affected firm value. This paper also confirmed that bank monitoring effects can differ between firms with high default risk and those with concentrated ownership structure through an event study analysis regarding the impact of the announcement of a unique Korean bank monitoring system of MDG designation on corporate stock price. Negative effects were observed in cases of firms with a high default risk, whereas positive ones in case of firms with concentrated ownership structure. These results of this analysis are generally the same as those which use a bank loan ratio variable.

Ⅰ. INTRODUCTION

There are varying views on the primary goal of a corporation, including profit maximization, pursuit of shareholder value and interests of stakeholders. In analysis of corporate finance, increasing corporate value in the market is usually considered the primary goal. Companies decide whether to invest in particular projects, and raise funds internally or from the outside, and the validity of these decisions is determined by whether they increase corporate value. A company's capital structure depends on the specific funding methods for investment, and according to the Modigliani-Miller theorem (Modigliani and Miller, 1963) and the pecking order theory (Myers and Majluf, 1984), several factors—e.g. corporate tax, default risks, or the presence or absence of agency problems—affect the influence of debt financing on corporate value. Bank loans and corporate bonds are the two most commonly used debt financing methods. Previous studies show that both borrowing from banks and raising capital in the market have comparative advantages in terms of monitoring effect (Diamond, 1984; Fama, 1985; De Fiore and Uhlig, 2011) and effect of price information provision (Allen, 1993; Boot and Thaker, 1997; Russ and Valderrama, 2012). In practice, operation of the financial system and the influence of financing on corporate value are influenced by various factors such as the development stage of financial institutions and financial markets.

It is generally accepted that financial system contributes to economy performance through capital allocation function and economic growth is highly correlated with financial development (Levine, 2005). Even though the role and gravity of the banks in a specific country is versatile, a banking system is crucial in successful and efficient capital allocation. This is because banks generally play an important role in examining firms' quality, and

disciplining them through creditor rights enforcement. The substantial influence of banks as creditors on debtors may vary depending on the economic and legal systems. For example, under the environment of a chronic suffering in financing through capital markets, heavy reliance on bank borrowing of companies will appear, and as a result, this strengthens the disciplinary power of the bank. Immature capital markets with vulnerable investor protection can also lead to a superior bargaining power of banks over bondholders. Also, under the chronic excess demand on money due to rapid economic expansion, creditors such as banks may more effectively exercise disciplinary power over their debtors.

Korea has a bank-friendly financial system because banks form an overwhelmingly large proportion of the system; additionally, legal and institutional systems have given banks a strong oversight authority over debtors. However, with the development of capital markets, improved access to the capital market by firms has somewhat reduced the disciplinary power of banks. Large firms that have access to bonds have an incentive to repay bank loans by mobilizing corporate bonds to avoid the interruption of the main creditor bank. This implies that as capital markets develop, the role of banks become weaker.

There is a consensus that indirect financial markets (e.g., banks) are more effective in reducing information asymmetry than the market. De Fiore and Uhlig (2011) emphasize that banks are advantageous to bondholders in that whereas bondholders rely solely on public information of the firm, banks benefit from economies of scale and private information about firms. Also, banks hold a relatively large stake in firms compared to bondholders, and thus have more ways to acquire private information. By acknowledging the relative strength of screening and monitoring function of bank loans, the positive relationship between firm performance and bank loan might be anticipated.

On the other hand, many believe that issuing bonds has a more positive effect on firm value than bank loans. Russ and Valderrama (2012) argue that firms prefer to finance through bonds since the cost of financing is cheaper in the bond market, and previous research (Bliss and Flannery, 2000; Ioannidou and de Dreu, 2006) which emphasizes market surveillance of bondholders, rating agencies, etc., values the importance of bondholders because they promote better decision making by management.

Other research suggest that there might be differences in the implication of bank loans and corporate bonds across countries, and also depending on the state of the economy. De Fiore and Uhlig (2012) found that while bank loans shrink during economic downturn, bond financing stays relatively stable during a crisis. According to De Fiore and Uhlig (2011), Europe is more centered around bank financing, but bond financing is more common in the US. By comparing the two markets they found out that while in the US the cost of bank finance is higher than in Europe, there is not a significant difference in the cost of bond financing. Market discipline also does not work well in countries where market infrastructure is weak or where there heavy government intervention.

This paper analyzes the effect of bank lending on firm value for listed companies in Korea. In particular, it analyzes how bank lending affects corporate value under different conditions, either positively or negatively. To investigate this, it is assumed that when a company has a higher share of bank lending, the bank has greater influence on the company, which in turn typically increases corporate value through stronger external monitoring which deters moral hazard by large shareholders or management, but negatively affects corporate value in cases where the bank is a main creditor bank and thus in a conflicting or a competitive position with the company's shareholders.

The analysis results showed that for companies with a centralized ownership (35% or more shares held by a controlling shareholder), a higher share of bank lending led to greater firm value, presumably because the company is subject to stronger monitoring and the disciplinary power of the bank, and thus, the bank has a positive effect of preventing a controlling shareholder from engaging in improper activities such as pursuit of personal gains. In the period after the 2008 global financial crisis, a higher share of bank lending had a negative effect on firm value for financially troubled companies with an interest coverage ratio of 100% or below, which is reflected in share prices in the short term. This is presumably because, as the default risk rises, the creditor bank puts pressure on the company in a way that increases the possibility of recovering loans.

Moreover, this paper analyzes the short-term movement of stock price using the event of bank-led credit risk evaluation results announcement, including the unique Korean bank monitoring system Main Debtor Group (MDG), as a proxy variable for bank monitoring. Event study analysis also showed similar results to the analysis using yearly panel data. That is, compared to other companies firms in MDG with symptoms of insolvency received negative impacts in stock price from the MDG designation and announcement and the event of credit risk evaluation results announcement. Companies with a concentrated ownership structure showed positive impacts in stock price after the MDG designation, regardless of whether or not they belonged to MDG.

The rest of the paper is structured as follows. Section II develops hypotheses that this paper will test. In Section III, the data, model and empirical results for panel data analysis are presented. Section IV analyzes the effect of cumulative abnormal return after MDG release and large corporate credit evaluation through the event study, followed by a conclusion in Section V.

Ⅱ. HYPOTHESIS DEVELOPMENT

Banks possess an advantage when determining firms' associated risks as they accumulate private information in the transaction process, which other investors cannot obtain. In addition, because banks may impose collateral conditions in debt, monitor and control changes in debtor risk through post-lending surveillance (e.g., loan review after initiation), this may result in a reduction in moral hazard of debtors. This allows for a more productive allocation of limited resources through a screening function which distinguish more profitable projects, and a monitoring function which searches for any morally hazardous activities of debtors after initiation. As long as banks' screening and monitoring functions work efficiently and market participants trust these activities, firms with a higher share of bank lending would receive more favorable evaluation given that other conditions such as debt ratio are equal. Datta et al. (1999) argue that firms with bank financing may issue bonds at a lower rate, which arises from the positive effect that bank monitoring provides and also the reputation-building effect that bank financing has on firms. However, if a bank functions inefficiently, it may hamper a firm's ability to optimize.

Firms may raise necessary funds through bond issuance. According to the pecking order theory (Myers and Majluf, 1984), a firm will fund itself in the order of retained earnings, debt and equity; the theory suggests that this is mostly due to information asymmetry and issuing costs. Because banks and bonds are mainly used in debt issues. Bolton and Freixas (2000) suggest a theoretical model in which firms with lower credit risk prefer bond issuance which gives a lower interest rate, but firms with higher credit risk resort to bank financing which requires a higher rate. In terms of feedback-effect banks fall behind capital markets. Firms that issue bonds are evaluated by many market participants for their

degree of risk; this is reflected in official daily bond rates, which firms may consider in their management decision making. Since there is a delay in the time it takes for a bank's monitoring results to be implemented by management, the effect of bank monitoring on firm performance might be weakened.

A company with a higher share of bank lending is subject to stronger monitoring by banks. However, the effect of stronger monitoring on firm value could be either positive or negative depending on the firm's characteristics or financial market conditions. Gorton and Schmid (2000) reported a positive relation between the company controlling power of banks and corporate performance in a test using German companies as a sample. On the contrary, Weinstein and Yafeh (1998) conducted research on the main creditor bank in Japan and argued that discouragement of high risk and high return investment of companies by banks did not result in corporate profitability improvement. Most of the existing literature regarding bank monitoring proved that external monitoring by banks induced improvement of corporate governance structure and enhanced corporate value in case of companies with weak governance structures (Byers et al., 2008; Ozelge, 2008; Ahn and Choi, 2009). Meanwhile, there are studies that proved that corporate value can be damaged as the influence of banks on companies becomes stronger, due to distortion of resource distribution (Sharpe, 1990) and decreased efficiency of business activity of the companies (Rajan, 1992; Krosner and Strahan, 2001). In the case of Korea, a system of corporate restructuring runs led by banks exists, which stimulates the distribution of limited resources to more productive sectors by liquidating insolvent companies. Hence, in case of insolvent companies the influence of banks can be larger compared to the others and are more likely to receive stronger bank control or restructuring by banks. This will have a negative impact on stock prices in the short term.

This paper examines the effects of bank monitoring on the improvement of corporate value according to the ownership structure. Previous studies that examined the relation between executive share ratio and corporate value showed contrary results of positive relation (Jensen and Meckling, 1976), negative relation (Fama, 1980; Demsetz, 1983), and nonlinear relation (Stulz, 1998; Morck et al., 1988). Positive relation puts stress on responsibility management, while negative relation points out the problem of pursuing private interest by the dominant stockholders. Studies that examined the relation between ownership structure and corporate value also reported controversial results. While Edmans and Manso (2011) supported dispersed ownership structure, studies including Dhillon and Rossetto (2009) argued that major shareholder dispersion has a negative impact on corporate value.

Meanwhile, Lee et al. (2014) reported a nonlinear relation between dominant stockholder share ratio and bank loan ratio in an analysis using Korean listed companies as a sample. In their study, bank loan ratio significantly decreased among the companies with a centralized ownership structure, which implies that a motivation to avoid bank monitoring exists among the dominant stockholders. Lin et al. (2013) also state that firms with greater differences between control rights and cash-flow rights for block shareholders prefer bond finance to avoid intervention through close monitoring from banks. These results show the possibility that banks are more likely to perform monitoring on debtors than bondholders do. Bondholders lack ways to actively intervene management and firm's operations, and due to the dispersed nature of bondholders' ownership structure, they have relatively little incentives to continually monitor firms once debt contract has been initiated(Diamond, 1984, 1991). However, banks face much greater exposure to risk, which gives them more incentives to monitor firms. Since their maturity terms are shorter, they can also impose conditions to control risk and contingency processes (such as a loan review) to provide ways to

continuously monitor debtor risk, allowing them to terminate the contract when needed. This also implies that bank monitoring can be more effective in firms with poorer corporate governance or a more concentrated ownership structure.

Hypothesis 1. For companies with a centralized ownership structure, a higher share of bank lending positively affects firm value due to stronger monitoring by banks and effective checks on controlling shareholders.

Next, this paper analyzes whether the effects of bank monitoring on increased corporate value are differentiated between companies that face a higher risk of insolvency and others. If creditor banks focus on the possibility of recovering loans, monitoring by banks might negatively affect firm value by, for instance, discouraging investment in a large project that has risks but could considerably increase firm value. This is because banks and shareholders have a symmetrical pay-off relationship. Many previous studies identified the issue of conflicting interests that arises when a creditor bank is involved in the borrowing companie's managements. That is, if the creditor bank becomes a board member, it makes decisions from the bank's position rather than the company's(Krosner and Strahan, 2001). The prediction is made that in a market condition with a higher risk of default and for companies that face a higher risk of insolvency, it is more likely that the bank would exercise its influence in a way that is more beneficial to the bank than for the shareholders. In a situation where wariness of insolvency risk increases, banks will make decisions from an aspect of maximization of loan retrieval (minimization of loan loss). That is, banks are likely to make efforts to increase loan retrieval possibility by limiting new investments such as high risk and high return projects and encouraging restructuring such as asset disposal (Weinstein

and Yafeh, 1998). This will broaden the difference of firm value between healthy firms and insolvent firms. That is, differences will be larger with higher bank loan ratios and stronger influence from banks on firms.

Hypothesis 2. For financially troubled companies, the creditor bank exercises its influence in a way that reduces the risk of loan loss, and thus a higher share of bank lending negatively affects firm value.

Ⅲ. PANEL DATA ANALYSIS

1. Data

In this paper, we use KOSPI listed unbalanced panel data from 2003 to 2013 (yearly). This is the period during which most of the bank-led massive corporate restructuring in the aftermath of the 1998 Asian financial crisis had been completed, and firms' reliance on bank financing had steadily decreased along with a rapid growth of capital markets. An empirical analysis was conducted for 5,897 datasets of 611 non-financial companies that settle their accounts in December. Data on the largest shareholders and shareholders with special interest—a proxy for ownership structure—was retrieved from FnGuide, and other data was drawn from KIS-value. To exclude distorting influence of extreme values, the top and bottom 1% data were winsorized.

The main variables used in this paper are Tobin's Q and bank loan ratio, which are computed as follows. Tobin's Q is calculated as the sum of the average market value of shares outstanding (ordinary and preference shares) and total debt, divided by total asset. As total debt and total asset are in book value, Tobin's Q can be said to be determined by the change

of equity value. Hence, strictly speaking, this paper uses the change in shareholder value of firms that were evaluated in stock market as a dependent variable. This implies that this paper is more appropriate for examining the effects on the change of equity value, rather than the debt value itself in the analysis of the effects of bank monitoring. Bank loan ratio is computed as year-end floating long-term debt and long-term debt divided by total debt. Two dummy variables are used for grouping firms; symptoms of insolvency dummy (SID) variable is given to 1 if interest coverage ratio is less than 1 and the concentrated ownership dummy (COD) is given to 1 if the proportion of common shares controlling shareholders and its affiliates have exceed 36%. SID judging criteria of interest coverage ratio less than one is being used as a very simple index that practically determines insolvency in Korean financial fields. For example, the credit risk evaluation for Main Debtor Group (MDG) , which will be introduced in Section 4, is a unique bank monitoring system of Korea used as an important quantitative evaluation criterion along with debt ratio. The criteria of COD—the proportion of common shares controlling shareholders and its affiliates exceeding 36%—are based on the facts proven by Lee et al. (2014), whose study examined the difference of means of debt issuing according to the ownership structure and reported that bank loan ratio decreases with a turning point of share ratio at 36%, arguing that this is because firms dislike bank intervention.

Additional explanatory variables used in estimating Tobin's Q are as follows. First, for profitability measures ROA is EBITDA divided by total assets[1], and for financial stability measure equity ratio is computed as total capital divided by total asset. Tangible fixed asset is divided by total assets to compute tangible fixed asset ratio, R&D expenditure is divided by

[1] Servaes (1996) argued that firms with low profitability have a positive relation with corporate value as they are under discounted transaction in the market.

total sales to get R&D expenditure ratio, and log of total assets[2] are used as explanatory variables. Descriptive statistics of the variables are shown in the table below.

Table 2-1. Summary Statistics

Variables	Obs.	Mean	Median	Std. Dev.	Min	Max
Tobin's Q	5897	1.00	0.89	0.46	0.37	3.14
Bank Loan Ratio (%)	5897	8.84	2.64	12.87	0	78.48
Bank Loan Ratio by Industry Mean (%)	5897	12.17	11.34	6.36	0	59.68
Symptoms of Insolvency Dummy(SID)*	5607	0.25	0	0.43	0	1.00
Concentrated Ownership Dummy(COD)**	5897	0.63	1	0.48	0	1.00
ROA (%)	5897	2.96	3.54	8.04	- 34.41	20.72
Equity Ratio (%)	5897	55.98	55.39	19.77	8.01	96.17
Tangible Fixed Asset Ratio (%)	5883	32.17	31.28	18.63	0.08	78.81
R&D Expenditure Ratio (%)	5894	0.72	0.04	1.63	0	10.13
Log (Total Asset)	5897	26.56	26.29	1.50	23.87	30.83

* Given to 1 if Interest Coverage Ratio is less than 1, otherwise 0.
** Given to 1 if common shares controlling shareholders have exceed 35%, otherwise 0.

2. Methodology

This paper examines the effect of bank loan ratio as a representative bank monitoring level on firm value. The analysis is based on a panel Fixed Effect model, which has a strength in controlling unique characteristics of individual firms. However, Tobin's Q estimated may be endogenous with bank loan, because as firm value increases firms are in a better position

[2] Larger economy of scale is expected with larger company size. In this case, a positive relation with corporate value can be observed. However, as argued by Berger and Ofek (1995), a negative relation is likely when overinvestment and cross-subsidization incurs loss of corporate value.

to acquire finance from external lenders at better terms. Since the main focus of this paper is on the effect of bank loan on firm value, a fixed effect two stage lease squares regression (FE2SLS) was run to mitigate the endogeneity issue. The industry mean value of bank loan ratio was used as an instrumental variable of bank loan, which is the endogenous explanatory variable. This can be a valid variable because, given that firms' financing decision is affected by their competitors and the particular nature of the industry, it has a high correlation with individual firms' bank loan ratio, while individual firm value has a low correlation with the industry mean value of bank loan ratio. As for the line of industry, the sub-category of the Korean standard industrial classification was used, and the surveyed firms included all KOSPI-listed companies as well as companies that are subject to external audit. Data was obtained from KIS-value.

FE2SLS is estimated as follows. In the first stage, within estimator is calculated using bank loan ratio as a dependent variable, the industry mean value of bank loan ratio as an instrumental variable and other control variables as explanatory variables. In the second stage another within estimator is calculated by using the previously projected estimator as an explanatory variable for bank loan ratio, and Tobin's Q as a dependent variable.

(1^{st} stage) Bank loan ratio = F (industry mean value of bank loan ratio, ROA, Equity ratio, Tangible fixed asset ratio, Log transformed Total Asset, R&D Expenditure ratio, year dummy)

(2^{nd} stage) Tobin's Q = F (Bank loan ratio estimate, ROA, Equity ratio, Tangible fixed asset ratio, Log transformed Total Asset, R&D Expenditure ratio, year dummy)

3. Results

In this paper, analysis was begun without assuming an endogeneity issue in the estimation model. Firm value is estimated with Tobin's Q as the dependent variable. The results are given in table 2-2 below. According to the estimates, firm value decreases as bank loan ratio increases before the 2008 global financial crisis (Model (2)). This result might be due to the self-selection based endogeneity problem, as troubled companies that were not properly evaluated in the capital market had no choice but to raise bank loan ratio, as they could not issue bonds and borrowing from banks was less costly. FE2SLS estimation was conducted, using the industry mean value of bank loan ratio as an instrumental variable for the bank loan ratio. The results are given below for Model (3) to Model (5).

The results of the FE2SLS estimation showed a negative correlation between the bank loan ratio and firm value in the period after the 2008 global financial crisis, conflicting with the results of the Fixed Effect estimation. No significant results were found in the pre-crisis period. Given the overall financial market condition where banks have implemented business restructuring in earnest since 2010 amid heightened default risks, the outcomes of Model (5)—firm value assessed in the stock market was lower for a firm with a higher bank loan ratio—suggests that banks' influence on firms could have negative effect on firm value. That is, when default risks escalate, the creditor bank has greater influence on firms with a higher bank loan ratio, and influence is likely to be exercised in a way that increases the probability of recovering loans instead of increasing firm value in the case of a rising default risk. In this case, the enhanced bank monitoring function driven by a higher bank loan ratio could negatively influence firm value because bank's goal would be to enhance the possibility of collecting existing loans.

Table 2-2. The Results of Estimation: Dependent variable is Tobin's Q

Variable	FE[1)]		FE2SLS		
	2003 - 2013 (1)	2003 - 2007 (2)	2003 - 2013 (3)	2003 - 2007 (4)	2008-2013 (5)
Bank Loan Ratio	-0.0002	-0.0025**	-0.0031	-0.0026	-0.0227***
ROA	0.0042***	0.0066***	0.0041***	0.0066***	0.0001
Equity Ratio	-0.0047***	-0.0070***	-0.0051***	-0.0070***	-0.0063***
Fixed Asset Ratio	-0.0014	-0.0002	-0.0012**	-0.0002	0.0017*
Ln(Total asset)	-0.0929***	-0.1103	-0.0857***	-0.1098**	-0.0961***
R&D ratio	0.0267**	0.0417**	0.0292**	0.0417***	0.0202**
Year Dummy	Yes	Yes	Yes	Yes	Yes
Within R^2	0.1488	0.3159	0.1394	0.3159	0.00
Observations (Groups)	5880 (611)	2415 (517)	5880 (611)	2415 (517)	3465 (610)

1) The standard errors allow for intragroup correlation ; the observations are independent across firms but not necessarily within firms.

2) *** p<0.01 ** p<0.05 * p<0.1

To further verify the finding that banks' influence negatively affects firm value when default risks escalate, the relationship between the bank loan ratio and firm value was analyzed for financially troubled companies with an interest coverage ratio below 1. Using the same methods, Fixed Effect estimation and FE2SLS estimation were conducted to yield results as shown in Table 2-3.

The estimation results showed that the coefficient that represents the influence of the bank loan ratio on firm value was lower by 0.0014~0.0043 for financially troubled companies

compared to companies in financially sound condition. Particularly, according to the results of the FE2SLS estimation which takes the endogeneity issue into account, the discrepancy of the same coefficient between the two groups of companies was 0.0043 in Model (3) which analyzed the entire survey period, and the discrepancy was even greater in Model (4) at 0.0078, which analyzed the period after the global financial crisis. These findings show that a higher bank loan ratio negatively affects firm value, especially for firms with a high default risk.

Table 2-3. The Results of Estimation : Dependent variable is Tobin's Q

Variable	FE (1)	FE[1] (2)	FE2SLS (3)	FE2SLS (4)
	2003 - 2013	2003 - 2013	2003 - 2013	2008 - 2013
Bank Loan Ratio (A)	0.0003	0.0003	-0.0018	-0.0267***
Symptoms of Insolvency Dummy(SID) (B)	-0.0346**	-0.0346**	-0.0069	0.0378
Interaction Term (A*B)	-0.0014**	-0.0014*	-0.0043***	-0.0078***
ROA	0.0029***	0.0029**	0.0030***	-0.0006
Equity Ratio	-0.0048***	-0.0048***	-0.0053***	-0.0065***
Fixed Asset Ratio	-0.0017***	-0.0017	-0.0015***	0.0020***
Ln(Total asset)	-0.0993***	-0.0993***	-0.0936***	-0.0826***
R&D ratio	0.0302***	0.0302**	0.0331***	0.0422***
Year Dummy	Yes	Yes	Yes	Yes
Within R^2	0.1587	0.1587	0.1593	0.1593
Observations (Groups)	5593 (604)	5593 (604)	5593 (604)	5593 (604)

1) The standard errors allow for intra group correlation; the observations are independent across firms but not necessarily within firms.

2) *** p<0.01 ** p<0.05 * p<0.1

Next, the hypothesis that for firms with a centralized ownership the higher bank loan ratio positively affects firm value due to stronger external monitoring on controlling shareholder was tested. In companies with a centralized ownership large shareholders or management have an incentive to pursue personal interests instead of endeavoring to enhance firm value; stronger monitoring by the creditor banks could deter such improper activities. Table 2-4 shows the results of Fixed Effect (Model (1)) estimation and Fixed Effect 2 Stage Least Squares (FE2SLS, Model (2)) estimation. For firms with a centralized ownership—where the largest shareholder and shareholders with special interests have 36% or more shares—the coefficient that shows the influence of the bank loan ratio on firm value was greater by 0.0027 and 0.0087, respectively, compared to companies with a more distributed ownership structure.

Table 2-4. The Results of Estimation: Dependent variable is Tobin's Q

Variable	FE[1)] (1)	FE2SLS (2)
	2003 - 2013	2003 - 2013
Bank Loan Ratio (A)	-0.0020**	-0.0082**
Concentrated Ownership Dummy(COD) (B)	-0.1156***	-0.1656***
Interaction Term (A*B)	0.0028**	0.0087***
ROA	0.0042***	0.0042***
Equity Ratio	-0.0046***	-0.0049***
Fixed Asset Ratio	-0.0015	-0.0013***
Ln(Total asset)	-0.0963***	-0.0922**
R&D ratio	0.0241*	0.0280***
Year Dummy	Yes	Yes
Within R^2	0.1581	0.1592
Observations (Groups)	5880 (611)	5880 (611)

1) The standard errors allow for intragroup correlation ; the observations are independent across firms but not necessarily within firms.

2) *** p<0.01, ** p<0.05, * p<0.1

Ⅳ. EVENT STUDY ANALYSIS

The analysis results so far show that the impact of bank loan proportion on corporate value can differ according to the characteristics of the companies. This section examines this relationship from a different perspective. Section 3 conducted a panel analysis using yearly data regarding the financial institution loans that were extracted from the balance sheet of companies. This chapter investigates the impact of Main Debtor Group (MDG), a unique bank monitoring system in Korea. That is, instead of measuring with bank loan proportion, the influence from banks on companies can be identified by whether or not the company is included in MDG. Since the companies that belong to MDG receive much stronger monitoring from creditor banks compared to other companies, it is surmised that positive or negative effects of bank monitoring according to the characteristics of individual firms can be observed more clearly.

1. Main Debtor Group (MDG) System and Corporate Evaluation from Credit Banks

MDG system in Korea is a core system implemented in the 1970s that has an ultimate goal of enhancing the asset soundness of the financial companies. For this purpose, financial institutions such as banks act as a creditor who controls the reckless management of companies that occur as firms pursue business expansion through financial institution loans and complex money transactions with affiliates and enhance their corporate financial structure. This system was not only actively used in the corporate restructuring that was implemented after the Asian financial crisis in 1998, but until recently also played a significant role in the restructuring of insolvent enterprises. MDG selection criterion is when the credit exposure of the whole affiliates at the end of the previous year exceeds 0.1%

of the credit exposure of the total financial companies. MDG and the firms belonging to it are announced early-April of every year. Main Bank, which is selected among the credit financial institutions, evaluates the credit risk of MDG until late-April of every year and exercises necessary procedures such as MOU signing for improving financial structure according to the evaluation results.

Meanwhile, banks conduct credit risk evaluation on individual companies separately from the MDG system. The evaluation of the large companies with a total credit exposure over 50 billion KRW takes place between April and June of every year, while the credit risk evaluation of small and medium sized companies is conducted between June and October. When the evaluation results indicate necessity of financial structure improvement with high risk of insolvency, banks lead the restructuring process.

As such, restructuring of insolvent companies used to be led by creditor banks in Korea. It is conjectured that corporate restructuring by the market was difficult due to environmental factors, such as an immature capital market. Hence, this paper examines the impact of a series of bank monitoring activities such as corporate credit risk evaluation conducted by banks (including the MDG system) on each of the firms with a high possibility of insolvency and firms with concentrated ownership structure. In other words, the event that this paper attempts to analyze is the designation and announcement of MDG (April 5th) and the announcement of credit risk evaluation results for large companies with their credit exposure over 50 billion KRW (June 25th). The MDG firms and those belonging to it are publicly announced on the website of the Financial Supervisory Commission every April. However, the results of the MDG credit risk evaluation that is conducted until late April are not announced separately. Next, credit risk evaluation for large companies with a credit exposure over 50 billion KRW is conducted between April and June of every year

and the results are announced through press release of the Financial Supervisory Service around June; however, information such as the name of the companies is excluded. This paper examines the impact of the events that took place in 2010 on the stock price. Due to the aggravated macroeconomic environment after the global financial crisis in 2008, a number of companies mainly centered on construction, shipping and shipbuilding faced managerial difficulties. Creditor banks, which continued its stance on encouraging autonomous restructuring of companies until 2009, began to show an intention of promoting active restructuring from 2010 following poor visible results. As such, 2010 was the year that the monitoring activities of banks on companies was further strengthened. As was assumed in section 2, if the reinforcement of bank monitoring negatively affects corporate value in the case of those with a high possibility of insolvency while positively impacting companies that have a concentrated ownership structure, stock prices will also respond to the series of events in the same direction.

2. Data and Methodology

This paper computed normal rate of return by using a market model, and computed Abnormal Return (AR), which is a difference with actual rate of return, and $CAR_i(\tau_1 , \tau_2)$, which is a Cumulative Abnormal Return from period τ_1 to τ_2, as below. (McKinlay, 1997)

$$\widehat{AR}_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}.$$

$$\widehat{CAR}_i(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \widehat{AR}_{i\tau}.$$

The period for estimating the normal rate of return was set at 160 days. The estimating period (mid-July in 2009 to early-March in 2010) was determined so that the impact of the announcement of the credit risk evaluation results for large companies in 2009 (June 11th) could be mitigated as much as possible, while also removing the impact of the MDG announcement in 2010 (April 5th).

In this paper, change of CAR (Cumulative Abnormal Return) three, five, seven and eleven days after the event was examined through a Cross-Sectional Model Analysis shown below. McKinlay (1997) argued that η_j can be estimated using the usual OLS if it has no Cross-Sectional correlation and satisfies the homoscedasticity.

$$\widehat{CAR}_i = \delta_0 + \delta_1 x_{1j} + \cdots + \delta_M x_{Mj} + \eta_j$$
$$E(\eta_j) = 0$$

Table 2-5 presents the basic statistics of the variables used in the analysis. The analysis sample included 565 companies with a December fiscal-year end and as of 2010 were listed on the stock market. Among them, 135 were firms that belong to the MDG group, which accounts for approximately 24%. Meanwhile, the sample was divided into a group of firms with symptoms of insolvency and a group of firms with concentrated ownership structure according to the corporate characteristics. The firms with interest coverage ratio below one were classified as firms with symptoms of insolvency. Among 536 companies for which data was available, 112 companies belonged to this group, which accounts for approximately 21%. Next, firms with a controlling shareholder ownership percentage over 36% were classified as firms with a concentrated ownership structure, with 377 out of the total 565 firms (approximately 67%) belonging to this group. This section analyzes the corporate monitoring effects of Korean banks according to the individual corporate characteristics

through an event study on the MDG designation and announcement in 2010 (April 5th, Event 1) and announcement of credit risk evaluation results for large companies (June 25th, Event 2).

Table 2-5. Summary Statistics

Variables		Obs.	Number (Value=1)	Mean	Median	Std. Dev.	Min	Max
Main Debtor Group (MDG) Dummy		565	135	0.2389	-	-	-	
Symptoms of Insolvency Dummy(SID)[1)]		536	112	0.2090	-	-	-	
Concentrated Ownership Dummy(COD)[2)]		565	377	0.6673	-	-	-	
Event 1 (MDG Release)	CAR (-1, +1)	559	-	-0.0048	-0.0107	0.0707	-0.2474	0.4449
	CAR (-1, +3)	559	-	0.0065	-0.0022	0.0832	-0.4907	0.5976
	CAR (-1, +5)	559	-	0.0088	0.0029	0.0956	-0.6658	0.7435
	CAR (-1, +9)	559	-	0.0141	0.0018	0.1244	-0.7820	1.0429
Event 2 (Large Corporate Evaluation Release)	CAR (-1, +1)	559	-	0.0052	0.0009	0.0443	-0.2573	0.3063
	CAR (-1, +3)	559	-	0.0072	0.0033	0.0634	-0.2927	0.6103
	CAR (-1, +5)	559	-	0.0154	0.0060	0.0776	-0.2595	0.6635
	CAR (-1, +9)	559	-	0.0114	0.0004	0.1007	-0.3373	0.8583

1) Given to 1 if Interest Coverage Ratio is less than 1, otherwise 0.
2) Given to 1 if common shares controlling shareholders have exceed 35%, otherwise 0.

3. Results

Figure 2-1 shows the movements of CAR(τ_1 , τ_2) mean difference between MDG and non-MDG groups during the period of enhanced bank monitoring around the events of MDG designation(April 5th) and credit risk evaluation(June 25th). This figure shows that the stock prices of firms belonging to MDG were negatively affected by the event of MDG designation compared to other firms.

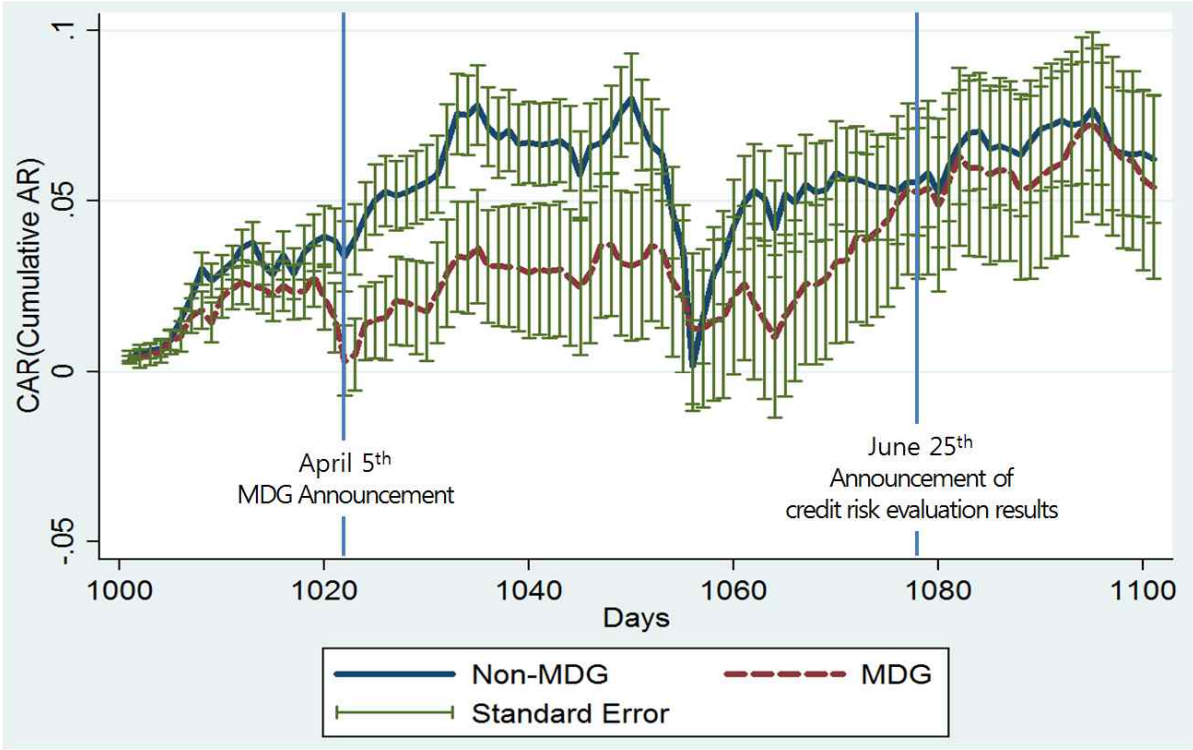

Figure 2-1. CAR movement between MDG and non-MDG groups

Table 2-6 presents the results of the test of whether there are any differences in $CAR_i(\tau_1 , \tau_2)$ between MDG firms and other firms. A statistically significant difference of $CAR_i(\tau_1 , \tau_2)$ was observed after the MDG designation and announcement according to whether or not a firm is a MDG member, while no statistically significant difference was observed before the announcement.

Table 2-6. CAR mean difference test between groups before and after MDG announcement.

	Obs	CAR (-7,-3)	CAR (-3,-1)	CAR (-3,+3)	CAR (-1,+3)	CAR (-1,+9)
Non-MDG (value = 0)	425	0.0063	0.0036	0.0156	0.0107	0.0182
MDG (value=1)	134	0.0037	-0.0077	-0.0086	-0.0069	0.0012
t-value		0.5317	**2.1374**	**3.279**	**2.8353**	**1.7125**

* t-value for H_0 : differ = mean(0) - mean(1) = 0. Bold-faced fonts indicate rejection at 5% level.

Next, we analyzed whether the companies belonging to the MDG represent the differentiated stock return according to the possibility of insolvency or the ownership structure. Firms with a higher possibility of insolvency were defined as those with an interest coverage ratio less than 1; this accounted for 23 out of a total of 131 companies (18%). Firms with an ownership structure where the ratio of controlling shareholders' rights exceeds 36% accounted for 81 out of a total 134 companies (60%).

Table 2-7 presents the results of a regression analysis studying the differentiated impacts of MDG designation and announcement on corporate stock price between MDG and non-MDG firms. Stronger monitoring and influence from creditor banks is expected when a firm is designated as a MDG company. The analysis tested a hypothesis that differentiation effects can be created in the case of firms with symptoms of insolvency and those with a high percentage ownership by the controlling shareholder.

Firms with symptoms of insolvency that have an interest coverage ratio below one showed negative significant impact on CAR. Meanwhile, firms with concentrated ownership structure where the percentage ownership of the controlling shareholder exceeds 36% did show a positive impact on stock price after the MDG announcement event. Next, the impact of the announcement event of credit risk evaluation results on stock prices in large companies that have a credit exposure over 50 billion won was examined. However, a meaningful result around the event was not found.

Table 2-7. Regression analysis results of CAR after MDG designation and announcement date

Dependent Variable	CAR (-1, +3)	CAR (-3, +3)	CAR (-1, +9)
Symptoms of Insolvency Dummy(SID)	-0.0377*** (0.001)	-0.0472*** (0.001)	-0.0358* (0.076)
Concentrated Ownership Dummy(COD)	0.0184* (0.068)	0.0237* (0.058)	0.0394** (0.025)
Ln(Total Trading Volume)	0.0002 (0.936)	0.0010 (0.759)	0.0027 (0.508)
Ln(Average Price)	-0.0007 (0.829)	-0.0012 (0.765)	-0.0101* (0.078)
Constant	-0.0058 (0.912)	-0.0147 (0.825)	0.0528 (0.582)
Observations	131	131	131
Adj. R^2	0.0646	0.0663	0.0626
F-Value	3.24	3.31	3.17

*** p<0.01 ** p<0.05 * p<0.1

The results above imply that the effects of strengthening bank monitoring can have a positive impact on stock prices in firms that have a concentrated ownership structure, while showing negative impacts in those with symptoms of insolvency. This is consistent with the panel data analysis results of the previous section.

Ⅴ. CONCLUSIONS

In this paper, the effect of bank financing on corporate value was examined through a study of KOSPI listed companies from 2003 to 2013. Bank loan ratio was used as a proxy variable for the level of monitoring, to examine whether stronger bank monitoring increases

firm value. For the analysis, a panel Fixed Effect estimation and Fixed Effect 2 Stage Least Squares (FE2SLS) estimation were conducted—the latter uses the industry mean value of the bank loan ratio as an instrumental variable to consider endogeneity issue. The analysis results showed that a higher bank loan ratio negatively affected firm value for financially troubled companies with an interest coverage ratio below 1, in the period following the 2008 global financial crisis when default risks escalated. As for companies with a centralized ownership structure where controlling shareholders have 36% or more shares, higher bank loan ratios positively affected firm value. When default risks rise, the higher the bank loan ratio, the more likely creditor banks are to exercise their influence in a way that increases the probability of recovering their credits, which might undermine shareholder value in the short term. In comparison, for companies with a centralized ownership structure, controlling shareholders might pursue personal interests; in this case, higher bank loan ratios could deter such activities through stronger monitoring by creditor banks.

Moreover, this study also confirmed that bank monitoring effects can differ between firms with symptoms of insolvency and those with a concentrated ownership structure through an event study analysis. That is, according to the results of analysis regarding the impact of the announcement of MDG designation, negative effects were observed in firms with symptoms of insolvency and positive effects were observed in firms with a high percentage ownership of a controlling shareholder. However, this paper used a very simple criteria—interest coverage ratio below 1—as the proxy variable representing the default possibility, because this criteria is broadly used and accepted as a typical simple criteria for insolvent firms. Future study using a continuous estimated value of default probability instead of applying dummy variable is recommended.

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CHAPTER 3

FACTORS DRIVING THE PROMPT CORRECTIVE ACTION OF SUPERVISORY AUTHORITIES : EVIDENCE FROM KOREAN SAVINGS BANKS

ABSTRACT

Korean Savings banks that expanded the number of high-risk loans experienced huge defaults after the 2008 global financial crisis. We consider the prompt corrective action (PCA) to analyze factors that drive savings banks to failure given that an order for PCA by a supervisory authority normally leads to defaults. We conduct discrete choice models to estimate the probability of PCA, using 2005 to 2011 data on 103 Korean savings banks. We find that the post-examination actions taken by supervisory authorities and a rapid increase in loans increase the possibility of PCA. These results suggest that depositors and the market can reduce the costs incurred from defaults by identifying information that predicts PCA.

Ⅰ. INTRODUCTION

After the 2008 global financial crisis, a considerable number of savings banks in Korea collapsed. Twenty-five savings banks, including the largest in terms of asset size, were ordered by Korean financial supervisory authorities to close business for the period of 2008 to 2012. The closure of savings banks in Korea is unsurprising given the development trajectory of the banking industry in the country.

Savings banks were established in 1972 to provide financial services primarily to the household sector, after which these institutions went through a series of restructuring and improvement schemes to guarantee financial performance. The outbreak of the 1997 financial crisis gave rise to the aggressive expansion of commercial banks that were allowed to provide lending services. These developments spelled fierce competition for Korean savings banks. Under this backdrop, Korean savings banks expanded project financing for the real estate sector to gain growth momentum, but this move resulted in a large number of bankruptcies after the 2008 global financial crisis.

The calamitous bankruptcy of savings banks translated into tremendous social costs, with customers who invested in subordinated debts and deposited amounts that exceeded the deposit insurance limit incurring massive losses. Financial authorities, such as the Financial Services Commission (FSC) and the Financial Supervisory Service (FSS), were criticized for their belated response and lack of consumer protection. More specifically, criticisms included their lax supervision and postponement of prompt corrective action (PCA) on savings banks that are at high risk of bankruptcy.

PCA primarily aims to rule out regulatory forbearance and minimize loss from deposit insurance funds by implementing preemptive actions in accordance with capital ratio and

management evaluation results; this process results in the immediate closure or suspension of problematic savings banks (Choi and Sohn, 2014). Korea adopted the PCA regulation for the banking sector in 1992 and for other sub-sectors, such as savings banks, in 1999. Three types of PCAs are implemented, depending on degree of insolvency: management improvement recommendation, demand, and order. From 2003 to 2011, supervisory authorities implemented 75 corrective actions, specifically broken down to 19 management improvement recommendations, 16 demands, and 40 orders. Among these, 18 corrective actions were postponed after authorities approved the recapitalization plans submitted by the savings banks (White Paper, 2012).

This paper examines the possible association of the PCAs imposed on savings banks with the financial variables of savings banks, supervisory action and policy, and regional economic conditions. This issue is important because PCA normally drives savings banks to opt for failure.[3] Should PCA be predictable, depositors and the market can reduce the costs incurred from defaults because they will be able to identify the factors that drive PCA. Accordingly, the supervisory authority also can reduce the cost arising from failures through an early intervention in problematic banks. In particular, we are interested in whether PCA measures are related to supervisory authorities' onsite examination results and whether savings banks whose services are characterized by rapidly increasing loans (especially real estate loans) are likely to be subjected to PCA. In 2006, Korean supervisory authorities introduced an incentive scheme to improve the financial soundness of savings banks. This scheme, called the "8-8 club," eases the loan restrictions imposed on savings banks with

[3] Out of 47 cases of PCA in our sample, 41 savings banks ended up with a default and only 6 were revived through recapitalization. However, those 6 banks were considered failures as they have a high probability of another PCA because the recapitalization only marginally improved their financial soundness.

capital adequacy and asset soundness. We also investigate whether this incentive scheme decreases the probability of PCA measures being imposed on savings banks that fall under the 8-8 club scheme.

We use discrete choice models to estimate the probability of PCA, using 2005 to 2011 data on 103 Korean savings banks as the sample. Our results show that the post-examination actions of supervisory entities effectively predict PCA. Return on asset (ROA) and non-performing loans that measure profitability and asset soundness are good PCA predictors. We also find that high loan growth and poor regional economic indicators increase the possibility of PCA and the failure of savings banks. By contrast, the 8-8 club policy is a statistically non-significant factor in explaining PCA despite its contribution to the high increase in loans.

This paper is organized as follows. First, we describe the history and recent developments in the savings bank industry in Korea. We then explain the supervisory system, focusing on PCA and onsite examination. Relevant literature is presented next. To analyze the factors that drive savings banks to opt for failures, we set up the regression models and examine data. The final sections provide the empirical results and conclusions.

Ⅱ. SAVINGS BANKS IN KOREA

In 1972, savings banks were established in Korea to foster financial intermediation between individuals and small businesses, in accordance with the Actions of Institutionalization of the Informal Credit Market.[4] Since the enactment of the law, savings

[4] The Korean government absorbed private loan companies into the financial system in 1972 and enacted the Savings Company Act. Because the government pushed for export-oriented growth policies, bank funding could

banks have continued to attract social interest because of bankruptcy and corruption-related problems, such as illegal lending and embezzlement by owners.

Following the 1997 IMF bailout, savings banks faced structural changes in the business environment. They were exposed to severe competition from large commercial banks and private lenders. Commercial banks expanded the amount of available mortgage loans and reduced the supply of business loans given decreased demand from the corporate sector. The removal of regulations for asset allocation in commercial banks also contributed to the increased competition. Savings banks were confronted with additional competition from private lenders, which aggressively expanded their business for low-credit clients. Savings banks then suffered a downturn in the local economy. To cope with this situation, savings banks provided high-risk and high-yield loan portfolio services, such as real estate project financing. This strategy was possible because of stable funding from deposits, on which the banks imposed interest rates higher than those imposed by commercial banks. Stable funding also came from the increased deposit insurance of up to 50 million won, which is the same as the amount of commercial banks.

Meanwhile, the government pursued policies to support savings bank profitability. These measures included an increase in the deposit insurance limit (from 20 million won to 50 million won) in 2001; the change in institutional category from "mutual savings and finance company" to "savings bank" in 2002; the approval of mergers and acquisitions (M&A) between savings banks in 2005; a partial easing of credit limit restrictions for high-performing savings banks that satisfy a BIS ratio of 8% and non-performing loan of 8%, (i.e.,

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not cover the needs of the households or local businesses, driving these customers to turn to private loan companies. These developments caused serious socio-economic problems.

the 8-8 club); and the allowance for the opening of specialized branch offices in 2006.[5]

After the 2008 global financial crisis, a considerable number of savings banks in Korea collapsed. This period is characterized by a series of defaults with a large scale for a relatively short period. Given the 2008 financial crisis, project finance loans deteriorated and savings banks suffered from insolvency. In particular, the 8-8 club policy that eases credit restrictions for high-performing savings banks provided the momentum for the rapid rise in project financing. Savings banks eligible to the club received regulatory exemption of a credit limit amounting to 8 billion won.[6] This policy contributed to increasing the asset growth of qualified savings banks.

Ⅲ. SUPERVISORY ACTIONS AND MEASURES

Since 1998, Korea has implemented a concrete PCA trigger system for problematic financial institutions. When capital ratio or management evaluation results fall below the minimum criteria, the supervisory entities take necessary prompt and appropriate actions to correct the problem. PCA regulation is a system that is designed to minimize the social costs arising from the insolvency of financial institutions; these social costs include financial

[5]After the government lifted the regulation on securities investment between high-performing savings banks that have a BIS ratio of more than 7%, eight M&As occurred.

[6] Credit exposure to a single person (individual or business entity) must be less than 20% of the company's equity capital. No savings bank may expose more than 25% of its total capital to an inter-linked business group in loans. Loans to individual borrowers are limited to 500 million won, and loans to small businesses and other corporate entities are limited to 8 billion won.

damage to depositors and the exhaustion of deposit insurance funds. This strategy stabilizes the financial system at a preliminary stage.[7] The PCA system is advantageous in minimizing the default risk encountered by financial institutions through reinforced market discipline, and reduces costs incurred from dealing with insolvent financial firms by motivating self-directed effort. At the same time, objective assessment focused on financial soundness helps create a level playing field for small and large financial institutions.[8]

Three types of PCAs are implemented : (1) management improvement recommendation for savings banks with a "BIS ratio under 5%" or a "composite rating 3 or higher, and asset or capital rating 4 or lower in management evaluation"; (2) management improvement demand for savings banks with a "BIS ratio under 3%" or a "composite rating 4 or lower in management evaluation"; and (3) management improvement order for savings banks with a "BIS ratio under 1%" or "with liabilities exceeding the assets" (FSS Handbook, 2011). Savings banks on which PCA measures are imposed must submit a rehabilitation plan to the FSS within one month from the date of the PCA. If the savings banks fail to satisfy this requirement, they will be subjected to more stringent PCA measures. Continued failure to comply will result in a business suspension.

The PCA and onsite examinations may be correlated. The examinations involve the

[7] The PCA may lead to a sudden deposit outflow from the savings banks subject to the PCA and hurt market stability. However, if we compare the cases of defaults with and without a PCA, it is difficult to deny the positive role of PCA: protecting disciplined depositors and minimizing the deposit insurance fund. This is particularly true in circumstances when the financial statement does not provide reliable risk information.

[8] Although the main purpose of PCAs is to preclude regulatory forbearance, the law allows regulators to take discretionary action. The regulator sometimes chooses not to enforce a PCA for a particular savings bank for some period.

general evaluation of financial institution's operations and management including the compliance of regulations. In other words, the examination result can contain information representing the institution's capacity that is difficult to detect using financial variables.[9] The problems detected during the examinations result in various supervisory actions, including sanctions. The examination results are reported to the company and disclosed to the public on the webpage of the supervisory authorities within two days of the report. The government recommends that the supervisory authorities release more information for the purpose of improving market surveillance.

Market discipline in Korea's savings bank industry is difficult to accomplish because the savings banks are characterized by weak governance such as frequent frauds committed by major shareholders, limited public disclosure of financial data, and rare financing by the market. Therefore, the Korean savings banks industry is compelled to rely on the supervisory and examination functions of regulatory authorities in controlling the risks encountered by savings banks.

Ⅳ. LITERATURE REVIEW

Many researchers have investigated the failure of savings. They analyzed the causes of savings bank defaults through the failure prediction model. Nam and Jin (1998) and Chang and Kim (2004) use ROA and sub-standard loan ratio variables as explanatory variables.

[9] Examination of savings banks in Korea focuses primarily on major shareholders' illegal lending and activities. Despite the weakened function of examination with less resource allocation resulting from the pursuit of risk-focused examinations, the most crucial part of examining savings banks lies in how fast vulnerability factors are identified and how insolvency is prevented through appropriate measures.

Kang et al (2013) propose the usefulness of BIS capital ratio and debt ratio as the predictor of savings banks' failure.

Since the global financial crisis, studies about the relationship between savings banks and real estate markets have emerged.[10] An and Choi (2008) analyze the effect of changes in real estate prices on the profitability of savings banks. They argue that real estate prices are highly related to savings bank profitability; a decrease in price disproportionally diminishes profitability. Many other studies also show a positive relationship between real estate price fluctuations and bank profitability (Hilbers et al. 2001; Arpa et al. 2001; Davis and zhu 2009).

Financial policy and ownership problems can be regarded as potential risk factors in savings banks. Although many studies (Beck et al. 2006; Chen 2007; Gonzalez 2005) propose that deregulation, such as the removal of entry barriers, fosters competition and improves sound bank performance, Martinez-Miera and Repullo (2010) contend that competition encourages taking more risk by reducing banks' franchise values.[11] They propose a U-shaped relationship between competition and the risk of bank failure. Regarding the relationship between ownership structure and bank risk-taking, many studies reveal a positive relationship between strong ownership and high risk-taking (Saunders et al, 1990; Anderson and Fraser, 2000; Garcia-Marco and Robles-Fernandez, 2008; Laeven and Levine, 2009).

This paper is different in that it examines the association of the PCAs imposed on savings banks not only with the major financial variables of savings banks but also with the results of onsite examinations, a particular financial policy called the 8-8 club, and regional

[10] These studies are based on the history that savings banks exposed to fierce competition with commercial banks and private lenders aggressively increased real estate Project Financing loan as the blue ocean market .

[11] Boyd and de Nicolo (2005) also propose that banks in high competition tend to pursue higher risk.

economic status. This issue is important because PCA normally drives savings banks to opt for failures and if PCA is predictable, the market can reduce the costs incurred from defaults by identifying the factors that drive PCA.

Ⅴ. DATA AND METHODS

We conduct probit and logit regressions to estimate the probability of PCA, using 2005 to 2011 data on 103 savings banks. We regress a dependent variable, PCA, against explanatory variables in the previous year to examine the driving factors of PCA. In addition, we use annual data based on the fiscal year of savings banks instead of the calendar year. For example, the fiscal year for 2005 covers July 1, 2005 to June 30, 2006. Such fiscal year data afford us the advantage of using reliable high-quality data audited by external accounting firms.[12]

We examine the factors that can predict the implementation of PCA measures by supervisory authorities. We use regional macroeconomic data as well as various financial data on savings banks that have been frequently investigated in previous research. We also include the vulnerabilities of savings banks measured by onsite examination, enabling us to identify the dangers faced by savings banks in an environment characterized by a lack of reliable financial information on savings banks. Finally, we investigate whether 8-8 club membership decreases the probability that PCA measures.

We hypothesize (1) rapid loan growth and high exposure to the real estate sector

[12] This advantage is critical because savings banks in Korea often falsify financial statements to conceal their actual financial status.

increase the probability of PCA; (2) poor results from supervisory examination increase the probability of PCA; (3) the incentive regulatory policy, the 8-8 club, decreases the probability of PCA.[13]

The dependent variable is the dummy, which is assigned a value of 1 if a savings bank is subjected to PCA and 0 otherwise. Most of the savings banks on which PCA is imposed face business suspension and asset and liability transfer to other financial institutions. Therefore, we can regard PCA as an avenue for the initial release of default information.

Table 3-1. The number of savings banks subject to PCA

	2005	2006	2007	2008	2009	2010	2011
Non-PCA	90	87	86	89	83	71	60
PCA	3	5	4	2	10	12	11
Total	93	92	90	91	93	83	71

In this paper, we consider the dependent variable as the occurrence of events designed to satisfy the trigger conditions of PCA, regardless of whether the PCA is imposed or not. In other words, we include the case where the PCA condition is satisfied, but the PCA is not imposed by a supervisor's discretionary decision.[14] This inclusion is beneficial in deriving a

[13] One can hypothesize differently that the 8-8 club policy, which removes the credit limit for qualified savings banks, contributes to increasing the default risk by inducing rapid loan growth.

[14] An incentive for the regulatory forbearance of regulatory authorities is provided for various reasons, such as the stabilization of the market and the concealment of supervisory failure (Kane, 1986, 1990; Boot and Thakor, 1993).

more objective point, eliminating the forbearance of the regulator.[15] Table 3-1 shows the summary statistics of the failure variables.

Table 3-2. Description of variables

Variable	Description	Data source
Financial variables		
Ln(Total loan)	Log of total loan	Financial Supervisory Service
Ln(Real estate loan)	Log of loan to real estate sector, including project financing	
ROA	Return on asset ratio (the ratio of revenue to asset value)	
Non-performing loan	Ratio of non-performing loans to total loans	
Regional economy		
Ln(Manufacturing index)	Log of the manufacturing production index in each province	Korea Statistics Information System
Supervisory information		
Supervisory actions	Number of supervisory actions prompted by onsite examination	Financial Supervisory Service
Examination dummy	Dummy variable with a value of 1 if there is onsite examination; the value is 0 otherwise	
8-8 club dummy	Dummy variable with a value of 1 if the BIS ratio is above 8% and the non-performing loan ratio is below 8%; the value is 0 otherwise	

[15] Choi and Shon (2014) report the undesirable consequences of the regulatory forbearance – the deterioration of depositors market discipline and a resultant increase in social cost. They analyze the effects of regulatory forbearance measures on market discipline, such as the postponement of PCA, and argue that where there is regulatory forbearance for savings banks with deteriorated asset soundness, depositors in relevant and neighboring savings banks become less sensitive to the risks encountered by savings banks.

Table 3-2 shows the description of the explanatory variables, which can be classified into three groups. The first comprises the various financial variables of savings banks: (1) log of total loan, (2) log of loan to real estate sector, including project financing, (3) ROA ratio (the ratio of revenue to asset value), and (4) ratio of non-performing loans to total loans.[16]

The second includes the log of the manufacturing production index in each province, thereby allowing us to control for regional economic status. We choose the average value of manufacturing production index matched well with savings banks' fiscal year instead of the regional GDP because the former is released quarterly.

The third group of variables comprises two types of supervisory information: (1) the number of supervisory actions prompted by onsite examinations and a dummy variable of examination and (2) a dummy variable assigned the value of 1 at a BIS ratio higher than 8% and a non-performing loan ratio below 8%, that is to say, a savings bank qualified as an 8-8 club member. The post-examination supervisory actions show the banks' general weaknesses and deficiencies, identified through the examinations. An FSS-commissioned white paper (2012) on savings banks report how advantageous the policy was in increasing capital.[17]

Table 3-3 presents the summary statistics derived on the basis of whether the banks are subjected to PCA. A statistically significant mean difference exists between the two groups of savings banks for all the financial variables. The sign of the difference is largely consistent with the expected one. Non-performing loans and the number of post-examination

[16] We disregard the BIS ratio because it is one of trigger conditions of PCA.

[17] Nevertheless, the policy can also cause negative effects of rapid growth of high-risk loan. Kim and Han (2012) indicate that the policy of relaxing the lending restrictions imposed on high-performing savings banks negatively influences profitability and asset soundness.

supervisory actions are higher in the PCA-subjected group. The log of total loans and real estate loans are also higher in the PCA-subjected group, while ROA is lower.

Table 3-3. Summary statistics

Variable	Obs.	Mean	Std. dev.	Min	Max	T-test
Whole savings banks						
Ln(Total loan)	613	12.353	1.172	7.818	15.218	
Ln(Real estate loan)	520	11.305	1.721	5.011	14.589	
ROA	613	1.002	2.227	-11.040	25.530	
Non-performing loan	613	9.831	7.025	0.110	78.080	
Ln(Manufacturing index)	613	4.487	0.187	3.718	4.768	
Supervisory actions	330	4.855	3.444	1.000	19.000	
Examination dummy	613	0.538	0.499	0	1	
8-8 club dummy	613	0.375	0.485	0	1	
Non-PCA savings banks						
Ln(Total loan)	566	12.294	1.160	7.818	15.218	
Ln(Real estate loan)	476	11.215	1.729	5.011	14.589	
ROA	566	1.157	2.156	-11.040	25.530	
Non-performing loan	566	9.389	6.783	0.110	78.080	
Ln(Manufacturing index)	566	4.487	0.189	3.718	4.768	
Supervisory actions	301	4.751	3.341	1.000	19.000	
Examination dummy	566	0.532	0.021	0	1	
8-8 club dummy	566	0.371	0.484	0	1	
PCA savings banks						
Ln(Total loan)	47	13.066	1.102	10.846	14.971	-4.39***
Ln(Real estate loan)	44	12.286	1.282	9.592	14.446	-4.01***
ROA	47	-0.866	2.245	-8.510	2.970	6.16***
Non-performing loan	47	15.155	7.751	3.970	32.820	-5.54***
Ln(Manufacturing index)	47	4.489	0.163	3.956	4.692	-0.07
Supervisory actions	29	5.931	4.301	1.000	15.000	-1.77*
Examination dummy	47	0.617	0.072	0	1	-1.13
8-8 club dummy	47	0.426	0.499	0	1	-0.74

Notes: The t-test is statistics on the mean difference between PCA imposed banks and non-PCA banks. ***, **, and * denote the significance levels of 1%, 5%, and 10%, respectively.

VI. EMPIRICAL RESULTS

We adopt pooled probit and logit models. Table 3-4 shows the results of a pooled probit regression in various specifications. Savings banks with a high loan growth rate are more likely to be subjected to PCA; the estimated coefficients are 0.534 and 0.395, which are statistically significant at the 1% levels. We also find that high real estate loan growth rate and the existence of many non-performing loans increase the probability of PCA and that high ROA decreases the probability of failure. The coefficients of regional economy are negative and statistically significant, implying that poor economic conditions negatively affect the failure of savings banks. We restrict our sample to large savings banks with assets greater than 300 billion won to determine whether the effects differ depending on size. Savings banks whose assets are greater than KRW 300 billion are under the enhanced regulation and closer monitoring of their businesses. The results remain the same, except that loan growth rate and regional economy growth rate do not exhibit a statistically significant effect on the probability of PCA.

An interesting result is that the number of post-examination supervisory actions is a meaningful PCA predictor. The coefficients of supervisory actions range from 0.055 to 0.067 and are statistically significant at 5% or 10%. This result therefore suggests that the post-examination actions in the previous year can predict the probability of PCA for the current year. After onsite examinations, approximately 6 months are usually spent to complete the reports and release the results to the public. Therefore, if the supervisory authorities speed up the necessary procedures following the examination, markets and depositors have more time to prepare for the PCA intended for a specific savings bank. Additionally, we run the estimation with the sub-sample of savings banks with assets of more than 300 billion won.

The coefficient of the supervisory action variable continues to show predictive power, with a magnitude that nearly doubles from 0.067 to 0.125.

Table 3-4. Probit regression results

Model	(1)	(2)	(3)	(4) (Asset size > 300 billion)
Ln(Total loan)	0.534 (5.71)***		0.395 (3.31)***	0.206 (0.65)
Ln(Real estate loan)		0.395 (5.18)***		
ROA	-0.231 (-4.61)***	-0.250 (-4.38)***	-0.217 (-4.61)***	-0.433 (-4.17)***
Non-performing loan	0.052 (3.73)***	0.041 (2.62)***	0.060 (4.21)***	0.075 (2.65)***
Ln(Manufacturing index)	-1.598 (-2.94)***	-1.989 (-2.95)***	-1.712 (-3.02)***	-1.070 (-1.11)
Supervisory actions* Examinations	0.055 (1.81)*	0.058 (1.90)*	0.067 (2.11)**	0.125 (2.57)***
Examinations	-0.138 (-0.55)	-0.098 (-0.38)	-0.106 (-0.42)	-0.346 (-0.98)
8-8 club			-2.827 (-1.16)	-3.490 (-0.70)
8-8club * Ln(Total loan)			0.247 (1.35)	0.325 (0.88)
Constant	-1.644	2.416	0.274	-0.510
Log-likelihood value	-119.80	-107.722	-117.447	-64.555
Pseudo R^2	0.278	0.285	0.292	0.373
Observations	613	520	613	291

Note: 1. Parentheses shows t-value.

2. ***, **, and * denote the significance levels of 1%, 5%, and 10%, respectively.

Table 3-5. Logit regression results

Model	(1)	(2)	(3)	(4) (Asset size > 300 billion)
Ln(Total loan)	1.041 (5.81)***		0.787 (3.50)***	0.438 (1.09)
Ln(Real estate loan)		0.791 (5.26)***		
ROA	-0.418 (-4.49)***	-0.462 (-4.38)***	-0.395 (-4.61)***	-0.809 (-4.05)***
Non-performing loan	0.101 (3.78)***	0.087 (2.93)***	0.115 (4.39)***	0.157 (2.88)***
Ln(Manufacturing index)	-2.862 (-2.70)***	-3.765 (-2.83)	-3.006 (-2.76)***	-1.516 (-0.69)
Supervisory actions* Examinations	0.105 (1.84)*	0.111 (1.97)**	0.124 (2.06)**	0.256 (2.72)***
Examinations	-0.324 (-0.66)	-0.197 (-0.39)	-0.240 (-0.49)	-0.893 (-1.24)
8-8 club			-5.477 (-1.16)	-4.126 (-0.62)
8-8club ∗ Ln(Total loan)			0.468 (1.32)	0.437 (0.85)
Constant	-4.112	-4.100	0.831	-3.301
Log-likelihood value	-120.507	-108.069	-118.329	-59.924
Pseudo R^2	0.273	0.283	0.287	0.381
Observations	613	520	613	291

Note: 1. Parentheses shows t-value.

2. ***, **, and * denote the significance levels of 1%, 5%, and 10%, respectively.

The post-examination actions taken by the supervisory authorities can be classified into three categories: onsite actions for a relatively minor violation, actions that require sanctions on savings banks and their staff, and warnings regarding management. We use the total number of supervisory actions including minor ones. However, we fail to find statistical significance for the coefficient of the variable for the number of supervisory sanctions except those imposed for minor violations. This result can be interpreted as the general vulnerability of savings banks rather than the extent of the violation being a more important factor in predicting PCA.

Finally, we reject the hypothesis that the 8-8 club decreases the probability of PCA. We do not find statistically significant results, but the negative coefficient of the 8-8 club dummy and the positive coefficient of the term for its interaction with loan growth suggest that the 8-8 club policy somewhat reduces the probability of PCA, but contributes to increasing this probability by intensifying loan growth.

Table 3-5 shows the results of a pooled logit regression in various specifications. The results remain qualitatively the same as those for the probit estimations.

Ⅶ. CONCLUSIONS

We examine the factors that predict PCA implementation by the supervisory authorities in Korea—an important issue, given that PCA normally drives savings banks to opt for defaults. We contend that PCA predictability will enable the market to reduce the costs incurred from defaults.

We investigate three major types of information: financial information, regional macroeconomic information, and supervisory information. The results show that post-examination supervisory actions effectively predict PCA. High loan growth and poor regional economic indicators also increase the possibility of PCA. By contrast, the 8-8 club policy introduced to improve financial soundness is statistically non-significant in explaining PCA.

In Korea, savings banks try to avoid the PCA measure by reporting a false financial statement, including the BIS ratio, which is the most critical in determining PCA measures. Therefore, depositors depend much more on regulatory actions than risk information disclosed by a savings bank for their deposit and withdrawal decisions. This lack of market discipline was also driven by the observation that the most bank failures were triggered by regulatory action rather than by bank runs in Korea. Therefore, our results suggest that using information on the post-examination actions, loan growth rate, and regional economic conditions, the market can predict PCA and reduce the costs incurred from the failure of savings banks.

Our results also suggest that supervisory authorities pay close attention to the savings banks that increase their loan exposure rapidly in the economic downturn in their main business region when monitoring their risks. In addition, the supervisory authorities should consider a negative effect of 8-8 club policy introduced to improve financial soundness. It seems that the policy also contributed at least partly to rapid loan growth.

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