Bank Loan-Loss Provisions:

A Study of Korean Commercial Banks

by

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ABSTRACT

This paper studies the bank loan-loss provisioning behaviour of 16 Korean commercial banks over the 2006Q2-2011Q2 period using both bank-specific and macroeconomic variables. Two regression methods: Generalised Least Squares- Random Effects model and the Dynamic Panel Data Arellano-Bond model are applied. The empirical analysis on LLPs of Korean banks in this paper mainly focus on the following issues: 1) whether LLP is influenced by the income smoothing practice; 2) the relationship between LLP practice and the economic cycle; 3) whether Korean banks use provisions to manage their capital given the minimum regulatory capital requirements; 4) whether LLP level in Korean banks are affected by their provision level of the last period. Evidence of income smoothing practice, procyclicality is present but there is no evidence of capital management. The result also suggests Korean banks adjust provision level based on that of the previous year.

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1. INTRODUCTION

Loan loss provision (LLP) is one of the most significant current discussions in banking literature. Not only do banks use provisions to cope with the risk of borrowers default on loans, they also have other incentives to use provisions such as regulatory capital management, income smoothing, and maintaining financial stability. Traditionally, provisioning is regarded as an accounting technique that allow banks to recognise an estimated potential loss (even before it occurs) then charge to their profit and loss account under item "Provisions", report under "Loan Loss Reserves" on balance sheet. Banks use reserves to deal with the expected future losses so that losses can be absorbed without causing any disruption in banks' lending process. One can logically argue that LLP practice is critical since it has a macroeconomic element of being forward-looking. That is, provisions are decided based on future anticipated losses rather than current incurred losses. According to Borio et al (2001), LLP allow banks to recognise estimated loss during economic upswings to build up a buffer to cope with losses in the downturns. In practice, however, provisioning practices have a pro-cyclical nature as seen in the recent global financial crisis. In other words, banks create less provision in economic upswings and then adhere to the regulation to increase it during downturns, which leads to restricted lending. Thus, the banking sector can exacerbate the business cycle through provisioning.

In theory, bank managers should set provisions amounts as close to the costs of covering the expected loan losses. However, as future anticipated losses cannot be accurately estimated, bank managers have much discretion in allocating LLPs. There are three main incentives for banks to manipulate LLPs, which are income smoothing, capital management and bank performance signalling. Income smoothing refers to a situation when bank managers have private information regarding the default risk and manipulate provisions upward when the earnings is lower, vice versa in order to reduce volatility. Bank managers also have incentive to increase provisions to meet the capital adequacy ratio requirement set out by the Basel Committee. Signalling refers to bank managers using provisioning practice to indicate banks' financial condition. An increase in LLP can signal financial strength to shareholders and other parties that "management perceives the earnings power of the bank to be sufficient strong that it can withstand a "hit to earnings" in the form of additional LLPs" (Beaver et al, 1989).

A considerable amount of literature has been published on these theories, on the pro-cyclicality and on the determinants of LLP using individual or mostly cross-country data,

bank-specific and macro variables. However, it is argued that loan classification standards and provisioning practices have "a number of conceptual and practical challenges and diverse systems" are used in different countries (World Bank, 2002). Though similarities exist, there is a lack of internationally recognised concepts. Therefore, empirical studies that focus on one individual country would eliminate concerns these differences cause. There is a number of existing LLP literatures focused on banks from Asia (namely Craig et al, 2006; Angklomkiew et al, 2009; Floro, 2010), and some studies on Korean banks' efficiency (Hall and Richard, 2013) or on macro policies, however, to the best of my knowledge, there is not any empirical study on loan loss provisioning practice of Korean banks.

In the aftermath of the Asian Financial Crisis (AFC) and the Global Financial Crisis (GFC), the Korean government had to spend trillion of Korean Won to deal with Non-performing loans (NPLs) in order to stabilise the banking industry. The Korean economy has been through upswings and downturns with GDP as low as -4.5 per cent in 2008Q4 and of 3.2 per cent in 2009Q3 (Bank of Korea). With banks' total assets dominated 60 per cent of the financial market, banks' provisioning practice for expected loan losses is believed to have significant influence on the volatility of profitability in Korean banks. Therefore, investigating what factors drive LLP behaviour is crucial in assessing the characteristics of the banking industry.

We analyse the determinants of LLPs in Korean banks by using a dataset that consists of bank-specific quarterly balance sheets' and income statements' variables for 16 commercial banks over the period of 2006Q2-2011Q2 from Korea Financial Supervisory Service. We also use two major macroeconomic variables- quarterly Gross Domestic Product growth rate (GDP) and quarterly Unemployment rate found on Bank of Korea website. We follow the regression methods used by Fonseca and Gonzalez (2008) and Floro (2010), which are Generalised Least Squares- Random Effects model and the Dynamic Panel Data Arellano-Bond estimation. We used the random effects model to solve the issues of bank-specific effects and the dynamic panel GMM Arellano-Bond to examine the lagged dependent variables' influence on our model at the same time control for the unobservable heterogeneity and the potential endogeneity of variables (Fosenca and Gonzalez, 2008).

The empirical analysis on LLPs of Korean banks in this paper mainly focus on the following issues: 1) whether LLP is influenced by the income smoothing practice; 2) the relationship between LLP practice and the economic cycle; 3) whether Korean banks use

provisions to manage their capital given the minimum regulatory capital requirements; 4) whether LLP level in Korean banks are affected by their provision level of the last period. The findings can hopefully provide the latest reference for bank managers, Korean banking regulator, economists, investors, and those are interested in the overall situation of loan loss provisioning practices of banks in Korea.

The remainder of this paper is organised as follows: Section 2 gives the overview of the banking industry before the Asian Financial Crisis 1997, during and after the AFC, the Global Financial Crisis 2008 and the presence. Section 3 reviews the literature about LLPs and the procyclicality, three incentives to use LLP: income smoothing, capital management, and signalling, as well as a summary of some key relevant empirical research. Section 4 describes the data, estimation models, and variables specifications together with their expected coefficient sign. Descriptive statistics analysis and regression analysis are presented in section 5. Finally, section 6 concludes the paper.

2. OVERVIEW OF THE KOREAN BANKING INDUSTRY

2.1. Introduction

The Korean banking industry can be divided into two sectors embracing the Commercial and Specialised banks. The Commercial banks are incorporated and governed under the Banking Act. They operate as intermediaries by lending of funds acquired through deposits and securities issuance as well as engaging in foreign exchange business, on- and off- balance- sheet business through issuance of commercial paper, securities trading, underwriting and other market business, and trust and credit card businesses (FSS Handbook, 2011). Hence, Commercial banks operate outside the normal comfort zone of a pure intermediation approach as their business models include operations in a number of different securities and off-balance-sheet markets. Commercial banks include nationwide, regional banks, and foreign bank branches. The structure of the industry is demonstrated in figure 1.

Nationwide commercial banks operate business throughout the country without regional restrictions. There was an increase in the number of nationwide commercial banks as a result of financial liberalisation measures and transformations over the course of financial industry restructuring. However, as of December 2010, the total number of nationwide commercial banks fell to seven due to bank closures and mergers in the aftermath of the AFC. These seven banks maintain branch-banking systems throughout the country with

the number of domestic branches totalled 4,225 as of December 2010(FSS Handbook, 2011).

Established in 1967, regional banks aim to better balance regional economic development and provide financial services to the regional and rural areas. As the result of closures and mergers in the wake of the AFC, the number of regional banks fell to six banks which are Busan, Jeonbuk, Daegu, Jeju, Kyeongnam, and Gwangju Bank. Like nationwide commercial banks, regional banks maintain branch banking within their respective localities with a network of 747 domestic branches as of December 2010 (FSS Handbook, 2011). The regional banks primarily serve small- and medium-sized enterprises, households and individual borrowers in their respective regions.

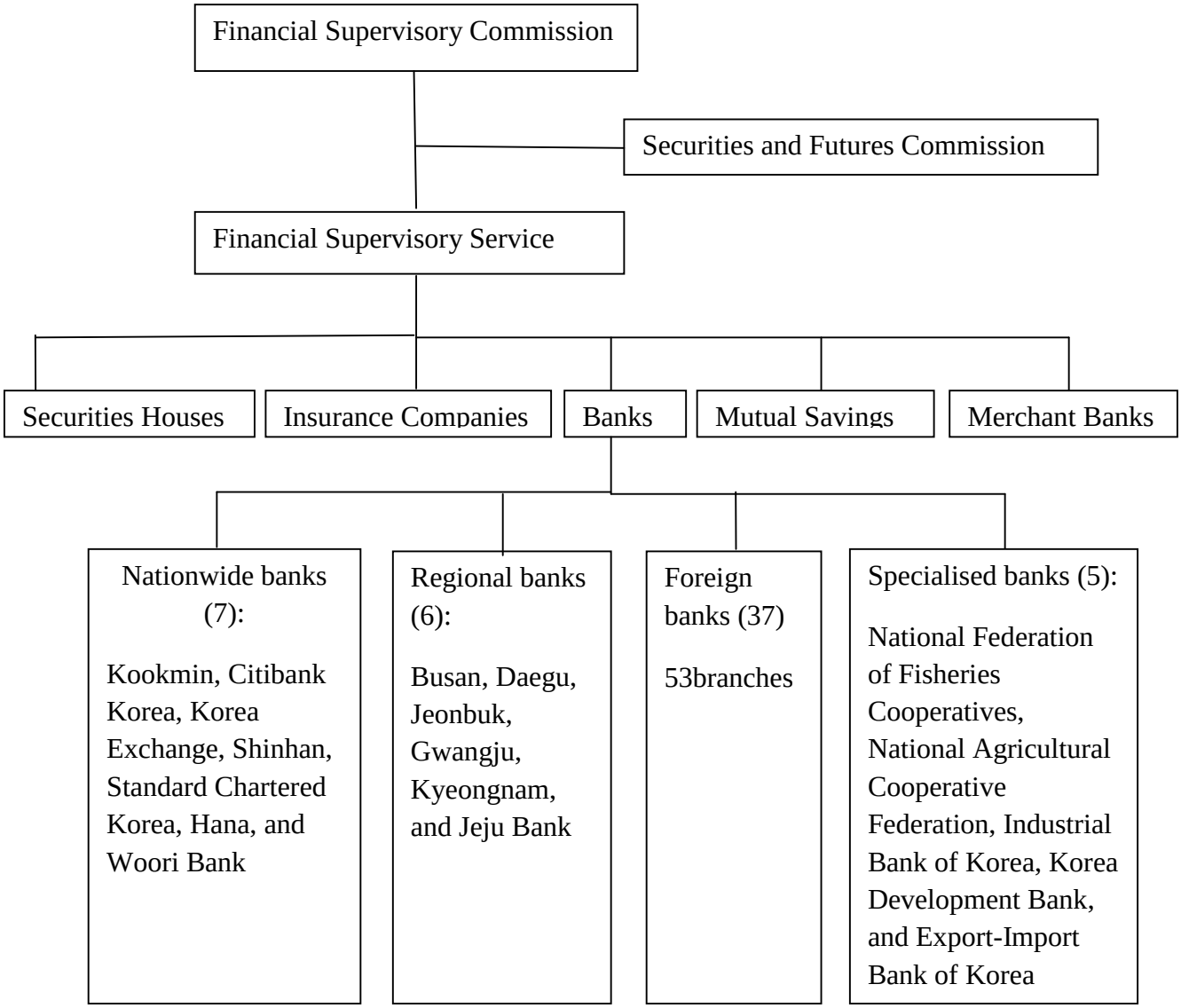
Finally, the specialised banks are government policy- based institutions that finance SMEs, offer standard commercial banking facilities and also fund export and high technology sectors with medium and long-term loans. They also compete with Commercial banks in the deposit and credit markets. The five specialised banks- also known as policies banks are: National Federation of Fisheries Cooperatives, National Agricultural Cooperative Federation, Industrial Bank of Korea, Korea Development Bank, and Export-Import Bank of Korea (FSS Handbook, 2011). The government uses them mainly as a direct conduit to control the flow of funds to various economic sectors to carry out its industrial policy. However, the banks also engage in commercial banking activities, which have considerably increased (Hall and Simper, 2013).

2.2. Pre- Asian Financial Crisis 1997-1998

During this time period, there were three main characteristics of the banking industry: the establishment and failure of *chaebols,* the weak management practices of banks, and the ineffective organisation of the financial system.

First point of discussion here is the establishment and failure of a number of family-owned conglomerates called *chaebols*. They were, as regarded by Banker et al (2010), “critical to the transformation” of Korea from being a poor agriculture focused to an industrial country. *Chaebols* received preferential treatment in this government-controlled banking system, including access to business licenses, protection from foreign

Figure 1. Structure of Korea Banking Industry



Source: Financial Supervisory Service Handbook, 2011

investors and imports, and cheap financing from largely government-controlled banks. The success of these conglomerates contributed to the strong economic growth which "transformed Korea's financial market into Asia's second largest by the mid-1990s" (Banker et al, 2010). Korean banks dominated more than 60% of the country's USD1.4 trillion total financial assets as of 1997.

Even though the financial market, especially the banking system achieved great economic growth overall, the *chaebols*' failures did not come as a surprise since they were heavily dependent on "bank financing with debt-to-equity ratios above 5:1" (Baek et al., 2004). The price to be paid for this reliance on debt became clear by July 1997 when a chain of

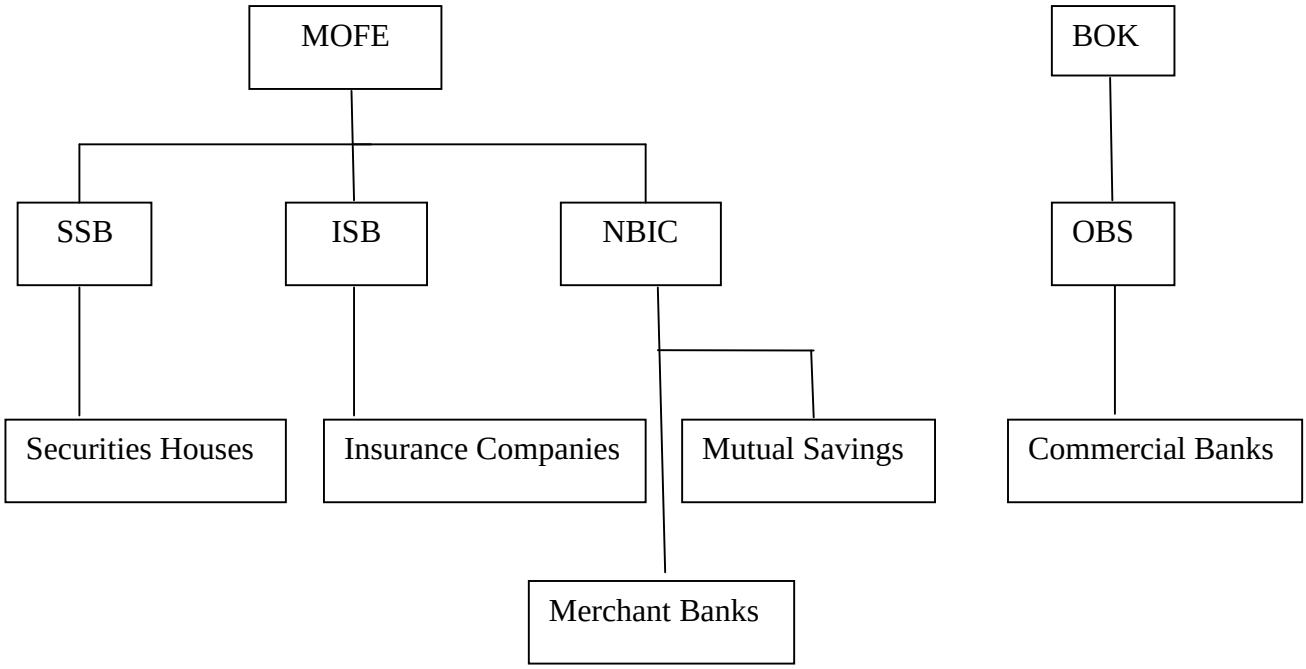
chaebols' bankruptcies happened. Three *chaebols* failures within six months- Kia Group, Jinro Group, and Halla Group- had taken away investors' confidence in the Korean economy. This led to the Korea Stock Price Index decreased by more than 50 per cent, the depreciation of the Korean Won, the increase of interest rates from 12 per cent to 25 per cent, and the growing number of non-performing loans (Banker et al, 2010). Most Korean financial institutions including banks as well as corporate were struggling for survival with "corporate bankruptcies averaged 500 a month during the first half of 1998" (Banker et al, 2010).

Secondly, the Korean banking industry was characterised by weak management practices prior to the Asian Financial Crisis despite being the Asia's second largest financial market. Banks had poorly planned supervision, no autonomy and were dependent on the *chaebols* as well as the government (Yoon and Miller, 2004, 2005). The government seemed to run the banking businesses from simply designing investment proposals to allocating designated amounts of bank loans and foreign capital. Bank managers had to follow government's directions in setting the interest rate or granting loans instead of relying on projected cash flows. They had no autonomy, hence little incentive to review the proposed investment projects. As a consequence, the banks' managers realised some high default risk in some borrowers but they could not even classify them as failing firms because the negative effects would spread throughout the whole economy (Yoo and Moon, 1999). Furthermore, banks' internal risk control structures including their credit analysis procedures, loan review processes and management information systems were basic and inadequate. Most banks' main objective was to take deposits from households to make cheap capital base for strategic industrial borrowers rather than to serve retail customers' needs or return profits to shareholders. Moreover, Korean government rewarded banks on the basis of their lending volume, not their profitability. This lack of autonomy and sound lending practice contributed to fundamental financial and managerial weaknesses, which had subsequently led to losses and weaker balance sheets for several banks. Total profits in the banking system peaked at USD 1.06 billion in 1996 before plunging to a loss of USD 2.8 billion in 1997 (cf. Banker et al, 2010). Upon realising these practices, the newly elected government in December 1997 called for a much needed fundamental reforms to transform Korean banking system. According to Thompson (1999), these reforms aimed at creating a better industry in which "market forces play the leading role in resource allocation" and bank managers have far greater accountability and autonomy in decision making. The reform strategy aimed to consolidate the banking system to the small number of well-managed and financially

sound domestic banks. In addition, the amended Banking Act also opened up to foreign banks in order to receive more capital, managerial skill and increased market competition.

Thirdly, the Korean banking industry before the 1997 crisis was inconsistently and ineffectively supervised due to an inadequate organisation of the financial system. Regulatory responsibility was divided between Bank of Korea (BOK) and Ministry of Finance and Economy (MOFE), with BOK supervising commercial banks and MOFE supervising non-bank financial institutions. Figure 2 shows the regulatory structure before the AFC.

Figure 2. Pre-crisis Regulatory Structure



MOFE: Ministry of Finance and Economy, SSB: Securities Supervisory Board, ISB: Insurance Supervisory Board, NBIC: Nonbank Insurance Corporation, BOK: Bank of Korea, OBS: Office of Bank Supervision

The dual nature of the regulatory structure and inadequate coordination resulted in inconsistent and ineffective supervision. For example, the Office of Bank Supervision (OBS), which was an internal organisation of the Bank of Korea (BOK), supervised commercial banks. The trust business of commercial banks, however, was under the supervision of the Ministry of Finance and Economy (MOFE), which also had the authority to grant and revoke bank licenses. Lack of coordination led both BOK and MOFE to neglect corporate governance of banks. Shareholders and depositors were not subject to market discipline. Due to lack of corporate governance, the profitability of

Korean banks was quite low even before the crisis[1]. Low profitability certainly contributed to the banking crisis.

Upon realising that financial supervisory system was inefficient and corrupt, the government established Financial Supervisory Commission (FSC) in April 1998 to function as a neutral and independent agency and to take over the supervisory power of MOFE. The four agencies- the OBS, SSB, ISB, and NBIC- were merged in January 1999 into the Financial Supervisory Service (FSS), which is under direct supervision of FSC. FSC plays a key role in restructuring the financial and corporate sectors. Figure 1 illustrated the structural changes.

As of end 1998, there were 12 nationwide commercial banks with 4,199 domestic branches. Nationwide banks hold the largest assets: W517 trillion or 85 percent of total assets. The major sources of the banks' funds are bank deposits which consist of Won deposits, certificates of deposits (CDs), and foreign currency deposits.

2.3. Crisis, Post- Asian Financial Crisis, and Banking Reforms

The negative effects of the Asian Financial Crisis led Korea to find itself in crisis: a large net outflow of foreign portfolio capital, lacking sufficient foreign currency liquidity following a sharp decline in foreign exchange reserves. This left the government no option but to turn to the International Monetary Fund (IMF) for an USD58.4 billion standby arrangement in exchange for a series of economic reforms (Koo and Kiser, 2001).

In the first phase of the two-stage bank restructuring which started on 14th April 1998, two banks were nationalised, five insolvent banks were closed and then merged with healthy banks, foreign capital was provided to seven banks, and the remaining surviving banks were helped with public funds to normalise operations (Banker et al, 2010). All banks shifted their focus to costs cutting and disposing of NPLs. In accordance with agreements with the IMF, the second stage of bank restructuring was carried out in beginning June 2000 and focused on restoring bank profitability. Financial holding companies were created to facilitate mergers and acquisitions to realise scale economies (Park and Weber, 2006a). This second stage of reform enabled the acquisition of unsound banks by healthy banks and voluntary mergers among other banks, which led to a decrease in the number of banks from 26 in 1997 to 14 at the end of 2002. The

[1] From 1987 to 1995, the average return on equity (ROE) of Korean commercial banks was 5.86 percent, half that of US banks (Ji and Park, 2010)

consolidation process resulted in eight dominant nationwide banks[2] which were in financially stable position to expand their extensive networks as well as to create synergy value from their acquisitions.

In the process of the sweeping financial sector restructuring, the government had to inject a huge amount of public funds into commercial banks through two government agencies- Korean Deposit Insurance Corporation (KDIC) and Korea Asset Management Corporation (KAMCO) (table 1). KDIC was originally established under MOFE in December 1997 for commercial banks, later on expanded to serve all the financial institutions by absorbing five other separate insurance funds (Ji and Park, 2010). Due to its short history, it did not have enough reserves and it issued bonds to finance itself. It authorised bonds amount to W31.5 trillion, which are used for capital injection and deposit-loss coverage of ailing financial institutions.

Another very important element of the reform is the reorganisation of Asset Management Corporation (KAMCO). KAMCO was established in 1962 to manage bad loans of the State-run Korea Development Bank (Ji and Park, 2010). On 24 November 1997, it completed a major reorganisation effort to carry out the acquisition and disposition of NPLs more efficiently under the control of MOFE. When it was reorganised, NPLs amounted to W38 trillion and the Nonperforming Asset Management Fund was W10 trillion. In May 1998, the fund size was increased to W32.5 trillion. The bailout fund is used to buy NPLs of financial institutions and assets of ailing business firms. KAMCO financed itself by issuing W32.5 trillion worth of its own bonds and by disposing purchased assets through direct sale of these assets or of asset-backed securities. On 26 November 1998, KAMCO started operation by purchasing the combined NPLs of Korea First Bank and Seoul Bank amounting to W4.39 million at the discounted price of W2.91 trillion. The average discount rate was set at 66.3 percent (Ji and Park, 2010). KAMCO bailout funds and KDIC funds constitute the fiscal support needed to facilitate the financial sector restructuring process.

[2] These were Commercial, Hanil, Korea First, Korea Exchange, Kookmin, Housing and Commercial, Cho Hung, and Seoul (Bank of Korea, 1998).

Table 1. Public funds injected into the banking system (trillion won)

Source	Support type	Nov 1997-Dec 1998	1999	2000	Total
KDIC	Total, of which:	27	28	23	78
	• Recapitalisation	6	16	14	36
	• Compensation of losses	7	4	1	12
	• Purchase of distressed assets	-	3	6	9
	• Insurance claim payment	12	5	2	19
	• Loans issued	2	0	-	2
KAMCO	Purchase of NPLs	12	3	12	27
Fiscal resources	Total, of which:	17	2	-	19
	• Recapitalisation	11	2	-	13
	• Purchase of subordinated debentures	6	1	-	7
Total		56	33	35	124

Source: BIS (Papers No.4)

The financial reform legislation transformed Korea from being a country where progress in modernizing financial institutions had been one of the slowest among OECD members to one where the new regulatory framework embodied the latest thinking among OECD members (Banker et al, 2010). Non-performing loan ratio had climbed to 16% in mid-1997 and 22.5% in early 1998 (Park, 2003). The banking sector improved significantly with substantial progress was made in identifying the extent of the bad loan problem, consolidating the banking sector and re-capitalising banks. Improvement in real economic activity and a decline in interest rates also sped up the banking sector recovery. Banks focused more on shareholder value creation, found new investors to acquire equity stakes as the sector reforms gained investors' confidence.

The credit card bubble in 2003 led to countercyclical, macro-prudential policies

From mid-1998 to early 2002, the government pursued expansive economic policies to stimulate an economy struggling under the weight of a severe financial crisis. Credit card issuers began to compete fiercely for new card members in an attempt to expand their market share. In many cases, they issued cards without checking the credit history of applicants. As a consequence of this poor risk management practice, lending to problematic cardholders increased, which left the credit card companies with rapidly growing bad assets on their balance sheet. The delinquency ratio outstanding for more than a month, which was as low as 3.8% in 2001, jumped to 11.1% by January 2003 (Kim Chang-Lok, 2006). The distress in the credit card sector then quickly spread to other financial sectors. And with the economy in recession, many low income households began to default on their debt and card companies declared insolvent or merged with another one.

The credit card bubble burst coupled with sharply rising mortgage loans since 2000 had undermined the stability of the overall housing market. The Financial Supervisory Commission has taken steps to prevent overheating in mortgage lending to minimize the risk of loan default. These are called countercyclical approaches. First, the supervisory raised the risk weighting for mortgage loans. Between 2001 and 2002, the risk weighting for mortgage loans related to capital requirement was raised from 50 per cent to between 60 and 70 per cent, with due consideration given to borrowers' credit history and debt repayment ability (Chang, 2010). Second, in 2002, the authority started to reduce the maximum Loan-To-Value (LTV)[3] ratio for mortgage loans, from approximately 75 per cent to 40 per cent in the Seoul metropolitan area. The supervisory authority determined that two of the major reasons for the surge in mortgage lending were the collateral-focused lending practices of financial companies and the willingness of households to take on mortgage debt beyond their ability to repay it, to take advantage of rising housing prices. In addition, the indirect approaches described above were thought to be insufficient to deal with the banks' rapidly growing housing loans. Thus the FSS chose this LTV ratio as the main, direct policy instrument to constrain the growth of mortgage loans. FFS required banks to lower the LTV ratio on mortgage loans to below 60 per cent in September 2002, then to 50 per cent in June 2003, after that the ratio was further

[3] The LTV ratio is defined as the ratio of a possible loan amount against the value of collateral. The detailed formula is:

$$\frac{\text{(The amount of housing mortgage loan + senior loans + leasehold deposit)}}{\text{The collateral value}} \times 100$$

reduced to 40 per cent in October 2003. Lowering the LTV ratio successfully resulted in the slowing of the growth in housing prices. As a consequence, there were fewer loan defaults and the growth of new loans was slowed (Chang, 2010).

2.4. Global Financial Crisis 2008

The Lehman Brothers bankruptcy in September 2008 and the resulting sudden stop in capital flows caused a loss of funding to cope with current account deficits for most capital flow recipient countries. While Korea's current account position prior to the crisis had comfortably remained in surplus, Korea was among the hardest hit country in Asia during the Global Financial Crisis (GFC). In response, the government has expanded the opening of the domestic financial and capital markets to promote foreign capital inflows (Ahn, 2008). As a result of the opening up, Korean financial institutions and the financial market as a whole have become increasingly affected by changes in the global financial markets. A large amount of capital outflows led by external GFC shocks could adversely affect the stability of individual financial institutions. The shock prompted a large outflow of foreign capital of US$42 billion in the fourth quarter of 2008 and the gross liabilities of domestic banks fell by US$25 billion (Tsutsumi et al., 2010).

As well as being exposed to a domestic real estate bubble, Korea's banking system is heavily dependent on international credit markets. Fitch Ratings and Moody's have both warned that South Korean (and Australia) are the most exposed in Asia to the European debt crisis (McGrath, 2012). According to Korea Herald, in the decade after the 1997-1998 Asian financial crisis, a total of W8.5 trillion of public funds were used to bail out troubled banks. Then in 2010, the KAMCO stepped in to provide additional public money, W2.8 trillion, to cover construction related loans.

In term of regulation, the Korean authority set up the Foreign Exchange Soundness Guiding Ratios to cope with liquidity shock by minimising the possibility of mismatches between their foreign currency assets and liabilities. It also established the Foreign Exchange Risk Management Indication Standards and induced financial institutions to strengthen their internal risk management to deal with foreign exchange risks including country risk, large credit risk, financial derivatives transaction risk, and market risk (Ahn, 2008).

2.5. Now

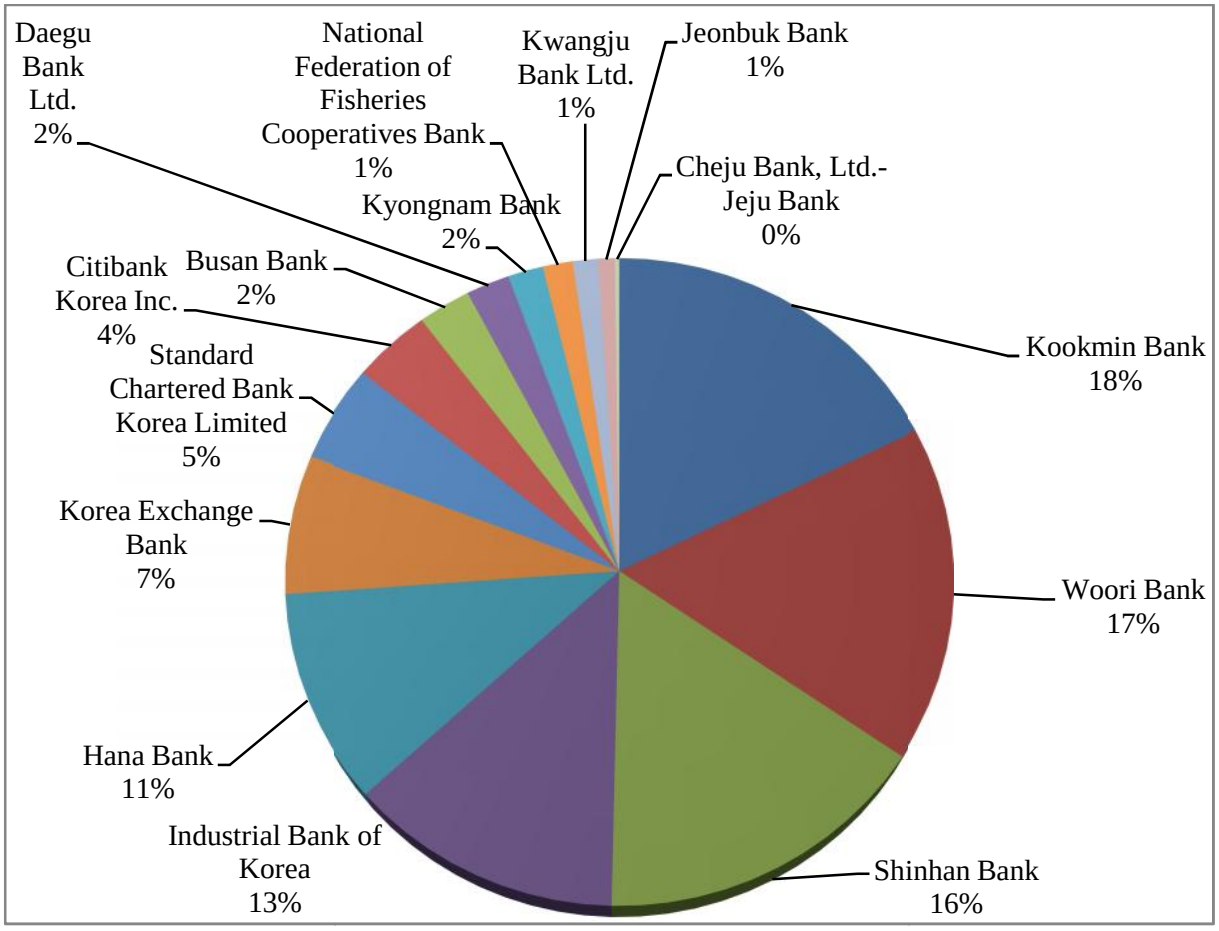
As in the US and other countries, the Korean bailouts encouraged the banks to continue to engage in risky lending. At the end of March 2010, loans extended by banks to

construction projects had increased to W11.9 trillion, compared to W6 trillion at the end of 2005. Loans considered to be risky increased from 45 per cent in 2010 to 60 per cent in 2011, while loans considered substandard rose from 10 per cent to 20 per cent in the same period (McGrath, 2012). The FSC have imposed six months suspensions on operations of four saving banks (Solomon, Hanju, Mirae, and Korea Savings Bank) on 6 May 2012 because they had a Bank of International Settlements ratio (BIS) fewer than 5 per cent. The BIS ratio indicates the solvency of a bank, showing the ratio between risk-bearing capital and risk-weighted assets. Banks are generally required o have a BIS ratio of around 8 to 10 per cent.

The industry is now in the process of implementing new risk management infrastructure and is on the path of Basel III compliant. Nonetheless, Korean banks are facing some new challenges such as encountering greater exposure to the international funding cost than other banks and Asia, and they are confronting the issue of maintaining a healthy Return-On-Assets in a highly liquid environment.

2.6. Characteristics of Korean Banking Industry

Figure 3. Distribution of Total Assets in Korean Banking Industry (2011)



Notes: Total assets = USD 1,255,133 million (or 1,446 trillion Korean WON)

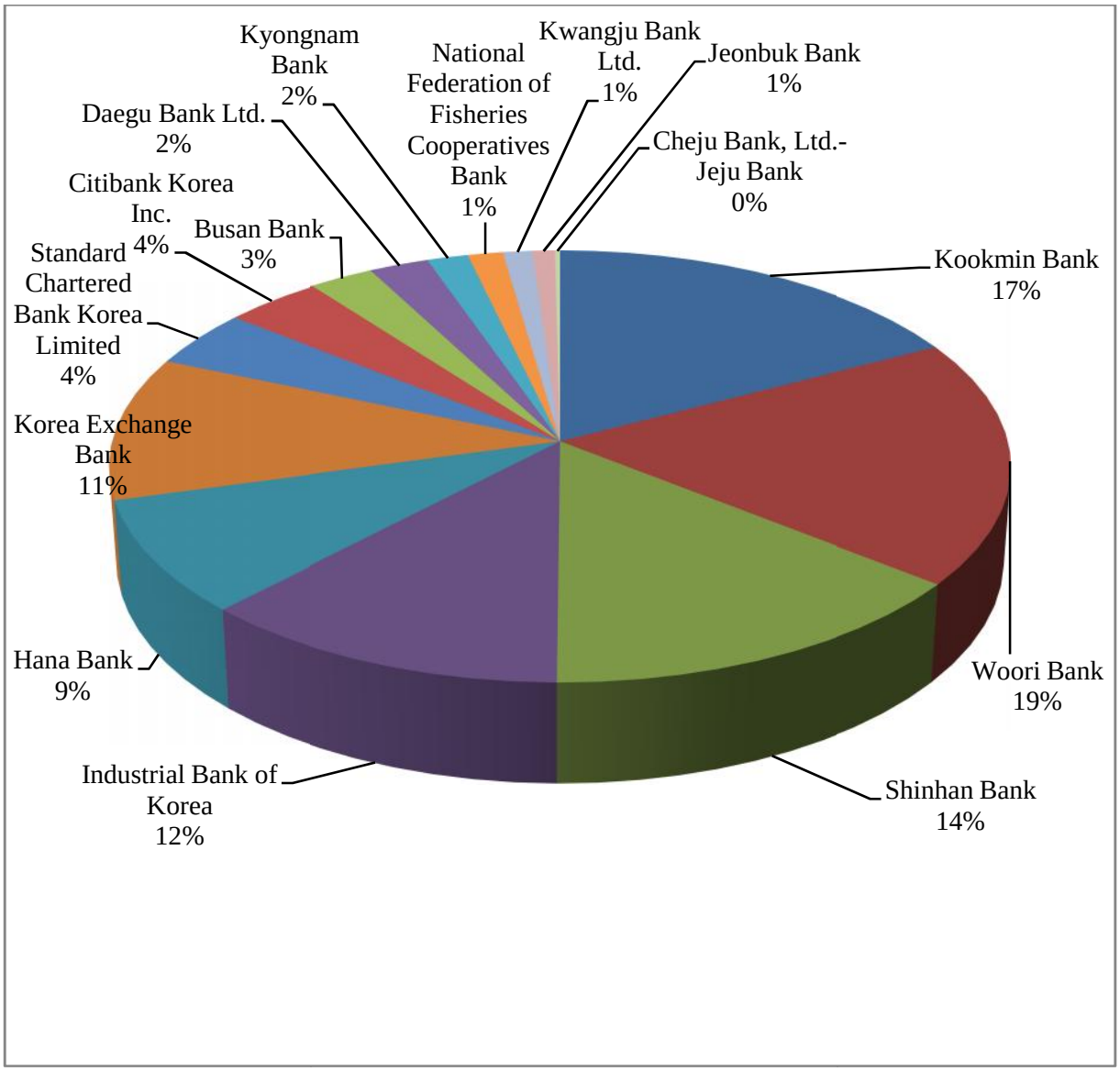
Source: Bankscope

The most striking characteristic of the Korean banking system is that it has been dominated by three biggest banks. Figure 3 shows the distribution of total assets in the Korean banking industry. The total assets of all commercial banks in Korea in 2011 was USD1, 255,133 million of which the three banks amount to more than half- Kookmin bank (18%), Woori bank (17%), and Shinhan bank (16%).

This concentration characteristic of Korean banking industry is similar to one of the US banking system where at the end of 2010, 56 per cent (USD7.6 trillion) of its total assets are controlled by the four largest US banks: Bank of America (USD2.3 trillion), J.P. Morgan (USD2.1 trillion), Citigroup (USD1.9 trillion), and Wells Fargo (USD 1.3 trillion) (Yahoo Finance, 2011). Similarity is also found in the Chinese banking system where four state-owned commercial banks- People's Bank of China, Industrial and Commercial Bank, China Construction Bank, and Bank of China Limited control approximately 48 per cent of total assets.

Additionally, the concentration of operating income is also an indication of high concentration nature of the Korean banking industry. The distribution of operating income is shown in figure 3. The three banks- Kookmin bank (17%), Woori bank (19%), and Shinhan bank (14%) have 50 per cent of all commercial banks' operating income in 2011. After the second-phase of the financial restructuring in 2001, the Korean commercial banking market became a more concentrated market than those in other OECD countries of a similar population size (Park, 2011).

Figure 4. Distribution of Operating Income in Korean Banking Industry (2011)



Notes: Total operating income = USD 36,968 million (or 42,580 billion Korean WON)
Source: Bankscope

Another aspect of the Korean banking industry is the corporate governance issues and risk management. Even though the *chaebols* era has gone, Korean banks are still in the process of gaining independence from government and strengthening its corporate governance practice. While the government does not hold a large direct ownership stake, it continues to exercise power over bank management leading to potential expropriation of shareholder and creditor values for the large corporate borrowers (Hahm, 2005). Recently, there have been operation suspensions of several banks due to corrupt and illegal practices by bankers to cover loan default losses.

2.7. Provisioning Practice of Korean banks

According to World Bank (2002), loan loss provisioning is a method that banks use to recognise a reduction in the realisable value of their loans. “Loan classification refers to the process banks use to review their loan portfolios and assign loans to categories or grades based on the perceived risk and other relevant characteristics of the loans” (World Bank, 2002). In Korean banking industry, the loan classification standards have become more conservative. The table 2 below summaries the pre-crisis and present classification of loans.

Table 2. Changes in Loan Classification Standards in Korean banking industry

Period of Overdue Payment	Pre-crisis Classification	Current Classification
1 – 3 months	Normal	Precautionary
3 – 6 months	Precautionary	Substandard or Doubtful
Longer than 6 months	Substandard or Doubtful	Substandard or Doubtful

Source: Financial Supervisory Service

In July 1998, the government made loan classification standards and provisioning requirements more conservative in line with international standards. According to the FSS Handbook (2010), banks are required to appropriately classify their assets and ensure their soundness. Bank assets are classified into five categories: normal, precautionary, substandard, doubtful, and estimated or presumed loss. Banks are required to set aside loan loss reserves in excess of the minimum regulatory ratios. Loans in arrears for three months or more are now classified as substandard or lower, and loans in arrears for one to three months are classified as pre-cautionary.

Financial Supervisory Service uses new loan classification procedures for its semi-annual auditing of bank loans. Its evaluation incorporates the findings of diagnostic reviews and ensures that classifications by management, as well as reviews by examiners, fully reflect the debtor’s capacity to repay, and not simply past performance. On 1 July 1999, the loan classification system became even more conservative, with expected future performance a criterion for classifying an asset as problematic. These forward-looking criteria led to a sharp increase in total bad loans and thus, bigger LLPs. For example, as of end-1998, banks’ total bad loans and precautionary loans were W33 trillion and W63 trillion, respectively. With strict application of forward-looking criteria, however, at least 50-70

percent of precautionary loans were expected to deteriorate into bad loans. In this case, total bad loans were estimated to range from W64 trillion to W77 trillion (Ji and Park, 2010). The size of NPLs is a moving target. It changes according to the standards of loan classification used. Under stricter standards, NPLs are bigger. As of the end of June 1998, FSC estimated that NPLs, including precautionary and substandard loans, amounted to W197 trillion, of which precautionary credit was W79 trillion, and credit that was substandard and lower was W118 trillion (Ji and Park, 2010).

Table 3. Adjusted Minimum Loan Loss Reserve Ratio for Banks, 2010 (per cent)

Classification	Household Loans			Corporate Loans			Credit Card Receivables		
	Until Nov 2002	Dec. 2002-Nov. 2006	Dec. 2006 and after	Until Nov. 2006	Dec. 2006-Nov. 2007	Dec. 2007 and after	Until Nov. 2002	Dec. 2002-Nov. 2006	Dec. 2006 and after
Normal	0.5	0.75	1.0	0.5	0.7	0.85	0.5	1.0	1.5
Precautionary	2.0	8.0	10.0	2.0	7.0		2.0	10.0	15.0
Substandard	20			20			20		
Doubtful	50	55		50			50	60	
Presumed loss	100			100			100		

Source: Korea Financial Supervisory Service, cf. Chang, 2010, p.9

About provisioning, FSS also tightened provisioning requirements on 1 July 1998 to meet international standards. Table 3 presents the changes. Requirements for precautionary loans have been raised from 1 to 2 percent. Provisioning requirements for substandard loans, doubtful loans, and estimated losses are now 20, 75, and 100 percent of each category's loans, respectively. The authority also raised the minimum loan loss reserve ratios for banks' household and corporate loans that were classified as normal and precautionary in November 2002 and in December 2006. In November 2002, the banks' minimum loan loss reserve ratios for household loans classified as both normal and precautionary were pushed up from 0.5 per cent to 0.75 per cent and from 2 per cent to 8 per cent, respectively. For loans classified as doubtful, the provisioning ratio was raised from 50 per cent to 55 per cent (Table 3). In December 2006, the minimum loan loss

reserve ratios for household loans classified as both normal and precautionary were further raised from 0.75 to 1.0 per cent and from 8 to 10.0 per cent, respectively.

Figure 5. Loan loss provisions and GDP growth rate

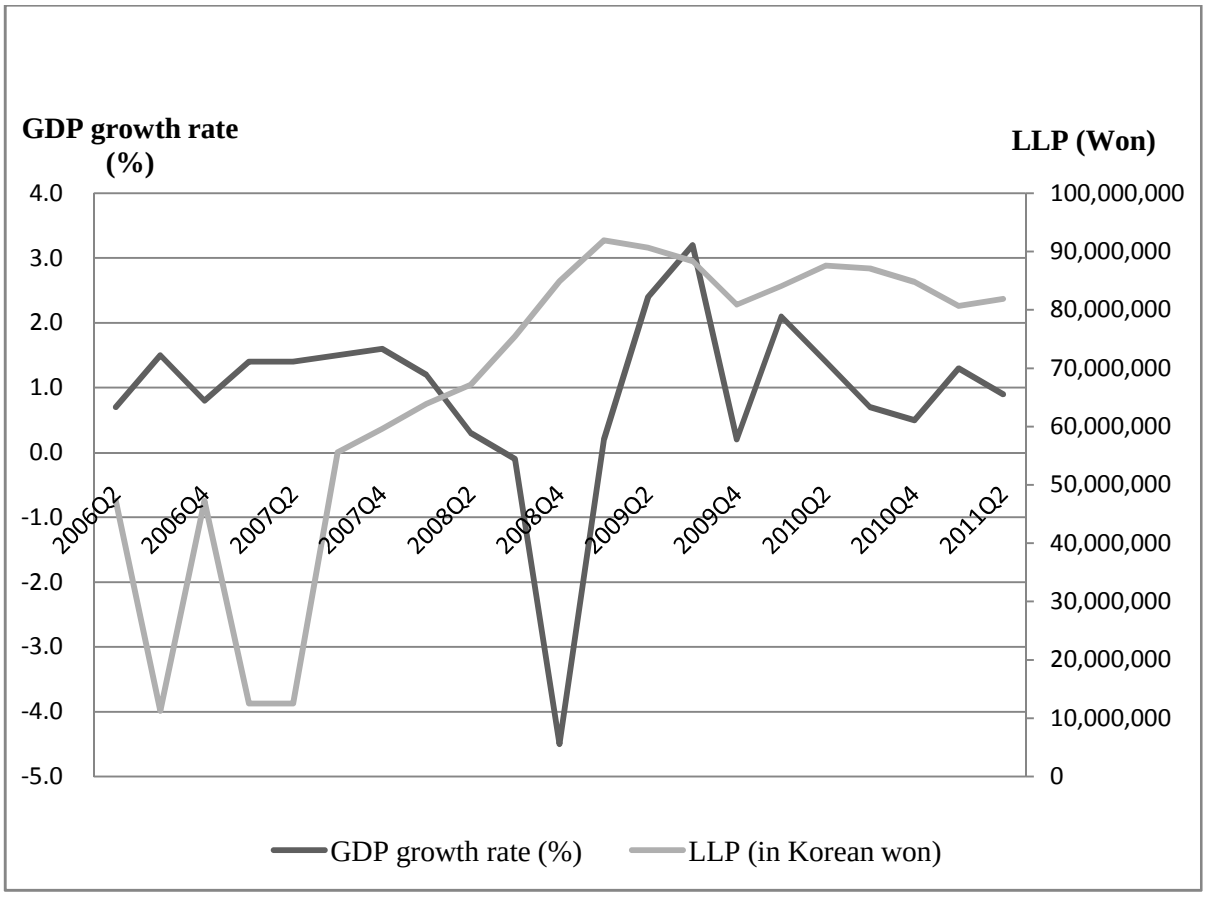


Figure 5 plots the LLPs of 16 banks against the quarterly Korean real GDP growth rate during 2006Q2 - 2011Q2. It can be seen from the graph that provisions of Korean banks are backward –looking and exhibit some procyclicality since the LLPs tend to move in opposite direction with GDP growth rate, a proxy for Korean macro-economy conditions. This means, on average, Korean banks tend to increase their LLPs level during the economic downturn to deal with the increasing default rate. This procyclical provisioning practice can explain the peak in provisions around 2008Q4 when the global financial crisis happened and the GDP growth rate was at the lowest -4.5 per cent.

According to Wezel (2010), among the causes of procyclicality are backward-looking loan loss provisioning rules that do not recognize the build-up of credit risks in boom phases and thus facilitate credit expansion and excessive risk-taking. Procyclical lending and provisioning occur when a period of high credit growth and lax lending standards is followed by a downturn, which triggers a rise in non-performing loans, hence, specific loan loss provisions"

Concerning countercyclical measures, Wezel also notes that dynamic loan loss provisioning can be one of the alternative tools to mitigate procyclicality since the basic idea of the tool is to build loan loss reserves during good times, which can be used to absorb losses in bad times. Wezel explains that "Dynamic provisioning is one of the approaches recommended by the Financial Stability Forum (2009) to recognize and measure loan loss that incorporate a broader range of credit information. During an economic upswing, the stock of dynamic provisions grows rapidly as loan origination is high and loan losses are typically low. The reverse is true during economic downturns, and additional provisions for actual loan losses are then covered by drawing on the stock of dynamic provisions".

However, Caprio (2010) shows that the method used in Spain and Colombia to vary provisions on a countercyclical basis demonstrated no ability to reign in or reduce an asset bubble. In Korea, the upward adjustments in provisioning requirements for mortgage loans were unsuccessful in limiting the expanding housing loans in times of the housing boom because the provisions were not designed to cover extreme events.

3. LITERATURE REVIEW

Recent developments in banks' failure have heightened the need for more resilient banking systems. The Basel Committee on Banking Supervision has taken the pioneer role by delivering Basel III which aims to build "higher capital and liquidity standards while supporting lending to the economy" (BIS, 2010). A considerable amount of literature has concluded that banks create less provision in economic upswings and then adhere to the regulation to increase it during downturns which leads to restricted lending and the spiral goes. Learning from the previous global financial crisis, banks are now encouraged to hold higher constant minimum capital requirements so that they can deal with financial crisis without facing lending contraction or dishonouring withdrawals. Loan loss provisions, an element in Tier 2 capital, are seen as one of instruments to counter the pro-cyclicality of capital regulation. Recent studies also suggest that LLPs have discretionary uses which associated with income smoothing, capital management and performance signalling (Bikker & Metzemakers, 2005; Bouvatier & Lepetit, 2008; Floro, 2010; among others).

3.1. Pro-cyclicality and Business Cycles

Central to the entire discipline of LLP is the concept of pro-cyclicality. The procyclical effects could be spread out through two notable channels. The first channel, also a

common theory in literature is that banks' provisioning behaviour is pro-cyclical in essence that it "reinforces the current development of the business cycle" (Bikker and Metzemakers, 2005). During an economic upswing, employment rate is high and possibly salaries are increased; hence loan default rate is low. Banks reflect this characteristic by lowering their LLPs during an economic boom and increasing provisions during an economic downturn to deal with rising loan defaults. Increased provisions lead to banks having little left to lend to businesses, which is detrimental to the economy recovery. As a result of the changes in provisioning, banks' lending behaviour changes and it does so over the course of the business cycle. The effect can be amplified since the number of non-performing loans in the following economic expansion is likely to increase due to banks become too optimistic and grant new low quality loans. This is the non-discretionary component of LLP which is more closely associated with credit risk and macroeconomic environment, among others. In a study of 29 OECD countries' banks, Bikker and Metzemakers (2005) found that provisioning is "substantially higher when the GDP growth is lower, reflecting increased riskiness of the credit portfolio when the business cycle turns downwards, which also increases the risk of a credit crunch". The pro-cyclicality behaviour also appears in studies by Cavallo and Majnoni (2001), Borio and Lowe (2001), and Laeven and Majnoni (2003) among many others. Cavallo and Majnoni (2001) found a negative relationship between LLP and banks' earnings in banks of non-G10 countries which may result from more fund has been put aside rather than lending out. This backward-looking, reactive provisioning is one of many that have been blamed for the recent financial crisis (Saurina, 2009). Arpa et al (2001) focus more on the influence of macroeconomic developments in explaining components of bank incomes and provisions for future credit losses over 1990-99. They demonstrate that Austrian banks make more provisions for credit risk as GDP growth figures decline. The second channel of pro-cyclical effects is the regulators' immediate measures to tighten provisioning practices in response to "systemic bank unsoundedness" (Cortavarria et al., 2000). The regulatory response during banking distress (tightening regulations), which may itself have produced a procyclical effect during the downturn. Banks are under stricter capital rules and in order to meet those, banks may have to cut back on lending, which leads to pro-cyclicality like above. The timing and phase in of regulations should be considered throughout since overly ambitious timetables may excessively hinder the economic recovery and slow down the return to solvency and soundness. Perhaps, this has been taken onboard by the Basel Committee and the implementation of Basel III has a 6 year phase-in period to allow for a smooth transition. Bikker and Hu (2002), however,

concludes that while procyclicality of banks' behaviour and the perceived increased procyclicality caused by the new capital accord are genuine problems, they are unlikely to have a substantial unfavourable effect on macroeconomic stability. They emphasise the new accord does help to enhance to financial health of the banking system, thereby diminishing the risk of the worst possible credit crunch caused by a banking crisis.

Another theory of why banks use LLPs to reduce risk is the counter-cyclicality of provisioning. This view states that credit risk is built up during the economic expansion and materialises in a downturn. The two reasons why credit risk grows during the upswing could be an excessive lending and a less critical assessment of borrowers' creditworthiness (Bikker and Metzemakers, 2005). According to this view, LLPs have a positive relationship with the lending cycle and banks should provision more in good times so that they can utilise in the downturn. This is a forward-looking assessment and management approach to risk and banks are being encouraged to implement a dynamic provision system. Spanish banks took the pioneer role in employing a banking system called statistical provisioning in 2000. This provisioning is based on risk assessment with observations over a longer period of time and by allowing for early detection of credit losses, it enables banks to form a buffer during economic expansion to be utilised in difficult times. To control for excessive increase in LLPs, Spanish central bank created a model that reflects the loans' different level of "latent risks" and therefore a maximum amount of statistical fund was set (Saurina, 2009). Since then many more countries follow Spain's step for examples, Portugal, France and the Netherlands also have some forward-looking elements in their provisioning (Bikker and Metzemakers, 2005). In Latin America, Peru, Colombia, Bolivia and Uruquay have adopted dynamic provision (Galindo and Rojas-Suarez, 2011). Although both Peru and Colombia have the dynamic provisioning system, they differ in methodologies. While similar to Spain, Colombia has provisions that are computed based on idiosyncratic, bank specific credit growth; Peru has provisions that follow a macroeconomic rule which using GDP as a benchmark.

Having had much the positive literature on dynamic provisioning, the challenges to a successful implementation lie in accounting implications, tax treatment of provisions, and data requirements (Saurina, 2009). Some argue that dynamic provisioning allows bank managers to use accounting techniques to carry out earnings management (next section of essay discusses this in details). However, Saurina (2009) strongly disagreed and confirmed that "LLPs are fully transparent" since publishing general provisions amount is mandatory for banks and there is a cap on the dynamic fund. Tax deductibility provides a

strong incentive for banks to put aside adequate LLPs. Tax treatments of LLPs vary across countries and regulators do consider the balance between restrictive tax rules leading to inadequate provisions and lower tax revenues. Provisions are tax deductible but level of deductibility depends on whether they are specific or general provisions. And within each category, the deductible amounts vary across countries. For example, in Spain, general provisions are tax deductable expenses up to 1% of the increase in gross loans (Saurina, 2009), in Italy the limit is 0.6% (World Bank, 2002). Another challenge of implementing the dynamic system is the data requirements. Regulators in some countries have "credit register" that is used to build the estimation model, but some do not have and need to depend on banks' own information, thus the reliability of data needs better assessment. Also, data is losses in the past, though does its best to predict the impacts on profit and loss account, there is no guarantee that the next crisis would be similar to the previous one.

3.2. The Incentives of Using Provisions

LLP is a "non-cash expense" (Rivard et al., 2003) that represents bank managers' estimate of the year's net change in probable loan losses. The management have better information regarding default risk in their loan portfolios therefore they can better estimate the LLP in each period. On the other hand, they can exercise discretion over the timing of materialisation of losses for managerial purposes such as income smoothing, capital management and performance signalling (Beaver and Engel, 1996; Ahmed et al, 1999; Gosh, 2007, Floro, 2010). The following subsections discuss these three in details.

3.2.1. Income Smoothing

Income smoothing is an accounting technique used to level out the fluctuations in net income from one period to the next.

Table 4. Breakdown of banks' profits

Interest income
-Interest expenditure
Net interest income
+Non-interest earnings
Gross profits (operational profits)

-Operational expenditure
Net profits (operational)
-Provisions
Profits before taxes

Source: Bikker and Hu (2002)

The simple table above illustrates the breakdown of banks' profits to show the possibility of evening out profits by increasing or reducing provision amount. During periods of low earnings, a bank may understate its expected loan loss, thus less provision in order to show higher earnings. Likewise, when profits are high, more provisions reduce variability of earnings and also reduce tax liabilities since corporations try to stay within beneficial tax brackets. Although income smoothing is considered as a violation of the internationally accepted accounting standards IFRS and IAS 39, which determined provisioning solely based on evidence of incurred losses or impairment (Banker et al, 2010), evidence of this practice has been present in many studies. Because bank managers have flexibility in estimating LLPs and LLPs are "a non-cash expense" (Rivard et al., 2003), managers may have some other potential motivations for income smoothing. Greenawalt and Sinkey (1988) tested income-smoothing hypothesis for 106 large US banks and found that these motivations include bank regulatory policy, risk management, agency theory, and compensation policy. Similar study by Rivard et al (2003) argued that earnings' variability is a measure of risk; therefore income smoothing can reduce the perceived riskiness of the bank, which leads to increased stock value. They also found that managers manage banks' earnings in response to the structure of their compensation package or even due to their job security concerns (Fudenberg and Tilore, 1995). Arpa et al (2001) demonstrate that Austrian banks make more provisions for credit risk as net income rises. Gosh (2007) found income smoothing is also one of Indian banks' practices.

3.2.2. Capital Management

Since general provisions also count as regulatory capital according to the Basel Accord, LLPs may be used to manage capital ratio (Ahmed et al., 1999; Bikker and Metzemakers, 2005; Anandarajan et al, 2007; among others). The development of Basel II framework confirmed the relationship between capital and LLPs: capital is used for unexpected losses whereas LLPs are for expected losses (BCBS, 2009). Regulatory capital is the sum

of Tier 1 and Tier 2 capital where Tier 1 consists of paid-in capital and retained earnings; Tier 2 includes general loan loss reserves and bank liabilities. Capital is crucial to banks because once it falls below the minimum required level, banks are under supervisors' scrutiny with prudential corrective actions. It is often found that banks with low Tier 1 capital tend to increase LLPs to meet capital ratios requirement. Moreover, banks would prefer increasing LLPs to raising capital on the market because doing so is costly and time consuming. According to Cortavarria et al (2000), managers have a stronger incentive to shift from pure Tier 1 capital to Tier 2 general provisions due to tax deductibility of provisions in some countries. Results from different empirical studies on the relationship between provisioning and capital management are somehow conflicting. Bikker and Metzemakers (2005) on 29 OECD countries' banks, Bushman and Williams (2007) on 28 random countries' banks found a negative relationship between LLPs and capital ratios, whereas Colin et al. (1995) on 160 banks, Eng and Nabar (2007) on Hong Kong, Malaysian and Singaporean banks concluded the positive relationship. Cavallo and Majnoni (2001), in their study of 1176 commercial banks of both G10 and Non-G10 countries, found that shortage of banks' capital may not be due to regulation of bank capital but most prominently to the lack of regulation of banks' LLP practices.

3.2.3. Performance Signalling

An increase in LLP can signal financial strength to shareholders and other parties that "management perceives the earnings power of the bank to be sufficient strong that it can withstand a "hit to earnings" in the form of additional LLPs" (Beaver et al, 1989). Kanagaretnam et al (2003) studied four hypothesises and concluded that because bank managers have different incentives, their tendencies to signal vary with bank size, earnings variability, degree of income smoothing, and investment opportunities. The study implicates that by understanding the conditions under which bank managers' use discretionary LLPs to signal banks' performance, regulators can distinguish between manipulating the use of accounting for opportunistic purposes and for better informative report of earnings.

Table 5 below summaries some of the notable empirical studies on LLPs.

Table 5. Summary of empirical studies on Loan Loss Provisions

Author	Country/ Countries	Research Period	Estimation method	Variables	Findings
Fonseca and Gonzalez (2008)	40 different countries	1995-2002	Arellano and Bond Generalised Method of Moments	LLPs, first and second lag of LLPs, EBTP, consumer loans, LTA, capital ratio, GDP, political-economy variables	Positive relationship between LLPs and consumer loans, LTA, capital and EBTP (evidence of income smoothing). Negative coefficient for GDP indicating procyclicality
Craig et al (2006)	242 banks from 11 Asian countries	1996-2003	Panel estimation	GDP, Property prices, Interest rate, Lags of the above variables, LTA, short-term funding/ assets, capital ratio, EBTP/assets, lending growth, interest margins	There are various findings; among them is evidence of procyclicality. Rising property values lead to reduced provisioning.

Angklomkiew et al (2009)	8 Asian countries: Hong Kong, India, Indonesia, Korea, Malaysia, Singapore, the Philippines, and Thailand	1998-2008	Panel data regressions	GDP growth, Loan growth, property prices, Earnings, capital ratio	Evidence of procyclicality; All variables are negatively related with LLPs. Banks provision more over the past few years than before the Asian financial crisis.
Wong et al (2011)	HongKong,Australia,China, Japan, Indonesia, Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand; (317 banks)	1996 - 2009	CoVar method proposed by Adrian and Brunnemeier (2008)	Assets, Equity/Assets, Liquidity (Current Assets/Assets), LLP/Loans; GDP Growth	Evidence of Procyclicality; LLP is negatively correlated with loan growth; Procyclical loan supply
Floro (2010)	Philippine banks	2001-2009	Arellano and Bond Generalised Method of Moments	LLRs, NPLs, income, LTA, size, GDP, monetary policy rate, capital buffers	1)Negative relationship between capital and LLPs; 2) non-linear relationship between economic cycle and LLPs; 3)Evidence of income smoothing and procyclicality
Bouvatier and	(15 European countries)	1992-2004	Arellano and Bond	LLPs, NPLs, GDP,	Non-discretionary components of

Lepetit (2008)	186 commercial and cooperative banks		Generalised Method of Moments	Deposits/total assets, Equity/total assets, total capital ratio, return on assets, LTA,	LLP amplifies the credit cycle; discretionary component does not explain credit fluctuations
Bikker and Metzemakers (2005)	Banks' balance sheet items from 29 OECD countries	1991-2001	Pooled cross-section and time series data regression	LLRs/total assets, GDP, unemployment rate, EBTP, loan growth, LTA, capital/total assets,	Evidence of procyclicality; Procyclical effect is mitigated by earnings and loan growth; banks provision more when capital ratio is low
Laeven and Majnoni (2003)	Data of 1419 banks from 45 countries worldwide	1988-1999	Generalised Least Squares with random bank-specific effects, AND Arellano and Bond Generalised Method of Moments	LLPs, first and second lag of LLPs, EBTP, loan growth, GDP	Banks postpone provisioning when faced with favourable cyclical and income conditions, procyclicality is less in emerging countries than in developed countries.

Notes: LLPs = Loan loss provisions, LLRs = Loan loss reserves, NPLs = non-performing loans, LTA = loan to assets, GDP = Gross Domestic Product, EBTP = earnings before taxes and provision.

Fonseca and Gonzalez (2008) studied the determinants of income smoothing by management of LLPs using dataset of 3221 bank-year observations from 40 countries worldwide and applied the Arellano and Bond Generalised Method of Moments estimation method. The authors found evidence of income smoothing and went further to conclude that level of income smoothing depends on factors such as investor protection, disclosure, regulation and supervision, structure, and financial development.

Craig et al (2006) are said to have conducted the most ambitious study focusing on Asia to date. They investigated the provisioning decisions of 300 Asian banks from 11 countries between 1996 and 2003 using both bank-level and macro variables. There were a number of findings for their various tests. Among those, evidence of procyclicality was found, real GDP, loan growth, asset prices and earnings are negatively related to provisions. The study also concluded that delays in provisioning might be a feature of Asian banking systems.

Angklomkliew et al (2009) also explored the provisioning behaviour of Asian countries. Their dataset was system-wide data from eight countries over 1998-2008 and the regressions used annual data, fixed country effects. Similar to findings of Craig et al (2006), they also found GDP, loan growth, earnings and capital may exacerbate financial system procyclicality. An interesting result was that the levels of provisioning and reserves appear to be higher in recent years, which means that some Asian countries seem to adopt a more dynamic provisioning practice, that is, to increase provision in good times in response to rising default risk. The authors also concluded that many of the earlier results reflected the behaviour of the variables around the Asian financial crisis, but might not represent current provisioning practice.

Floro (2010) carried out a study using a unique database of Philippine financial intermediaries from 2001Q1-2009Q1 and dynamic panel estimation model similar to Fonseca and Gonzalez (2008) and Bikker and Metzemakers (2004) to examine how bank capital position influences the management of LLPs. The results support the capital management theory and the evidence of procyclical behaviour in loan loss provisioning. Floro (2010) concluded that both low-capitalised and well-capitalised banks provision by less during an economic expansion and more during a downturn.

4. DATA DESCRIPTION AND MODELLING METHODOLOGY

The dataset and modelling estimation to test the existence of income smoothing and procyclicality of Korean banking system will be described in this chapter. Section 3.2 will explain the data while the concerned variables will be specified in section 3.3. The tested model and assessment methodologies will be defined in section 3.4, with detailed descriptive statistics in section 3.5.

4.1. The data

In this research, a sample consisting of bank balance sheet and income statement data for the period of 2006Q2 to 2011Q2 collected from Korea Financial Supervisory Service is used. We chose the time period because it covers the upswings and downturns of the economy around global financial crisis time. Following the screening criteria that Bikker and Metzemakers (2005) and Floro (2010) used for their dataset, we also carried out two steps of data selection. The first step was to make sure that only data from commercial banks were included in order to obtain a more homogeneous group of banks. It is because heterogeneous banking group may lead to instability in the coefficients across the sample and also commercial banks have more balance sheet information that is relevant to the research question, especially provisions information. The second step was to exclude banks with missing figures for the selected variables from the sample data. After fulfilling these two screening standards, the final dataset consists of 16 commercial banks- 272 bank-quarter observations. The macroeconomic variable- quarterly GDP growth rate, GDP deflator were obtained from the Bank of Korea, and the quarterly unemployment rate figures from OECD.Stat. All variables were deflated by the GDP deflator to remove the influence of inflation on their values. Loan loss provisions, earnings, capital, loans were normalised by one-period lag of total assets to minimise possible heteroskedasticity due to size difference (Laeven and Majnoni, 2003; Fonseca and Gonzalez, 2008).

4.2. Methodology

Following the previous studies, notably in Floro(2010), Laeven and Majnoni (2002), Fonseca and Gonzalez (2008), we use both the Generalised Least Squares (GLS) for model without lagged dependent variables and Generalised Method of Moments (GMM) estimator for model containing lagged variables. The rationale of using these two methods is explained in the following sections.

4.2.1. Generalised Least Squares estimator- Random Effects model

When doing regression for panel data by using the pooled Ordinary Least Squares model, we treat individual effects as fixed and common and thus ignore the bank-specific effects

in our sample. However, banks are heterogeneous and have some characteristics that are difficult to measure or hard to obtain but influencing LLPs (Fonseca and Gonzalez, 2008). To check for presence of heterogeneity, we used **Breusch-Pagan test**. The test result in table 6 rejects the null hypothesis of homogeneity (p=0.0000). For this reason, applying OLS estimator can lead to bias results. In order to solve this problem, we consider GLS estimator, fixed effects or random effects model, which can accommodate the individual effect arising from different types of banks.

Table 6. Breusch - Pagan test for individual heterogeneity

Estimated results:	Var	Sd=sqrt (Var)
LLP	105.4554	10.26915
e	0.0601854	0.2453272
u	0.2619579	0.5118183
Chi2(1) = 41261.78		
Prob>chi2 = 0.0000		

Once decided that GLS estimation method should be used, we also need to choose between the fixed and random effects models since it is an important issue in panel data analysis. In order to decide whether to use random effects model or fixed effects model, we need to consider whether there is any correlation between individual heterogeneity term and the regressors. If there is then the fixed effect model is appropriate and vice versa. A statistical test called **Hausman test** was used to test for correlation between the individual effect term and the regressors. H-null is no heterogeneity versus H-alternative-There is heterogeneity. The test result on table 7 shows that the null hypothesis of no heterogeneity cannot be rejected since the p-value is different from zero (p=0.0652). Therefore, the random effects model was applied. Previous studies in LLPs which used this regression model include Greenawalt and Sinkey (1988), Laeven and Majnoni (2003), and a more recent one of Taktak et al (2010).

Table 7. Hausman test for individual heterogeneity - regressors correlation

	---Coefficients---		(b-B)	sqrt (diag(v_b-V_B))
	(b) fixed	(B) -	Difference	S.E.
EBT	0.0511615	0.0482748	0.0028866	-
CLOANS	0.0147937	0.01471	0.0000837	-
CAP	0.057475	0.0449638	0.0125112	0.0015089
SIZE	0.010203	0.0006978	0.0095051	0.0024089
GDP	0.0000939	0.0005271	-0.0004333	0.0000957
UNEMP	0.0008919	0.0013036	-0.0004117	-

Chi2 (6) = 14.95

Prob>chi2 = 0.0652

The following equation can be estimated using STATA:

Equation 1. GLS estimator- Random Effects model

$$LLP_{i,t} = \beta_0 + \beta_1 EBT_{i,t} + \beta_2 CLOANS_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 CAP_{i,t} + \beta_5 GDP_t + \beta_6 UNEMP_t + COMM_{i,t} + REG_{i,t} + \varepsilon$$

4.2.2. Generalised Method of Moments estimator (GMM)

The inclusion of lagged endogenous variable makes both random effects and fixed effects models inconsistent. The presence of the lagged dependent variable gives rise to the econometric problem of autocorrelation, which commonly exists in the context of time series analysis. Autocorrelation problem means that the values of the error term are not independent, that is the error term in one period in some ways influences the error in another period. This violates the fundamental assumption of regression analysis. In most studies of LLPs, previous authors used a dynamic model Generalised Method of Moments (GMM) estimation developed by Arellano and Bond (1991) for models that include lags of the dependent variable– $LLP_{i,t-1}$, , $LLP_{i,t-2}$ as explanatory variables.

There are many empirical studies on LLPs adopt the GMM method, for example, Laeven and Majnoni (2003) studied loan loss provisioning behaviour with the business cycle of 45 global banks; Perez et al (2006) investigated the Spanish banking system; Bouvatier

and Lepetit (2007) examined how banks' provisioning rules affect loan lending behaviour; ; Ghosh (2007) studied Indian banks; Fonseca and Gonzalez (2008) studied the determinants of income smoothing by managing LLPs using data from 41 banks worldwide; and Floro (2010) examined the Philippines banks' LLP evidence.

Following these previous research, we adopt the Generalised Method of Moments (GMM) estimation Arellano and Bond (1991). The Dynamic Panel Data Arellano-Bond estimation is specially designed to obtain unbiased and efficient estimates in a dynamic panel data model with lagged endogenous variables. Floro (2010) argued that this method can address three main econometric problems which are the presence of unobserved bank-specific effects, the ability to capture the dynamic nature of LLPs through lagged dependent variables, and the potential endogeneity of the explanatory variables. According to Mileva (2007), the GMM method solves the individual fixed effects and autocorrelation problem by using first-differences to transform the equation with lagged dependent variables:

$$LLP_{i,t} = \alpha + \beta_1 LLP_{i,t-1} + \beta_2 LLP_{i,t-2} + x'_{i,t} Y + \omega_{i,t}$$

Into equation:

$$\Delta LLP_{i,t} = \alpha + \beta_1 \Delta LLP_{i,t-1} + \beta_2 \Delta LLP_{i,t-2} + \Delta x'_{i,t} Y + \Delta \omega_{i,t}$$

By transforming the regressors by first differencing, the fixed bank-specific effects are removed because they do not vary with time, they are removed:

$$\Delta \omega_{i,t} = \omega_{i,t} - \omega_{i,t-1} = \varepsilon_i + \nu_{i,t} - \varepsilon_i - \nu_{i,t-1} = \nu_{i,t} - \nu_{i,t-1}$$

The first-differenced lagged dependent variable also subtracts its past level. In this way, the GMM estimator eliminates individual effects, solves the autocorrelation problems mentioned above, and thus provides an unbiased result.

There are two methods of regressing using system GMM estimator: one-step system GMM estimator and two-step system GMM estimator. Mileva (2007) argued that since the standard errors of two-step system GMM estimator are downward biased, the reliability of the estimator cannot be guaranteed. Based on this argument, the one-step is chosen in this empirical study.

We use the econometric software STATA11 to do the following Arellano-Bond dynamic panel GMM estimation:

Equation 2. Dynamic Panel Data GMM- Arellano and Bond model

$$LLP_{i,t} = \beta_0 + \beta_1 LLP_{i,t-1} + \beta_2 LLP_{i,t-2} + \beta_3 EBT_{i,t} + \beta_4 CLOANS_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 CAP_{i,t} + \beta_7 GDP_t + \beta_8 UNEMP_t + COMM_{i,t} + REG_{i,t} + \varepsilon$$

4.3. Variables' specification and expected signs

In this study of Korean banks' loan loss provisioning behaviour; we use both bank-specific variables- loan loss provisions, earnings before taxes, capital ratio, total assets, consumer loans, and macroeconomic variables- GDP growth rate, unemployment rate. These variables are discussed below.

Loan Loss Provision ($LLP_{i,t}$): This is the dependent variable which is the level of loan loss provisions scaled by the one-period lag of total assets. We use lagged values to avoid potential endogeneity problems. For example, loan loss provision at *t* corresponds to provisions during the year *t*, while assets at *t-1* correspond to the bank assets at the beginning of year 1. Hence, $\frac{LLP_{i,t}}{Total\ Assets_{i,t}}$ is measured as $\frac{LLP_{i,t}}{Total\ Assets_{i,t-1}}$. We also include first and second lags of this dependent variable ($LLP_{i,t-1}, LLP_{i,t-2}$) in the right hand side of the equation.

***Earnings (EBT)*:** This is the ratio of net income before taxes for bank *i* in year *t* over one-period lag of total assets. Earnings variable is usually used as a proxy for the income smoothing practice in the literature. Banks have several incentives to understate provisions amounts to boost their profits in bad years and increase the amounts in good years. Greenawalt and Sinkey (1988), Fonseca and Gonzalez (2008) among others found evidence of income smoothing practice- a positive relationship between earnings and provisions. Another study using data from industrialised countries by Perez et al (2006) also documented strong evidence of earnings management through provisions. In a few papers, provisions are found to vary inversely with earnings when they are negative, which would contribute to procyclicality. In our study, we expect the sign of this variable to be positive.

***Consumer Loans (CLOANS)*:** This is the ratio of consumer loans over one-period lag of total assets. Because it measures the risk exposure of banks' lending activity, Loans to Assets is a proxy for banks' risk profile. It is argued that during economic expansions,

banks tend to use lax credit policies and lend more in order to meet borrowers' needs; therefore a high loan/asset ratio is associated with lower credit quality. Banks would set aside more provisions when this ratio is higher. According to Greenwalt and Sinkey (1988), Bikker and Metzemakers (2005), Fonseca and Gonzalez (2008) among others, loan/asset ratio is found to be positively associated with LLPs. We follow their finding and expect the sign for this variable to be positive.

***Capital buffers (CAP)*:** This is the ratio of Tier 1 and Tier 2 capital for bank *i* in year *t* to total risk-weighted assets and acts as a proxy for capital management hypothesis. In line with the capital management theory explained in literature, Ahmed et al (1999), Kim and Kross (1998) and Anandarajan et al (2005) found that LLP decisions are influenced by the level of risk of a bank as measured by the capital adequacy ratio- a tool for the risk management of banks. According to Fonseca and Gonzalez (2008) and Yeh (2010), since Tier II supplemental capital includes internationally recognised non-equity items such as preferred stocks and LLPs, they can be counted as Tier II capital up to 1.25% of risk-weighted assets. Thus, banks' managers have more of an incentive to build a loan loss reserve cushion when their capital level is low. Moreover, banks would prefer increasing LLPs to raising capital on the market because doing so is costly and time consuming. Results from different empirical studies on the relationship between provisioning and capital management are somehow conflicting. Bikker and Metzemakers (2005) on 29 OECD countries' banks, Bushman and Williams (2007) on 28 random countries' banks found a negative relationship between LLPs and capital ratios, whereas Colin et al. (1995) on 160 banks, Eng and Nabar (2007) on Hong Kong, Malaysian and Singaporean banks, Fonseca and Gonzalez (2008) concluded the positive relationship. Cavallo and Majnoni (2001), in their study of 1176 commercial banks of both G10 and Non-G10 countries, found that shortage of banks' capital may not be due to regulation of bank capital but most prominently to the lack of regulation of banks' LLP practices. In two of the studies (Davis and Zhu (2009), Craig et al (2006)) there is no significant impact of capital on provisioning. Among all LLPs related literature, Ahmed et al (1999) contributed an extensive study on the capital management theory that took into analysis the changes in capital adequacy regulations. They argued that since the loan loss reserves is not included in Tier I capital, an increase in LLPs decreases Tier I capital by the after-tax amount of the provision. Following their study, we expect a negative coefficient sign for the capital variable.

***Size (SIZE)*:** Size is measured by using the log of total assets for bank *i* in year *t.* The literatures on this variable have been a mixture. According to Floro (2010), bigger banks may have greater possibilities to diversify their loans and thus be able to reduce overall risk exposure more than small banks. From this perspective, big banks do not have as much risk exposure as small- sized banks, thus they will provision less. Contrary to this loan diversification argument, Yeh (2010) propose an explanation based on the stakeholders' perspective. Large banks are under stricter scrutiny from different stakeholders and the information asymmetries are lower for large banks, they tend to maintain higher LLPs to smooth incomes. These conflicting findings suggest us not to have a certain expected sign for SIZE.

***GDP growth (GDP)*:** This is the rate of growth of gross domestic product in year *t* and one of the two major macroeconomic variables in this study for examining whether provisioning practices might exacerbate the business cycle. In an economic upswing, consumers' as well as firms' incomes are rising, GDP growth rate indicates improving conditions and thus reduces the likelihood of loan defaults; whereas in an economic downturn the opposite effect will happen. Banks are expected to make adjustments on LLPs by lowering provisions during an economic boom and increasing them during a recession, thus creating procyclical provision behaviour (Laeven and Majnoni (2003),;Bikker and Metzemakers (2005), Fonseca and Gonzalez, (2008)). Based on these extensive empirical literatures, in our study, provisions should be negatively related to GDP growth, thus the expected sign of this variable should be negative.

***Unemployment Rate (UNEMP)*:** This is another macroeconomic variable which is the quarterly unemployment rate in year *t.* According to Bikker and Hu (2002), the short-term unemployment rate like the quarterly data used in this study is primarily regarded as a reflection of the business cycle. In addition, unlike GDP growth rate, which "reflects the degree of change" in the business cycle, the unemployment rate "indicates the current phase" of the business cycle. Therefore, inclusion of this variable in our model is useful to the investigation of the interaction between business cycles and bank loan loss provisioning behaviour. Bikker and Hu (2002) investigated the interaction between business cycles and bank behaviour for 26 industrial countries and found that the unemployment rate coefficient carries a "significantly negative sign" (pg. 163). Bikker and Metzemakers (2005) studied how bank provisioning behaviour is related to the business cycle from 29 OECD countries and found that the unemployment variable had a

significant positive coefficient in a European bank sample. Following these previous studies, we expect a positive relationship between LLPs and unemployment rate.

Table 8. Summary of variables used in the study

Variables	Measurements	Expected Sign	Comments
$LLP_{i,t}$	$\frac{LLP_{i,t}}{Total\ Assets_{i,t-1}}$	+	Dependent variable
$LLP1_{i,t}$	$\frac{LLP_{i,t-1}}{Total\ Assets_{i,t-2}}$	+	First lag of dependent variable
$LLP2_{i,t}$	$\frac{LLP_{i,t-2}}{Total\ Assets_{i,t-3}}$	+	Second lag of dependent variable
$EBT_{i,t}$	$\frac{Earnings_{i,t}}{Total\ Assets_{i,t-1}}$	+	Income smoothing hypothesis
$CLOANS_{i,t}$	$\frac{Consumer\ Loans_{i,t}}{Total\ Assets_{i,t-1}}$	+	Credit Risk
$SIZE_{i,t}$	$\log Total\ Assets_{i,t}$	+/-	Bank specific & signal effect
$GDPG_t$	Quarterly GDP Growth Rate$_t$	-	Macroeconomic variable
$UNEMPRATE_t$	Quarterly Unemployment Rate$_t$	+	Macroeconomic variable
$CAP_{i,t}$	$\frac{Tier\ 1\ Capital + Tier\ 2\ Capital_{i,t}}{Risk-Weighted\ Assets_{i,t}}$	-	Capital management hypothesis

***Dummy Variables (COMM, REG)*:** These dummy variables are bank types used to distinguish three types of banks in the study. They are commercial (COMM), regional (REG), which take value of 1 if the bank is commercial or regional respectively, and value of 0 otherwise. Special bank type is not coded so that we could determine if being a commercial bank, regional bank has different level of LLPs than being a special bank.

5. RESULTS ANALYSIS

5.1. Descriptive Statistics

Table 9. Summary Statistics of Variables

Variables	Observations	Mean	Std. Dev.	Min	Max
LLP	271	-0.1703	0.8227	-5.6121	0.3259
LLP1	238	-0.1886	0.8672	-5.6121	0.0308
LLP2	221	-0.1961	0.8920	-5.6121	0.0308
EBT	271	0.0026	0.0146	-0.1237	0.1712
CLOANS	271	0.7722	0.4149	-3.2986	3.6490
SIZE	256	17.4946	1.3058	14.6295	19.1983
CAP	272	0.1385	0.0208	0.0940	0.1887
GDP	272	2.75	0.8427	0.9	3.8
UNEMP	272	3.4875	0.3829	3	4.3

Table 9 presents the summary statistics of all variables except dummy variables used in our estimation. The standard deviation of 82.27 per cent indicates the big differences in loan loss provisioning practice between banks. The average earnings before taxes to lagged total assets (EBT) is 0.26 per cent, with standard deviation of 1.46 per cent meaning there is a rather smaller dispersion for earnings ratio. During 2006Q2-2011Q2, the Korean banks in our sample held an average capital buffer of 13.85 per cent.

Table 10 exhibits correlation matrix for the variables in our model. The small correlation coefficients among the explanatory variables indicate that there is not any multicollinearity problem. The correlation between EBT and LLPs is positive, indicating that on average, Korean banks exercise the income smoothing practice. The GDP growth rate is negatively correlated with LLPs indicating procyclicality.

Table 10. Correlation Matrix for Variables

	LLP	LLP1	LLP2	EBT	CLOAN	SIZE	CAP	GDP	UNEM
LLP	1								
LLP1	0.919	1							
LLP2	0.825	0.919	1						
EBT	0.167	0.212	0.115	1					
CLOAN	0.441	0.424	0.440	0.084	1				
SIZE	0.050	0.058	0.054	-0.059	-0.061	1			
CAP	0.008	0.051	0.075	-0.022	-0.1078	0.098	1		
GDP	-0.108	-0.068	0.036	0.022	0.046	0.002	-0.165	1	
UNEMP	0.143	0.178	0.140	0.049	-0.004	0.002	0.362	0.013	1

5.2. Regression analysis

Table 11 presents the basic random effects regression results without lagged dependent variable LLP.

Table 11. Random Effects Regression Results

Variable	Coefficient	z-value	P>|z|
EBT	0.0483	2.76	0.006
	(0.0181)		
CLOANS	0.0147	33.78	0.000
	(0.0004)		
CAP	0.0332	4.23	0.000
	(0.0118)		
SIZE	0.0003	0.65	0.517
	(0.0005)		
GDP	-0.0006	-2.58	0.010
	(0.0002)		
UNEMP	-0.0013	-2.82	0.005
	(0.0005)		
COMM	-0.0051	-2.83	0.711
	(0.0018)		
REG	-0.0067	-2.89	0.803
	(0.0023)		
INTERCEPT	-0.0222	-2.00	0.046
	(0.0085)		
R-square: 0.8406	Prob > chi2 = 0.0000		
Wald chi2 = 1293.81	Number of observations: 255		

Notes: The regression is estimated using Generalised Least Squares with random bank-specific effects for the whole sample of 17 Korean banks for the period 2006Q2-2011Q2. The dependent variable is the ratio of LLPs over lagged total assets. EBT equals profits before tax over lagged total assets. CLOANS is the customers loans of bank i in period t normalised by the lagged total assets. CAP is the ratio of Tier 1 capital to total risk weighted assets. SIZE is the log of total assets. GDP is the quarterly GDP growth rate data. UNEMP is also the quarterly unemployment rate. All data has been deflated. Standard errors are between brackets. Significant statistics at 95%.

The R-square is equal to 0.8406 means that our model can explain 84.06 per cent of factors affecting LLPs in Korean banks. This R-square is rather high. Coefficient of EBT variable is highly significant and is positive indicates that Korean banks in our sample have followed the income smoothing practices. This result is in line with our expectation. The coefficient can be interpreted that holding other factors fixed, for every one unit of surplus earnings, Korean banks will increase LLPs level by 4.83 per cent. This number is lower than the average level of 7.60 per cent found in Bikker and Metzemakers (2005), which means that Korean banks on average do less earning management through LLPs than banks from OECD countries. It is much lower than the average level of 22.7 per cent increase in LLPs level reported in Bouvatier and Lepetit (2008) study. This positive relationship between earnings and LLPs is also consistent with one found in banks from other 14 countries studied by Fonseca and Gonzalez (2008) as well as Japanese banks studied by Agarwal et al (2007). According to Bouvatier and Lepetit (2008) and Bikker and Metzemakers (2005), banks with good performance are more able to offset the cyclicality of LLPs and that the income smoothing behaviour helps to enhance the financial soundness and reduces procyclicality. In addition, since the effect of the income smoothing variable EBT on LLPs (4.83 per cent) is stronger than that of the capital management variable CAP (3.32 per cent), Korean banks usually use LLPs as a tool of income smoothing practice rather than managing regulatory capital. This result is in line with the research of Fonseca and Gonzalez (2008) and Floro (2010). Moreover, as discussed in the literature review, because provisions are tax deductible in most countries including Korea, banks have strong incentives to lower tax by allocating their income to LLPs.

The CLOANS variable is a proxy of credit risk and highly significant (p=0). The positive coefficient is in line with our expectation. Based on the coefficient, Korean banks increase W1.47 of LLPs for an increase of W100 in consumer loans on average. This means that banks in Korea will adjust their LLPs based on their amounts of loans in order to cover the

potential loan losses. The result is in line with the research of Bikker and Metzemakers (2005) and Floro (2010). The coefficient is higher than the evidence from 29 OECD countries' average level of 0.82 proposed by Bikker and Metzemakers (2005), which suggests that Korean banks provision for loan default risk more than banks from OECD countries, therefore Korean banks' loan loss provisioning practice can be regarded as being more prudent than that of these OECD countries.

The CAP variable is positive and significant (p=0). The positive sign of the coefficient is contradictory to our expectation of the capital management hypothesis. Based on the coefficient, banks increase W3.32 of LLPs for an increase of W100 in capital. This indicates that on average, Korean banks do not use LLPs to manage capital. One possible explanation is that Korean commercial banks in our study have maintain high capital buffers, therefore do not need to manage capital through LLPs. The average capital ratio of 13.85 per cent shown on the summary statistics table supports the argument.

The SIZE variable is not significant in our model (p=0.517), this indicates that the loans diversification and signal effect in Korean banks do not seem to affect the loan loss provisioning behaviour.

The coefficient of the macroeconomic variable GDP is negative and significant (p=0.01). The sign of the coefficient is in line with our expectation that LLPs are negatively related to GDP growth rate and shows a procyclical feature. The coefficient can be interpreted that on average, when Korean GDP increases by one unit, Korean banks' LLPs will decrease by 0.06 units. The coefficient suggests that provision level is lower when the economy is booming and rises in the economic downturns. This implies the procyclical behaviour and lack of a forward-looking risk assessment of Korean banks' provisioning practice. Cavallo and Majnoni (2002), and Bikker and Hu (2002) suggested the similar results.

Another macroeconomic variable UNEMP is the quarterly unemployment rate, it is also negative and statistically significant (p=0.005). According to Bikker and Hu (2002), short-term unemployment is primarily a reflection of the business cycle. In our study, the coefficient of -0.0013 means that on average one unit increase in UNEMP, Korean banks' LLP will decrease by 0.0013 units. Even though it is not a large amount of change but the result emphasises further the presence of procyclicality in the Korean banking industry.

In terms of the two bank type dummy variables COMM (for commercial banks) and REG (for regional banks), their coefficients are not statistically significant and suggest that there is not much difference in LLPs levels among different types of Korean banks.

Table 12. One-step GMM Regression Results with Lagged Dependent Variables

Variable	Coefficient	z-value	P>|z|
LLP L1.	0.8167 (0.0400)	0.08	0.000
L2.	0.0437 (0.0321)	0.01	0.005
EBT	3.7414 (0.7048)	5.31	0.000
CLOANS	0.6365 (0.3249)	1.96	0.050
CAP	-0.1374 (0.7902)	-0.17	0.862
SIZE	0.0079 (0.0022)	3.53	0.000
GDP	-0.0277 (0.0173)	-1.60	0.055
UNEMP	-0.0848 (0.0311)	-2.73	0.006
INTERCEPT	-0.7152 (0.2819)	-2.54	0.011

Number of observations: 220

Wald chi2 = 616.37

Prob > chi2 = 0.0000

Notes: The regression is estimated using Generalised Method of Moments dynamic Arellano-Bond model for the whole sample of 17 Korean banks for the period 2006Q2-2011Q2. The dependent variable is the ratio of LLPs over lagged total assets. L1 and L2 are first and second lagged dependent variable respectively. EBT equals profits before tax over lagged total assets. CLOANS is the customers loans of bank i in period t normalised by the lagged total assets. CAP is the ratio of Tier 1 capital to total risk weighted assets. SIZE is the log of total assets. GDP is the quarterly GDP growth rate data. UNEMP is also the quarterly unemployment rate. All data has been deflated. Standard errors are between brackets. Significant statistics at 95%.

The table 12 above presents the regression results for an one-step Arellano-Bond GMM estimated dynamic panel model. The regression includes the first lag and the second lag of

the dependent variable. The p-value equals 0.000, indicating that variables in the model are jointly significant at the 1 per cent. The variables which are highly significant in the static model also remain significant in the dynamic model. The result is in line with research from Pain (2003), who used both static models and dynamic models to investigate the provisioning experiences of the major UK banks and Bikker and Metzemakers (2005) who investigated banks from 29 OECD countries.

The result shows that both first and second lagged dependent variables are positively related to the LLP and are significant (p=0.000, p=0.005 for first and second lagged LLP respectively), which is consistent with our expectation. On average, Korean banks will adjust their LLP by 0.8167 units based on every one unit increase of LLP in the previous year and by 0.0437 units based on every one unit increase of LLP in the year before the previous year. Floro (2010) argued that the speed of adjustment of LLPs may be due to slowly recognising potential loss against the bad loan when it comes to doubtful assets. The result is also in line with the research by Fonseca and Gonzalez (2008), which found that adjustment of LLPs to the equilibrium level in each year is partial and thus is more suitable to model banks' provisioning behaviour using a dynamic model. Having considered the fact that the random effects model can employ more observations (an extra of 35 observations), especially in a rather small dataset, and it also can control for unobservable heterogeneity, it is beneficial to use both models in the study.

6. CONCLUSION

Loan loss provisioning practice is crucial for management of banks in a way that it minimises credit risk, helps in the management of regulatory capital, reducing volatility of profits and maintaining banks' stability. During the period 2006Q2-2011Q2, the Korean banking system has experienced many financial reforms and reorganisations and surely the provisioning practice has had a significant influence on the volatility of profitability in Korean banks as well as on the development of the economy as a whole. It is then important to study the factors that drive the provisioning behaviour, both bank-specific and macroeconomic factors. We use the dataset that consists of both bank-specific variables- quarterly balance sheet and income statement variables for 16 commercial banks in Korea over the period of 2006Q2-2011Q2 collected from the Korea Financial Supervisory Service and major macroeconomic variables- GDP growth rate and unemployment rate. We follow the regression methods used by Fonseca and Gonzalez (2008) and Floro (2010), which are Generalised Least Squares-Random Effects model and the Dynamic Panel Data Arellano-Bond estimation. We used the

random effects model to solve the issues of bank-specific effects and the dynamic panel GMM Arellano-Bond to examine the lagged dependent variables' influence on our model at the same time control for the unobservable heterogeneity and the potential endogeneity of variables (Fosenca and Gonzalez, 2008). The regression results present the following conclusions:

Firstly, we find a positive relationship between LLPs and banks' earnings before taxes, indicating that Korean banks on average follow an income smoothing practice. Holding other factors fixed, for every one unit of surplus earnings, Korean banks will increase LLPs level by 4.83 per cent.

Secondly, the GDP growth rate is negatively related with the LLPs, which implies procyclicality. Banks' provisioning behaviour is rather a backward-looking risk assessment over the economic cycle.

Thirdly, our result does not support the capital management hypothesis since the coefficient is positive and significant. Korean banks do not seem to use LLPs to manage capital. One possible explanation is that Korean banks may have already achieved sufficiently high capital buffers of 13.85 per cent- as shown in the summary of statistics. According to Bloomberg on 26th August 2012, some banks maintain a BIS ratio as high as 16.79 per cent (the Citigroup inc.) or 15.57 per cent (Standard Chartered plc.) compared to the regulator's 10 per cent guideline.

Fourthly, the first and second lagged dependent variables in the GMM model are significant and positively related to the dependent variable LLP. This suggests that on average Korean banks adjust their LLPs based on the level in the previous year and that the speed of adjustment of LLPs may be due to slowly recognising potential loss against the bad loan when it comes to doubtful assets (Floro, 2010).

Our research shows that the size variable is not significant, indicating our sample data do not support for the signalling hypothesis and the diversification effect of loans to reduce overall risk exposure. Finally, there is no significant difference in LLPs among three different types of banks: commercial, regional and special.

These findings provide useful source of information for regulators, investors, and interested scholars. For regulators, they are a basis to analyse whether reported LLPs of Korean commercial banks are enough to cover the estimated loan losses and enhance provisions practice policy within the context of national economic conditions to become a more

dynamic, counter-cyclical. Understanding provisioning behaviour also helps with the implementation of Basel III. For investors, the findings give overview information about the banking industry, the economy and financial risks. These also provide the latest reference for interested scholars who would like to study loan loss provision practice and its determinants of Korean commercial banks.

The study has a limitation and this suggests potential directions for future research. The GMM estimation is used for a dataset that has a large number of observations and a small time series dimension (large N, small T). Our results could be improved further if we increase the sample size to perhaps, include other types of banks.

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