CREDIT MARKETS, FINANCIAL CRISES, AND THE MACROECONOMY

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ABSTRACT

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This study consists of three chapters, each of which is an individual paper. The first chapter investigates how the dynamic process of reallocation of credit across firms behaves before and after financial crises. Applying the methodology proposed by Davis and Haltiwanger (1992) for measuring job reallocation, we construct measures of credit reallocation across Korean firms in the 1981-2012 period. The credit boom preceding the 1997 financial crisis featured a modest intensity of credit reallocation. By contrast, after the crisis and the associated reforms, credit reallocation significantly intensified and started to comove with the business cycle, while credit growth slowed down (deleveraging). The higher dynamism of the credit sector in reallocating liquidity cannot be explained by "flight to quality" episodes but reflects a structural change in the credit reallocation process that has persisted since the end of the crisis. The intensification of credit reallocation appears to have been associated with enhanced allocative efficiency.

The second chapter explores the evolution of credit reallocation across Korean non-financial firms for the period 1981-2012. I employ a dynamic latent factor model that decomposes regional credit reallocation rates into national, region-specific and idiosyncratic components. I find that the common factor explaining common movement across 16 regional credit flows increased after the 1997 financial crisis. The common factor comoves with national excess reallocation. It is positively and strongly correlated with national excess reallocation, while it is negatively correlated with national net credit growth. It exhibits mild counter-cyclicality. I examine what extent the volatility of credit reallocation was driven by national, region-specific and idiosyncratic components. This study uncovers evidence that the national factor accounts for a sizable fraction of regional reallocation rates of total credit and loans, while it plays only a minor role in explaining the fluctuation in regional reallocation rates of bonds.

The last chapter explores the relationship between religion and bank performance. The study uses data on credit unions in Korea for the period 2000 to 2007 to investigate the effects of religion on bank performance. The empirical results show that credit unions based on religious institutions not only suffer less from troubled loans but they also enjoy higher profits relative to ordinary ones. I find that the religious credit unions unique features, such as non random potential clientele, rich soft information and reputational incentive to repay, are likely to be what enables them to outperform.

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CHAPTER 1

CREDIT REALLOCATION, DELEVERAGING, AND FINANCIAL CRISES

1.1 Introduction

The Great Recession has reignited the debate over the long-run effects of financial crises and of the reforms frequently enacted in their aftermath. In recent decades, while some financial crises (e.g., those of Chile in 1982 and South Korea in 1997) have been followed by several years of sustained output growth, other crises (e.g., Mexico in 1982) have marked the onset of prolonged periods of stagnation. The role of the credit market is at the heart of the analysis of the crises. Several scholars and policy makers put emphasis on the credit booms that often precede the crises and the sluggish credit growth (deleveraging) that follows them (Gourinchas and Obstfeld, 2012; Dell'Ariccia, Igan, Laeven and Tong, 2012; IMF, 2004). A popular argument is that periods of credit bonanza can fuel excessive investment and a poor allocation of financial resources, culminating in financial crashes. In turn, financial crashes can trigger a drastic shift in the lending policies of investors and financial institutions, resulting into slow credit growth during the subsequent recoveries (The Economist, 2012; Mendoza and Terrones, 2012). The policies enacted in response to financial crashes would exacerbate the creditless nature of the recoveries.

In contrast with the breadth of knowledge on the behavior of credit aggregates, we know very little about the dynamic process of reallocation of credit before and after financial crises. Yet, there is growing evidence that the allocation of physical and financial inputs plays a role as relevant as their total volume in affecting aggregate economic activity. Numerous studies find that the impact of aggregate shocks and structural reforms on the macroeconomy occurs through the allocation of labor, capital, and financial resources as much as through their total volume (Caballero and Hammour, 2005, 2001; Eisfeldt and Rampini, 2006; Caballero, Hoshi and Kashyap, 2008). In particular, the dynamism with which an economy is able to reallocate financial resources across

firms is deemed as crucial for efficiency and growth (Beck, Levine and Loayza, 2000; Wurgler, 2000; Galindo, Schiantarelli and Weiss, 2007). These observations elicit fundamental questions: do the credit booms that precede financial crises feature an intense reallocation of credit or a mere rollover of credit to firms already served by the credit market? Do financial crises and the subsequent reforms enhance the flexibility with which liquidity is reallocated across businesses? Or does the deleveraging process that follows the crises stifle the dynamism with which the credit market reallocates liquidity? Answering these questions can yield critical insights into the interaction between the credit market and the macroeconomy. It can also inform us about the optimal policy response to credit booms and busts. For example, during a creditless recovery, a policy that promotes the creation of new lines of credit and a policy that prevents the termination of existing credit relationships can both boost credit growth. However, these two policies will exert opposite effects on credit reallocation: promoting credit creation will foster credit reallocation, hindering credit destruction will depress it. What policy should thus be pursued?

This paper takes a first step towards addressing these questions. We study the dynamic process of reallocation of credit across South Korean non-financial businesses in the $1981-2012$ period and investigate whether the credit reallocation process changed after the 1997 financial crisis and the subsequent reforms. The Korean economy and our database constitute an ideal testing ground for our purposes. Credit is a key source of external finance for Korean firms (accounting for almost 82% of their external funding in 2000).[1] Our unique data set comprises unusually rich microeconomic data on more than 30,000 non-financial firms, representing about 49.2% of the employment of Korea in 2000, for example.[2] Moreover, the data set covers a long time period (33 years) and features the occurrence of a major financial crisis around the sample midpoint (end of 1997). This allows to separate cyclical changes in the credit reallocation process, as induced by the crisis, from structural long-lasting changes.

Credit growth was rapid throughout the 1990s and further accelerated during the credit boom

[1] Source: Flow of Funds, Bank of Korea.

[2] The data source is KISLINE, the business information source provided by the leading Korean credit rating agency, Korea Investors Service (KIS), which is affiliated with Moody's.

that took place from 1993, till the onset of the crisis in 1997. Prior to the crisis, the allocation of credit was strongly influenced by government policies. Many firms, especially those affiliated to industrial groups (*chaebols*), were guaranteed the renewal of existing loans without close scrutiny by financial institutions (Hong, Lee and Lee, 2007). The 1997 crisis caused a credit crunch and a sharp decline in GDP (by 5.7% in 1998). In response to the crisis, the government enacted structural reforms of the corporate and financial sectors that affected both the demand and the supply side of the credit market. These reforms aimed at reducing firms' leverage and inducing lenders to adopt more selective policies in allocating credit. The economy started to recover from the crisis in the second half of 1998 and GDP growth rebounded to 10.7% in 1999 and 8.8% in 2000. In the years following the crisis, credit to the business sector grew at a pace significantly lower than in the pre-crisis period, triggering a deleveraging of the business sector. Economists debate whether such a deleveraging process was healthy or exerted a drag on the recovery.

To measure credit reallocation, we employ the methodology proposed by Davis and Haltiwanger (1992) for the measurement of job reallocation and used by Herrera, Kolar and Minetti (2011) for the measurement of credit reallocation across U.S. firms. Average real credit growth equalled 10.8% in the pre-crisis (1981–1996) period, and peaked at 12.9% during the 1993–1996 credit boom. After the crisis, during the deleveraging period (1999 through 2004) credit shrank at a rate of 1.5%, and overall, between 1999 and 2012, expanded at an annual rate of only 4.3%. A drop in credit growth can be attained through a reduction in the rate of credit creation and a relatively stable credit destruction, thus implying less intense reallocation of credit. Alternatively, it can be attained through a relatively stable credit creation and an increase in credit destruction, thus implying more intense reallocation of credit. We find that Korea followed the latter path. On average, inter-firm gross credit reallocation (the sum of credit creation and credit destruction) was about 21.4% between 1981 and 2012, the same order of magnitude of that found for the United States by Herrera et al. (2011). Most importantly, the intensity of credit reallocation rose significantly after the crisis, from an average of 17.9% in 1981–1996 to an average of 24.7% in 1999–2012. If we net out from gross credit reallocation the amount of reallocation strictly needed to accommo-

date the net credit change, we obtain that, after being depressed at an average of 7.0% during the 1993–1996 credit boom, excess credit reallocation jumped to an average of 19.0% in 1999–2012.

The reader could wonder whether such a staggering increase in credit reallocation after the crisis can be explained by the "flights to quality" (e.g., the flights of credit from small to large firms) that often characterize crises (Bernanke, Gertler and Gilchrist, 1999). The results dispute this hypothesis. Consistent with the flight to quality argument, we indeed uncover evidence that the reshuffling of credit across classes of firms different in size, industry, and location intensified during the crisis. However, after the crisis, the importance of the reallocation of credit within groups of firms relatively homogenous for size, industry, and location, increased while the reshuffling of credit across different classes of firms (as induced, for instance, by aggregate or sectoral shocks) became less important.

All in all, this first set of findings are consistent with the view that the structural corporate and financial reforms enacted in response to the crisis made the process of reallocation of credit across businesses more frictionless and fluid, for example by ameliorating the lending policies of financial institutions (Lim, 2010). In support of this argument, we find that, when we break down credit into loans and bonds, the increase in reallocation occurred for both types of credit but for loans it was more pronounced. This hints at a change in the dynamism with which after the crisis financial institutions, such as banks, reallocated loans.

We then turn to explore whether, besides its intensity, the dynamic behavior of credit reallocation also changed after the crisis. The volatility of credit reallocation increased. Moreover, in line with what found for the intensity of reallocation, the contribution to the volatility of credit reallocation of the idiosyncratic (firm-level) credit changes grew relative to the contribution of sectoral and aggregate shocks. Yet, the most interesting finding probably pertains to the cyclical behavior. Credit reallocation exhibited a procyclical behavior throughout the 1981–2012 period. However, while prior to the crisis this procyclical behavior was especially driven by credit growth, after the crisis the comovement with the business cycle was especially driven by the excess credit reallocation (while credit growth became essentially acyclical).

In the last part of the paper, we gather preliminary evidence on whether the higher dynamism of the credit market in reallocating liquidity was associated with an improvement in the efficiency of the reallocation process. To this end, we construct an index of credit reallocation efficiency employing firms' sales to capital and profits to capital ratios. We uncover evidence that the intensification of credit reallocation after the crisis was associated with enhanced efficiency in the credit reallocation process.

The remainder of the paper unfolds as follows. Section 2 relates the analysis to prior literature. Section 3 describes the reforms of the corporate and financial sectors that we expect to have affected credit reallocation. Section 4 describes the data and the empirical methodology. Section 5 investigates the intensity of credit reallocation before and after the financial crisis. Section 6 explores the role of flight to quality episodes, while Section 7 focuses on the time series properties of credit reallocation. Section 8 investigates the efficiency of the credit reallocation process. Section 9 concludes.

1.2 Prior Literature

This paper relates to two strands of empirical literature. The first strand investigates the interaction between the credit market and the business cycle. Claessens, Kose and Terrones (2012) explore the interplay between business cycles and financial cycles using aggregate data for advanced and emerging countries. Mendoza and Terrones (2012) study the anatomy of credit booms and busts in a large set of emerging countries. Bordo and Haubrich (2010) offer a detailed historical account of the behavior of money and credit aggregates during recessions. In this strand of literature, a number of studies focus on the "flight to quality" episodes that can occur during recessions. Kashyap, Stein and Wilcox (1993) document an increase in commercial paper relative to bank loans during downturns. Lang and Nakamura (1995) and Oliner and Rudebush (1995) provide evidence of a reshuffling of bank credit from small to large firms after monetary contractions. Only recently few studies have started to analyze the continuous process of reallocation of funds that occurs in the credit market. Dell'Ariccia and Garibaldi (2005) study the process of reallocation of loans across

U.S. banks. Herrera et al. (2011) document stylized facts of the process of reallocation of credit across U.S. firms using Compustat data. Neither paper studies the role of financial crises in credit reallocation and how the process of credit reallocation relates to credit booms and to deleveraging processes.

The second related strand of literature analyzes the allocation of financial resources prior to and after financial crises. Using Chilean data, Chen and Irarrazabal (2012) show that a reduction in resource misallocation after the 1982 financial crisis led to a growth in total factor productivity. Studying the 2002 Argentine crisis, Neumeyer and Sandleris (2010) uncover evidence that financial crises can instead increase the misallocation of resources. Midrigan and Xu (2013) and Gilchrist, Sim and Zakrajsek (2013) examine the effects of financial constraints on total factor productivity losses using Korean establishment-level data and U.S. firm-level data, respectively.

Some microeconometric studies examine how financial institutions allocate loans after crises and the associated reforms. Borensztein and Lee (2002, 2005) find that in Korea credit was not directed to profitable sectors in the 1970-1996 period, whereas profitability was important for maintaining access to credit during the 1997 financial crisis. Dunchin, Ozbas and Sensoy (2010) uncover evidence that in the United States the credit crisis of 2008 restrained the supply of external finance to profitable projects. Using Indonesian data, Blalock, Gertler and Levine (2008) show that foreign owned firms less vulnerable to liquidity constraints fared better than domestically owned firms during the East Asian crisis. Korajczyk and Levy (2003) and Levy and Hennessy (2007) demonstrate that financially constrained firms and unconstrained firms make different capital structure choices in response to business fluctuations.

1.3 Crisis, Reforms, and the Credit Market

The South Korean economy experienced sustained output growth over the 1981 – 2012 period, with the real GDP increasing at an average annual rate of 6.6%. At the end of 1997 and beginning of 1998, a major financial crisis hit the economy (the GDP dropped by 5.7% in 1998). It is often maintained that excessive investment and poor allocation of capital, labor and financial resources

made the economy vulnerable to the crisis (Park and Lee, 2003; Joh, 2003; World Bank, 2000). In response to the crisis, in 1998 and 1999, the government engaged in deep reforms of the corporate and financial sectors. This section describes salient aspects of the reforms which can have affected the flexibility and dynamism with which credit is reallocated across firms.

1.3.1 Corporate Reforms

Prior to the crisis, Korean non-financial businesses expanded by relying heavily on bank loans and bonds. Firms affiliated to business groups (*chaebols*) benefited from the government's corporate policy that encouraged the growth of *chaebols* in the belief that large-scale firms would better compete in global markets (Borensztein and Lee, 2005). In 1995, the top 30 *chaebols* accounted for 16.2% of the Gross National Product and 41.0% of the value added of the manufacturing sector. In 1997, the median debt-equity ratio of *chaebol*-affiliated firms was almost 400% (Lee and Rhee, 2007). Debt overhang allegedly caused inefficient investments.[3] Joh (2003) documents that *chaebols* suffered from low productivity and return on equity.

After the onset of the crisis, the government enacted a reform of the corporate sector. *Chaebol*-affiliated firms were forced to lower their debt-equity ratio below 200% by 1999: the debt-equity ratio of the top 30 *chaebols* dropped to 171.2% in 2000. Debt guarantees among *chaebol* affiliates were abolished: the debt guarantees of the top 30 *chaebols* dropped from 26.9 trillion won in April 1998 to zero in March 2000 (Chang, 2006). Along with the reform of *chaebols*, an unprecedented amount of loans poured into supporting new small and medium-sized firms. At the peak of the venture business boom in 1999, the ratio of venture companies' value added to the GDP reached 2%.

[3] Kim and Maksimovic (1990) document that higher debt decreases the efficiency of input allocation.

1.3.2 Financial Reforms

Prior to the crisis, preferential credit was given to large firms to develop key manufacturing industries.[4] Enjoying little independence in monitoring firms, banks often engaged in a mere renewal of outstanding loans (Haggard, Lim and Lim, 2010).

After the onset of the crisis, new financial supervision criteria, such as capital adequacy regulation and loan classification standards, were introduced to restrain over-investment and enhance efficiency in the allocation of liquidity. This allegedly altered lending practices. Financial institutions stopped rolling over loans to companies with high debt and increasingly subjected firms to loan appraisals (Berger, Clarke, Cull, Klapper and Udell, 2005). To obtain funds, large firms (including *chaebol*-affiliated ones) increasingly turned to capital markets, which, in turn, became more sensitive to firms' profitability and default risk (Borensztein and Lee, 2002).[5]

1.3.3 The Effects on the Credit Market

It is commonly agreed that for various years the corporate and financial reforms exacerbated the deleveraging process of the business sector initiated by the crisis (Bank of Korea, 2003). On the demand side of the credit market, the reforms prompted the corporate sector to maintain a high level of liquidity; on the supply side, they forced financial institutions to apply less inertial lending standards. Figure 1.1 plots the real debt growth rate and real equity issues of Korean non-financial firms, together with the real GDP growth rate, over the 1981–2012 period. The two financial variables are constructed using the Flow of Funds Accounts compiled by the Bank of Korea. The figure clearly illustrates the rapid credit growth before the financial crisis and the credit contraction after the crisis.[6] From the end of 2001, credit to the corporate sector started to increase again, but

[4]Furthermore, the liberalization of financial markets - accelerated since 1993 - enabled firms to borrow from non-bank financial institutions and foreign lenders (Chang, 2006).

[5]Banker, Chang and Lee (2010) show that, thanks also to the banking sector reforms, the technical efficiency of the banking sector improved after the financial crisis.

[6]In aggregate, the slowdown in the growth of credit to the business sector was partially compensated by an acceleration in loans to households (according to the Bank of Korea, the ratio of corporate loans to total loans shrank from 76% in 1997 to 55% in 2002).

at a very slow pace. It was only in 2006 that credit growth accelerated.

While insightful, conventional credit aggregates are silent on the dynamic process of reallocation of credit across firms. Thus, they do not allow to discern whether the financial crisis and the associated policy reforms had indeed an impact on the dynamism with which credit was reallocated across firms.

1.4 Data and Methodology

In this section, we describe the data and the methodology used to measure credit reallocation.

1.4.1 The Data Set

To measure inter-firm credit reallocation, we need microeconomic, firm-level data. Our main data source is KISLINE, the business information source of the leading Korean credit rating agency, Korea Investors Service (KIS), which is affiliated with Moody's. KISLINE provides information on financial statements, public disclosures and corporate governance of Korean businesses. Our data set covers all the publicly traded firms as well as all the privately held firms subject to annual external auditing. The 1981 Corporate External Audit Law requires all privately held companies whose assets are above a given level and all publicly traded firms to report their annual external audit (including financial statements) to financial authorities. Between 1980 and 2012, to reflect the inflation rate, the asset threshold for privately held firms was raised four times and since 2009 it has been 10 billion won. The coverage of KISLINE implies that our data set covers the whole period in which a sample company exists. For instance, if a firm was subject to external auditing only in 2006, our data set would include information about it for all the years in which the firm was operational during the sample period.

The data set spans 33 years, from 1980 to 2012, and includes 33,463 firms (2,245 publicly traded firms, 31,218 privately held ones) and 373,685 firm-year observations. We exclude financial firms because we aim at studying the demand side of the credit market. The firms in the data

set account for a large fraction of economic activity in Korea. They accounted for 49.2% and 56.6% of regular employment of the non-financial sector and of the manufacturing sector in 2000; the bank loans they obtained amounted to 81.61% of the bank loans to all non-financial businesses in 2008. By comparison, the Compustat firms used by Herrera et al. (2011) to document empirical regularities of credit reallocation in the United States roughly account for one third of the employment of non-financial U.S. businesses. The average sales (total debt) of the privately held firms and publicly traded firms in the sample are 297 million won (223 million won) and 4.6 billion won (2.9 billion won), respectively.

The long sample period and the extensive coverage enable us to analyze the effects of the 1997 financial crisis on credit reallocation as well as various cross-sectional properties of credit reallocation. Additionally, our data make it possible to analyze separately the effects on the reallocation of loans and bonds.

1.4.2 Measurement

Following Herrera et al. (2011), we define total debt as all forms of financial debt except accounts payable to suppliers. We exclude trade credit because it has properties very different from other kinds of debt. It is for transaction purposes rather than for financial purposes; moreover, it is based on relationships with suppliers rather than with financial institutions. Finally, trade credit is very expensive and firms resort to it only when they do not have access to other forms of finance. These features imply that trade credit has low substitutability with other forms of debt (Rajan and Zingales 1995; Nilsen 2002). In addition to total credit, we investigate long-term credit, loans, and bonds. Long-term credit is important because it frequently finances long-term investment plans. Loans and bonds, in turn, may exhibit different dynamics.

This paper follows Herrera et al. (2011) in addressing a few methodological issues in the measurement of credit reallocation. A first issue regards firm entry and exit. The information provided by KISLINE on firm inception and exit years enables us to distinguish between newborn firms and firms that enter the data set but were already operational or were spinned off from other firms.

Likewise, we can distinguish between dying firms and firms that exit the data set but continue to exist. Only when a firm exits due to bankruptcy, liquidation, or merger and acquisition, it is treated as a dying firm. A second issue is the mismatch between fiscal year and calendar year that occurs in roughly 5% of the firms in the sample. Following the way Compustat addresses this mismatch problem, if the fiscal year ends after May 31st, the data of the firm are not reallocated as if there was no mismatch problem. If, instead, the fiscal year ends before May 31st, the data are allocated to the previous year. Alternatively, we address this issue by apportioning fiscal year data proportionally to calendar years; this leads to virtually identical results. Lastly, we deflate all the original variables using the implicit GDP deflator in order to study credit reallocation in real terms and relate its dynamics with that of real aggregate variables.

To measure credit reallocation, this paper replicates the methodology proposed by Davis and Haltiwanger (1992) for measuring job reallocation and employed by Herrera et al. (2011) for measuring credit reallocation in the United States. Let c_{ft} denote the average debt of firm *f* between year *t-1* and year *t* and C_{st} denote the average debt of set *s* of firms between year *t-1* and year *t*. The debt growth rate g_{ft} of firm *f* is obtained by dividing the change in debt from year *t-1* to year *t* by c_{ft}. This growth rate takes values in the $[-2, +2]$ interval and has the advantages of symmetry and boundedness (for more on its statistical properties, see Davis and Haltiwanger, 1992, and Törnqvist, Vartia and Vartia, 1985). If a firm is born its debt growth rate takes the value of +2; if it dies, its debt growth rate takes the value of -2.

Five aggregate credit flows are constructed using these building blocks. Credit creation (POS_{st}) is the sum of the debt growth rates of the firms with growing debt weighted by their debt size (the firm debt average over the subsample's debt average). Credit destruction (NEG_{st}) is the sum of the debt growth rates of the firms with shrinking debt weighted by their debt size. The third measure, gross credit reallocation (SUM_{st}), is the sum of credit creation and credit destruction.[7] Net credit growth (NET_{st}) is constructed as credit creation less credit destruction. The last measure, excess

[7] Since credit creation and destruction are generated with annual data, they do not capture changes of credit during a year. Thus, they represent lower bounds on the true credit creation and destruction.

credit reallocation (EXC_{st}), is computed as gross credit reallocation less the absolute value of the net credit change. That is, EXC_{st} measures credit reallocation in excess of the minimum required to accommodate the net credit change. These five credit flows can be written as follows:

$$POS_{st} = \sum_{1f \in s_t g_{ft} > 0} g_{ft} \left(\frac{c_{ft}}{C_{st}} \right) \tag{1.1}$$

$$NEG_{st} = \sum_{1f \in s_t g_{ft} < 0} |g_{ft}| \left(\frac{c_{ft}}{C_{st}} \right) \tag{1.2}$$

$$SUM_{st} = POS_{st} + NEG_{st} \tag{1.3}$$

$$EXC_{st} = SUM_{st} - |NET_{st}| \tag{1.4}$$

where $NET_{st} = POS_{st} - NEG_{st}$.

1.5 Credit Reallocation, Credit Boom, Deleveraging

This section studies the intensity of credit reallocation before and after the crisis.

1.5.1 Intensity of Credit Reallocation

Panel A of Figure 1.2 plots gross credit reallocation, excess credit reallocation, and the net credit change together with the real GDP growth rate for the period 1981 to 2012. Panel B of the figure plots credit creation and destruction. Panel A of Table 1.1 shows the average flows of credit for the same period and for the pre-crisis (1981-1996) and post-crisis (1999-2012) sub-periods. It also shows average credit flows for two narrower sub-periods: the credit boom (1993-1996) and the deleveraging phase (1999-2004). Over the 1981-2012 period, the net credit change equalled 6.9% on average. Between 1981 and 1996, credit grew at an annual rate of 9.6%. Credit growth was especially rapid from the beginning of the 1990s and accelerated between 1993 and 1997, originating a credit boom (average credit growth over 10.3%). After the crisis, credit growth dropped dramatically, averaging -2.8% between 1999 and 2004 and 3.0% between 1999 and 2012.

Figure 1.1: GDP and Business Sector Debt and Equity Panel A shows the real GDP growth rate of South Korea and the real growth rate of the total debt and equity of Korean firms. The solid line is the year -on-year quarterly growth rate of the real GDP (scale on the right Y-axis). The dashed line and the dotted line represent the year-on-year quarterly real growth rate of the total outstanding debt and total outstanding equity of Korean firms, respectively (scale on the left Y-axis). Debt consists of total loans from financial institutions and bonds issued. Debt and equity data are from the Flow of Funds Accounts compiled by the Bank of Korea. Panel B shows the aggregate leverage ratio (total debt/nominal GDP, solid spike) of Korean firms for the period 1990:1 to 2005:1. The shaded areas in the Panel A and B correspond to the financial crisis.

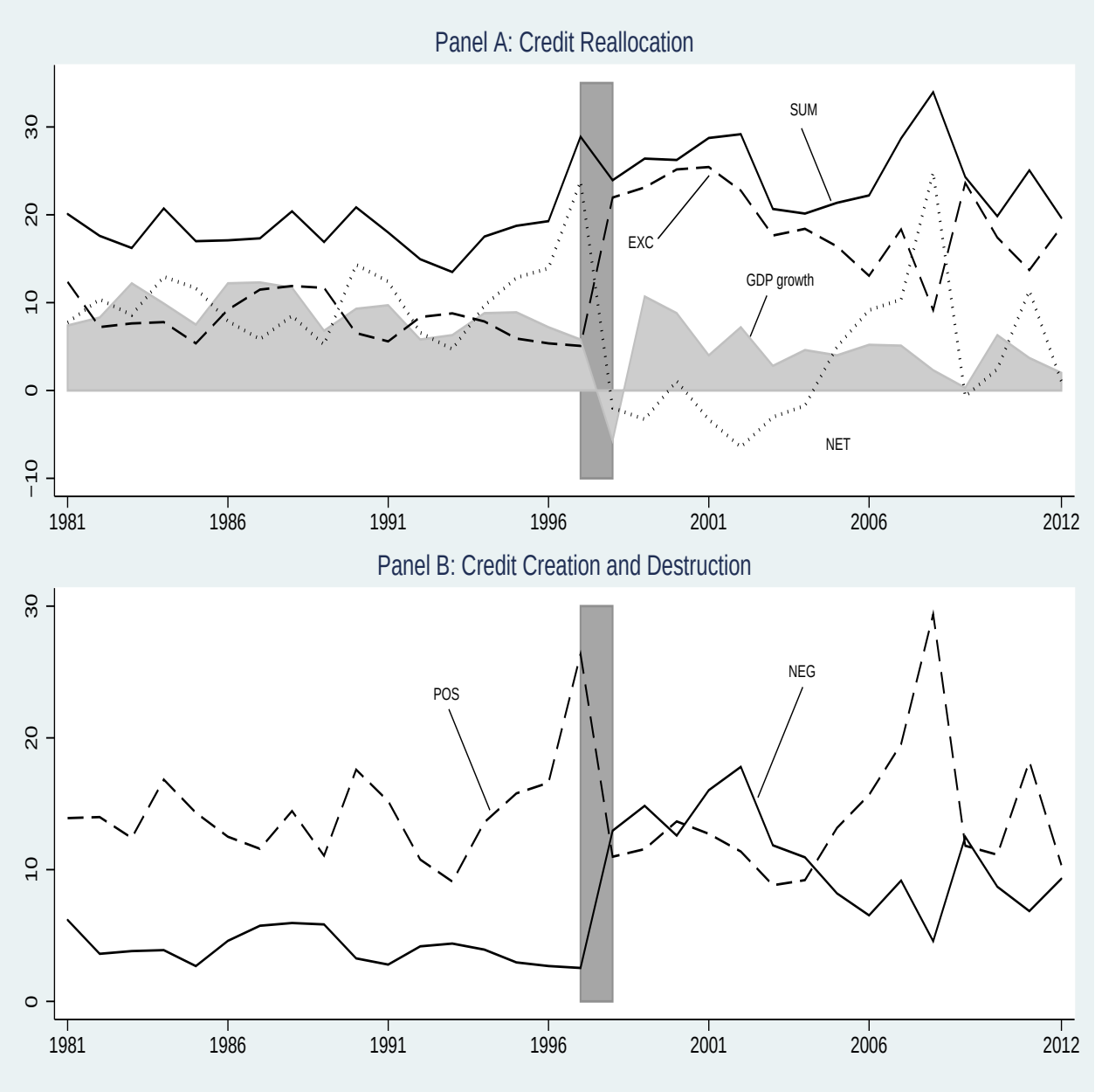

Figure 1.2: Credit Change and Credit Reallocation Panel A shows gross credit reallocation (SUM, solid line), excess credit reallocation (EXC, dashed line), the net credit change (NET, dotted line), and the annual real GDP growth rate (gray area). Panel B shows credit creation (POS, solid line) and credit destruction (NEG, dashed line).The vertical shaded areas in the two panels correspond to the financial crisis.

A deleveraging process can be achieved through a reduction in the rate of credit creation and a relatively stable credit destruction, thus implying lower credit reallocation. Alternatively, it can be attained through a relatively stable credit creation and an increase in credit destruction, thus entailing higher credit reallocation. Korea followed the latter path. Over the whole sample period, the average credit creation and destruction were 14.18% and 7.25%, respectively; the average credit reallocation equalled 21.42%. Credit destruction surged significantly during the crisis and thereafter remained permanently higher than in the pre-crisis period: the average credit destruction was 4.16% before the crisis (1981-1996) and more than double (10.86%) after it (1999-2012). Credit creation dropped during the crisis and reverted back to the pre-crisis level (about 14%) after the crisis. As a result of these dynamic patterns of credit creation and destruction, gross credit reallocation increased after the crisis, rising from an average of 17.89% in the pre-crisis (1981-1996) period (17% during the credit boom of 1993-1996) to an average of 24.70% in the post-crisis (1999-2012) period (25% during the 1999-2004 deleveraging period).[8] Figure 1.1 makes clear that the tendency of the gross reallocation of credit to increase in the last phase of the credit boom was only due to the need to accommodate the acceleration in credit growth. The behavior of the excess credit reallocation is particularly telling in this respect: the average excess credit reallocation was 8.31% between 1981 and 1996, and it actually slowed down to 6.98% during the credit boom. After the crisis, due to the significant increase in gross credit reallocation and the drop in the net credit change, it rose to 18.99%. Altogether, the behavior of credit reallocation and the net credit change reveal that the credit boom was characterized by a depressed excess reallocation of credit. By contrast, the creditless recovery after the crisis was characterized by an intensification of the reallocation of credit that has persisted since then.

We performed Chow tests to assess formally the presence of a structural break in the credit flows in 1998. The results, shown in Table 1.1, suggest that there was a structural break in credit destruction, net change, and excess reallocation (with a significance level of 5%) between the pre-

[8]The magnitude of credit reallocation over the full sample is of the same order as that found by Herrera et al. (2011) for U.S. non-financial businesses over the 1952-2007 period. However, the net credit change is higher than that of the U.S. business sector.

crisis and the post-crisis period, while there was no structural break in credit creation. A concern with Chow tests might be that they require to posit the year of structural break. To assuage this possible concern, we followed the approach of Stock and Watson (2003). Specifically, we specified an AR(1) process for the conditional mean of credit reallocation. We then used the Quandt Likelihood Ratio (QLR) test statistic, also known as the sup-Wald statistic, to test whether the conditional mean of the AR(1) process had a structural break at some unknown date. We obtained evidence of a structural break of the excess credit reallocation in 1999 (with a significance level of 1%). The 67% confidence interval for the break date is between 1997 and 2001.[9] Furthermore, we compare the mean of credit flows between pre-crisis period (1981-1996) and the post-crisis period (1999-2012) using rank sum tests. The results, shown in Table 1.1, again suggest that the means of credit flows except credit creation differ between the two periods (with a significance level of 5%)

An appealing feature of our data is that they allow to disentangle the behavior of loans and bonds. Interestingly, after the crisis the inter-firm gross reallocation of loans rose more sharply than the gross reallocation of bonds (see Table 1.1 and Figure 1.3). This stems from the fact that both loan creation and loan destruction rose while the increase in bond destruction was approximately offset by the decrease in bond creation. To summarize, gross and excess credit reallocation have significantly intensified after the crisis than before it, and this has especially been due to the increase in the intensity of the reallocation of loans.

[9] The Quandt test results are available from the authors.

Variable	Period	POS	NEG	SUM	NET	EXC
Total credit	81-12	14.177	7.246	21.423	6.930	13.216
	81-96	13.730	4.157	17.887	9.573	8.314
	93-96	13.768	3.491	17.258	10.277	6.981
	99-04	11.189	13.856	25.045	-2.668	22.070
	99-12	13.840	10.855	24.696	2.985	18.986
	Chow test	0.196	2.315	1.899	2.570	3.983
	Rank sum	0.748	-4.448	-4.115	2.827	-4.448
Long-term credit	81-12	18.255	11.090	29.346	7.165	20.222
	81-96	17.754	8.087	25.841	9.667	15.929
	93-96	17.051	6.395	23.446	10.655	12.790
	99-04	15.791	18.343	34.134	-2.552	28.292
	99-12	17.979	14.709	32.688	3.269	25.501
	Chow test	0.050	6.160	1.099	3.429	6.110
	Rank sum	0.042	-3.575	-3.035	2.245	-3.326
Loans	81-12	18.946	12.682	31.628	6.263	22.000
	81-96	16.481	8.185	24.666	8.296	15.477
	93-96	17.089	7.344	24.433	9.745	14.688
	99-04	16.547	22.497	39.045	-5.950	31.652
	99-12	20.639	18.090	38.730	2.549	29.954
	Chow test	-2.536	-3.908	-4.656	1.538	-4.282
	Rank sum	-2.536	-3.908	-4.656	1.538	-4.282
Bonds	81-12	22.066	11.718	33.784	10.349	21.040
	81-96	25.146	9.501	34.648	15.645	18.912
	93-96	19.737	5.224	24.961	14.513	10.448
	99-04	16.413	18.108	34.521	-1.695	25.691
	99-12	18.238	14.549	32.787	3.688	24.086
	Chow test	3.184	2.262	0.648	3.961	1.239
	Rank sum	2.993	-2.702	0.831	3.118	-1.912
Jobs	81-12	8.322	6.760	15.082	1.562	12.243
	81-96	7.964	5.678	13.642	2.287	10.707
	93-96	6.912	5.178	12.089	1.734	9.990
	99-04	9.408	9.935	19.343	-0.527	16.322
	99-12	8.868	7.787	16.656	1.081	13.919
	Chow test	1.331	0.301	1.113	4.640	1.839
	Rank sum	-2.37	-2.702	-2.889	0.416	-3.118

Notes: Panel A reports the average flows of total credit, long-term credit, loans, bonds, and jobs. The period 1981 to 1996 and the period 1999 to 2012 reflect the pre-crisis period and the post-crisis one, respectively.

Table 1.1: Magnitude of Gross Flows

1.5.2 Size and Persistence of Credit Changes

An extensive literature demonstrates that, because of non-convex adjustment costs, businesses prefer adjusting labor and capital in a lumpy way (see, e.g., Davis, Faberman and Haltiwanger, 2006). While it is unclear to what extent a similar argument holds for credit, recent studies suggest the presence of non-convex adjustment costs in credit changes (Eisfeldt and Muir, 2013; Bazdresch, 2013). It is then important to investigate to what degree the intensification of credit reallocation after the crisis was driven by large credit changes. Following Gourio and Kashyap (2007) and Herrera et al. (2011), we sort firm credit changes into three groups. If a firm's debt growth

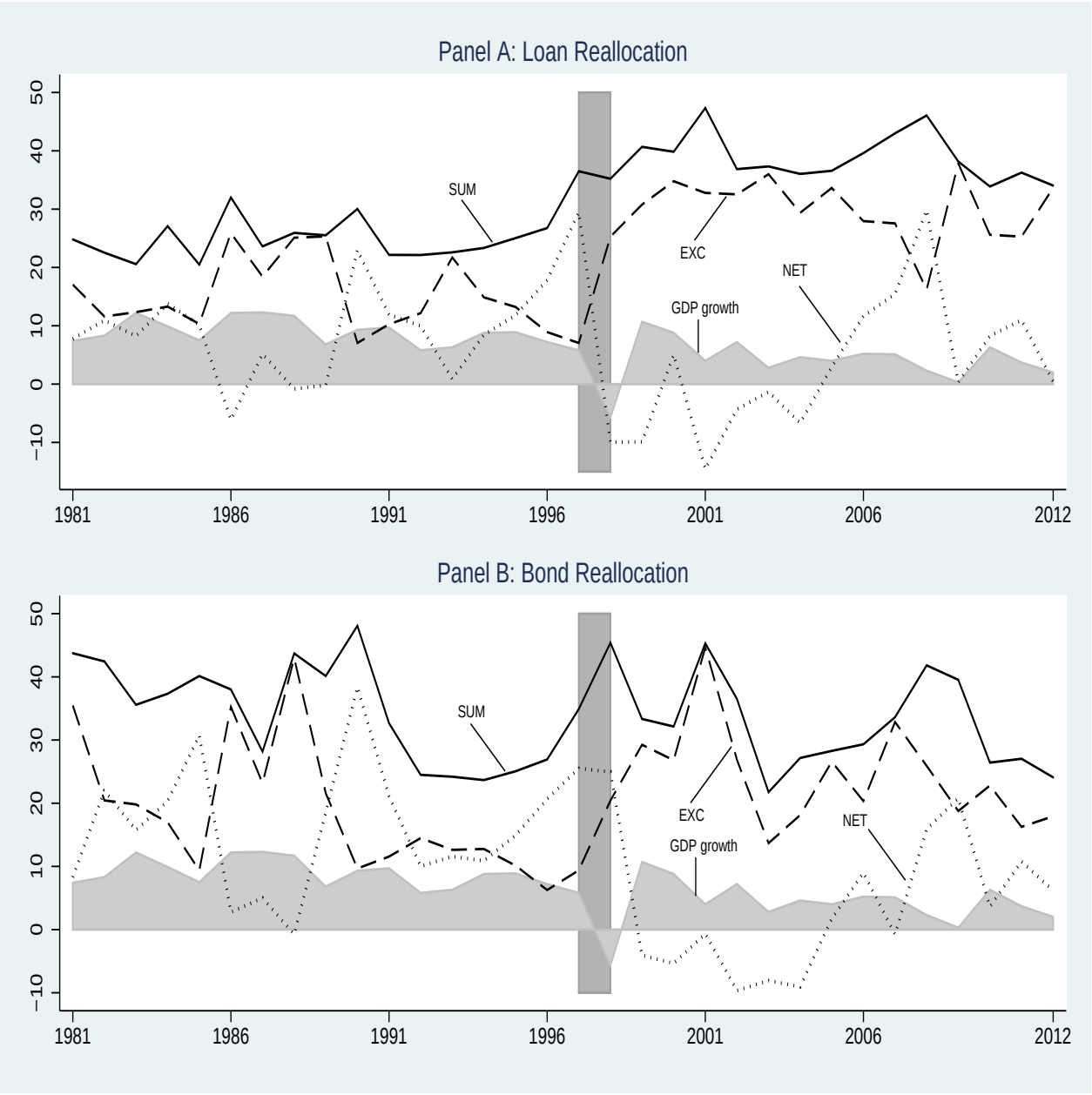

Figure 1.3: Loan and Bond Reallocation Panel A shows loan reallocation (SUM, solid line), excess credit reallocation (EXC, dashed line), the net credit change (NET, dotted line), and the annual real GDP growth rate (gray area). Panel B shows bond reallocation (SUM, solid line), excess credit reallocation (EXC, dashed line), the net credit change (NET, dotted line), and the annual real GDP growth rate (gray area). The vertical shaded areas in the two panels correspond to the financial crisis.

rate exceeds 18% or is below −18%, then this is labeled as a large credit increase and decrease, respectively. Next, using the methodology above, we calculate the credit creation due to large credit increases (POSbig$_{st}$) and the credit destruction due to large credit decreases (NEGbig$_{st}$). Based on these two measures, we then compute the gross and excess credit reallocation (SUMbig$_{st}$ and EXCbig$_{st}$) and the net credit growth (NETbig$_{st}$) due to large credit changes. Table 1.2 and Figure 1.4 display the credit flows attributable to large credit changes; numbers in parentheses are the shares of credit flows due to large changes. On average, between 1981 and 2012 the share of credit reallocation due to large credit changes equalled 76.80%. This share actually rose from 72.09% before the crisis to 80.94% after the crisis. Thus, a substantial portion of the increase in credit reallocation is attributable to large credit adjustments.

Credit changes could be large but temporary, thus reflecting short-lived liquidity shortfalls. To check whether the increase in the intensity of credit reallocation after the crisis was driven by temporary debt changes, we assess the persistence of the debt changes using the index proposed by Davis and Haltiwanger (1992)

$$P_{ft} = min\left[1, max\left(0, \frac{g_{ft,t+2}}{g_{ft,t+1}}\right)\right] \tag{1.5}$$

where $g_{ft,t+2}$ and $g_{ft,t+1}$ are the debt growth rate between year *t* and year *t+2* and the debt growth rate between year *t* and year *t+1*, respectively. The maximum persistence, equivalent to P_{ft}=1, occurs when all the debt change of a firm *f* from *t* to *t+1* lasts until *t+2*; P_{ft}=0 means instead that the debt change of a firm *f* is purely temporary. In the full sample period, the unweighted average value of P_{ft} was 0.71. This value did not change after the crisis (equalling on average 0.72 before the crisis, 0.70 after it). This indicates that the firm-level debt changes underlying the credit flows were persistent both before and after the crisis and that the intensification of credit reallocation after the crisis was not due to temporary liquidity shortfalls.

1.5.3 Comparison with job flows

It is useful to compare the intensity of credit reallocation with that of job reallocation. We consider regular employment, which includes permanent and temporary employment, whose labor contracts are longer than 1 year. Credit reallocation is more intense than job reallocation in Korea, consistent with what found for the United States by Herrera et al. (2011). Table 1.1 shows that the job reallocation rate rose from 13.64% in the pre-crisis period to 16.66% in the post-crisis period. Interestingly, both job creation and job destruction rose after the crisis.

1.6 The Role of "Flights to Quality"

The macroeconomics literature on credit market imperfections argues that, following negative aggregate shocks, financiers contract credit to information opaque borrowers, such as small firms, while they accommodate the increasing credit demand of information transparent borrowers, such as big firms (Bernanke, Gertler and Gilchrist, 1999). This would induce a reshuffling of credit (a "flight to quality") from small to big firms. Similarly, following negative aggregate shocks credit can flow from industries suffering from tight credit conditions to industries less exposed to tight credit. The reader may then wonder to what extent the intensification of credit reallocation we have uncovered reflected a flight to quality triggered by the financial crisis and that persisted after the crisis.

To probe this point, we break down our sample based on four group categories: size classes, 2-digit manufacturing industries, *chaebol*-affiliation, locations, and whether listed or not. We measure the reallocation of credit within a group using the following index put forth by Davis and Haltiwanger (1992)

$$W_t = 1 - \frac{\sum \left| NET_{jt} \right|}{\sum SUM_{jt}} \tag{1.6}$$

where j denotes a group. W_t =1 if credit reallocation across groups does not occur and all the reallocation is within groups; W_t = 0 if reallocation within groups does not occur and all credit

Variable	Period	POSbig	NEGbig	SUMbig	NETbig	EXCbig
Total credit	81-12	11.507	5.250	16.757	6.257	9.676
		(80.006)	(66.988)	(76.800)	(76.940)	(67.939)
	81-96	10.693	2.304	12.997	8.389	4.608
		(77.166)	(55.325)	(72.093)	(88.193)	(55.325)
	93-96	10.331	1.957	12.288	8.374	3.914
		(73.809)	(57.379)	(70.195)	(81.541)	(57.379)
	99-04	9.258	11.233	20.492	-1.975	18.300
		(82.358)	(79.545)	(80.765)	(56.968)	(82.564)
	99-12	11.674	8.533	20.206	3.141	15.235
		(81.945)	(79.325)	(80.942)	(67.035)	(80.759)
Long-term credit	81-12	16.160	9.122	25.282	7.038	16.585
		(87.571)	(78.894)	(85.090)	(91.838)	(79.082)
	81-96	15.496	5.959	21.455	9.536	11.700
		(86.459)	(71.228)	(82.116)	(99.966)	(71.244)
	93-96	14.395	4.608	19.003	9.786	9.217
		(83.934)	(72.411)	(80.742)	(91.977)	(72.411)
	99-04	13.791	16.601	30.392	-2.810	24.934
		(88.774)	(87.471)	(88.055)	(84.874)	(88.432)
	99-12	15.984	12.816	28.800	3.168	22.088
		(88.134)	(86.696)	(87.648)	(81.108)	(87.108)
Loans	81-12	16.968	10.794	27.763	6.174	18.536
		(88.670)	(80.229)	(86.507)	(91.866)	(80.227)
	81-96	14.134	6.078	20.211	8.056	11.418
		(85.357)	(71.650)	(81.648)	(84.919)	(71.661)
	93-96	14.475	5.218	19.693	9.257	10.436
		(84.277)	(70.030)	(80.470)	(117.097)	(70.030)
	99-04	15.735	20.630	36.365	-4.895	30.042
		(91.551)	(91.511)	(91.508)	(88.066)	(91.830)
	99-12	19.589	16.082	35.672	3.507	27.357
		(91.992)	(89.885)	(91.352)	(99.250)	(90.021)
Bonds	81-12	19.920	10.109	30.028	9.811	17.714
		(88.347)	(82.598)	(87.785)	(100.028)	(81.116)
	81-96	23.070	7.872	30.942	15.198	15.635
		(90.645)	(78.196)	(88.121)	(93.594)	(78.145)
	93-96	17.171	3.296	20.467	13.875	6.592
		(87.159)	(64.246)	(81.943)	(97.441)	(64.246)
	99-04	11.342	17.832	29.173	-6.490	22.684
		(83.337)	(91.537)	(88.471)	(141.954)	(83.337)
	99-12	14.744	13.207	27.951	1.536	20.817
		(84.813)	(87.543)	(86.678)	(107.728)	(84.214)
Jobs	81-12	6.189	5.012	11.201	1.177	9.007
		(72.505)	(72.341)	(72.425)	(81.131)	(71.854)
	81-96	5.911	4.015	9.926	1.896	7.413
		(71.277)	(68.946)	(70.507)	(93.156)	(67.402)
	93-96	4.243	3.249	7.493	0.994	6.078
		(61.320)	(62.640)	(62.020)	(78.305)	(61.005)
	99-04	8.263	6.981	15.244	1.282	13.962
		(78.483)	(77.768)	(78.122)	(86.406)	(77.768)
	99-12	6.855	5.521	12.376	1.334	11.042
		(73.099)	(76.040)	(74.245)	(69.336)	(76.040)

Notes: This table reports the average flows due to large changes. Numbers in parentheses indicate the shares of total flows due to large changes. The period 1981 to 1996 and the period 1999 to 2012 reflect the pre-crisis period and the post-crisis one, respectively.

Table 1.2: Average Flows due to Large Changes

reallocation occurs across groups.

Table 1.3 displays the results when we partition the sample into size classes (sales quintiles). Credit reallocation decreases monotonically with size. For instance, the credit reallocation rates for the 1st sale quintile before and after the crisis were 23.65 and 33.38, respectively, markedly larger than 16.11 and 21.86 for the 5th quintile.[10] The average W_t was 0.57 and rose from 0.44 in the pre-crisis (1981-1996) period to 0.73 in the post-crisis (1999-2012) period (see Panel B). In unreported tables, we also partition manufacturing firms into 24 two-digit SIC industries. Credit reallocation exhibits considerably across industries. With the exception of a few manufacturing industries, such as electronic components and motor vehicles industries, in all industries credit reallocation increased after the crisis, fueled mainly by an increase in credit destruction. The average W_t was 0.52 between 1981 and 2012, and, again, rose significantly from 0.43 in the pre-crisis period to 0.63 in the post-crisis period. Next, we partition the sample into 16 regions based on the Korean administrative districts (7 metropolitan cities and 9 provinces). We identify a firm's location using the headquarter address reported by KISLINE. The average W_t rose from 0.40 in the pre-crisis period to 0.67 in the post-crisis period, suggesting that the share of credit reallocation across regions shrank after the crisis. Finally, a classification relevant for examining credit reallocation in South Korea is that between chaebol and non-chaebol firms. When we split firms based on whether they are affiliated or not to one of the top 30 *chaebols*(defined according to the classification of the Korean government), we obtain again that the average W_t rose significantly after the crisis (0.47 to 0.75).

Altogether, these results suggest that the importance of credit reallocation within relatively homogeneous groups of firms increased after the crisis, while that of the reallocation across groups dropped. Does this imply that no flight to quality occurred during the crisis? Actually, the sharp increase in the W-index occurred after a substantial drop during the crisis (see Table 1.3 for sales quintiles). Such a drop of the index suggests that the crisis was indeed characterized by a reshuffling of credit from risky and informationally opaque small firms to safer and informationally

[10] However, such a monotonic pattern cannot be observed for loans and bonds separately.

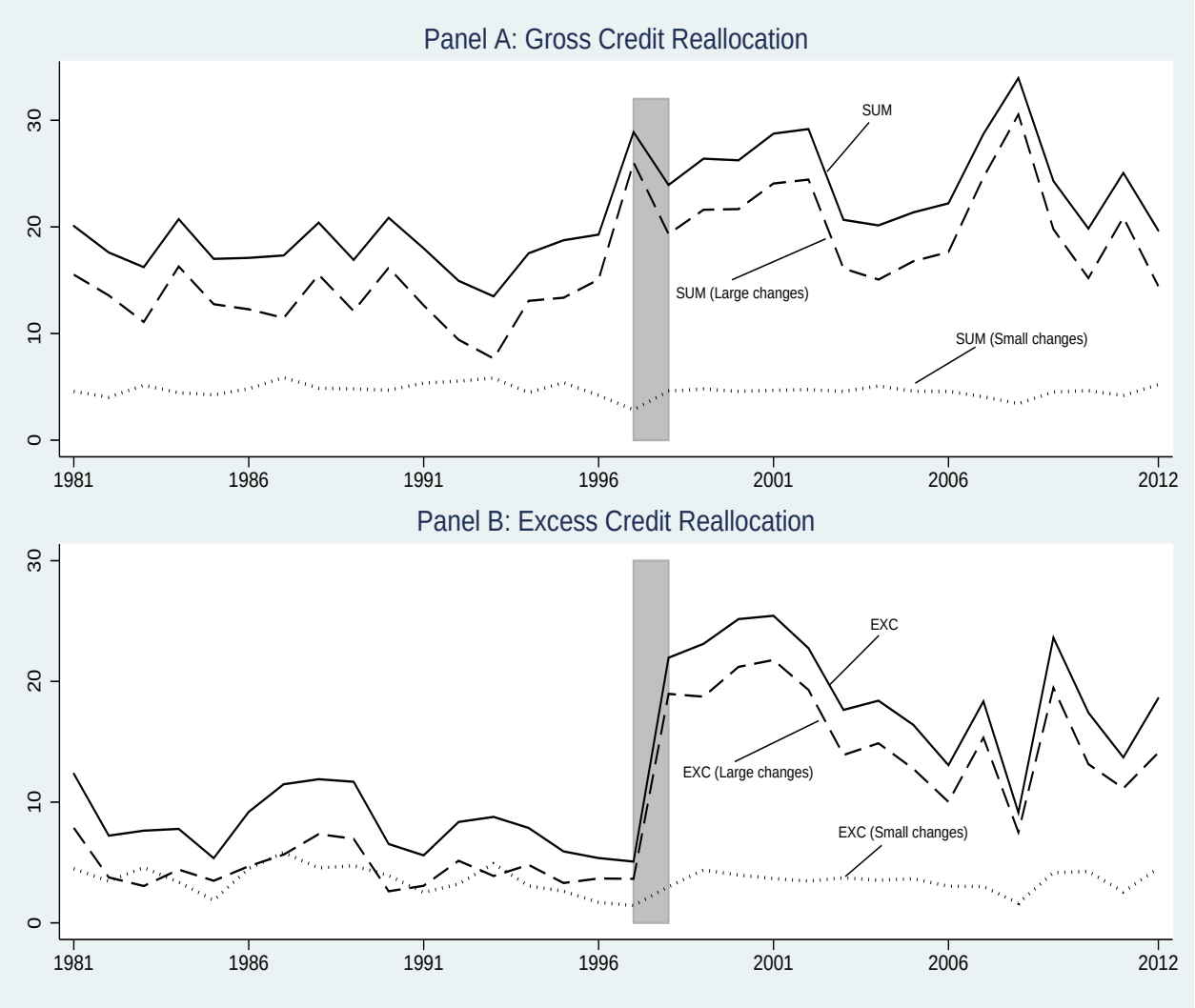

Figure 1.4: Large Credit Flows Panel A of this figure shows gross credit reallocation (SUM, solid line), gross credit reallocation due to large changes (dashed line) and to small changes (dotted line) for the period 1981 to 2012. Panel B of this figure shows excess credit reallocation (EXC, solid line), excess credit reallocation due to large changes (dashed line) and to small changes (dotted line) for the period 1981 to 2012. The vertical shaded areas in the two panels correspond to the financial crisis.

transparent large firms. Nonetheless, the increase of the W-index after the crisis strongly suggests that flights to quality among relatively homogeneous classes of firms cannot explain the significant, persistent intensification of credit reallocation after the crisis.

		Total Credit					Loans					Bonds				
Panel A: Credit reallocation in sales quintiles																
Quintile	Period	POS	NEG	SUM	NET	EXC	POS	NEG	SUM	NET	EXC	POS	NEG	SUM	NET	EXC
1st	81-12	19.981	7.905	27.885	12.076	15.809	23.281	10.838	34.119	12.443	20.397	41.767	29.185	70.952	12.583	40.988
	81-96	18.506	5.148	23.654	13.359	10.296	21.735	8.807	30.542	12.928	15.058	39.072	17.241	56.314	21.831	30.734
	93-96	15.381	5.607	20.988	9.775	11.214	18.615	7.293	25.908	11.322	14.586	33.995	22.439	56.434	11.556	43.823
	99-04	24.172	11.057	35.229	13.115	22.114	27.950	12.937	40.887	15.013	25.874	54.449	47.270	101.719	7.178	49.169
	99-12	22.059	11.321	33.380	10.738	22.642	25.488	13.377	38.866	12.111	26.754	47.748	40.108	87.856	7.641	52.430
2nd	81-12	17.435	7.510	24.944	9.925	14.809	21.532	11.161	32.692	10.371	20.541	36.148	22.724	58.872	13.424	36.144
	81-96	16.636	5.009	21.645	11.627	9.905	19.989	9.459	29.448	10.529	15.857	34.171	14.466	48.636	19.705	26.352
	93-96	16.505	5.009	21.514	11.496	10.017	22.267	8.421	30.687	13.846	16.841	27.082	15.720	42.802	11.363	31.439
	99-04	17.408	13.098	30.506	4.309	25.382	20.366	15.838	36.204	4.528	30.344	49.382	36.554	85.935	12.828	56.916
	99-12	18.380	10.314	28.694	8.066	20.279	23.059	13.273	36.332	9.786	25.974	41.310	30.528	71.838	10.782	47.974
3rd	81-12	15.125	7.263	22.388	7.863	13.916	20.962	12.027	32.989	8.935	21.975	24.624	17.331	41.955	7.293	26.185
	81-96	15.325	4.710	20.035	10.616	9.419	18.832	9.603	28.435	9.229	16.375	30.782	10.856	41.638	19.925	20.810
	93-96	14.587	3.571	18.158	11.016	7.142	20.800	6.754	27.554	14.046	13.507	20.901	6.066	26.967	14.835	12.133
	99-04	13.491	11.855	25.346	1.637	22.867	22.569	20.288	42.856	2.281	37.156	17.191	26.434	43.626	-9.243	30.523
	99-12	14.508	10.057	24.565	4.451	19.073	22.653	14.870	37.523	7.783	28.275	18.859	24.919	43.777	-6.060	33.430
4th	81-12	16.423	6.669	23.092	9.754	13.164	20.497	11.071	31.568	9.426	20.901	27.672	16.386	44.058	11.286	27.834
	81-96	16.785	4.228	21.013	12.557	8.456	19.542	8.574	28.116	10.968	15.206	25.531	9.416	34.947	16.115	18.695
	93-96	18.982	2.546	21.528	16.436	5.092	23.552	5.490	29.042	18.062	10.979	17.271	6.941	24.212	10.329	13.883
	99-04	12.802	11.569	24.371	1.233	22.210	19.174	17.474	36.648	1.700	33.512	18.999	20.990	39.989	-1.991	22.018
	99-12	15.690	9.518	25.208	6.172	18.639	21.528	14.226	35.754	7.302	27.836	30.303	24.291	54.595	6.012	37.452
5th	81-12	13.017	6.183	19.200	6.834	10.733	17.819	12.284	30.103	5.534	19.472	21.391	10.721	32.111	10.670	19.204
	81-96	12.639	3.472	16.111	9.168	6.943	15.443	7.502	22.944	7.941	13.793	24.282	9.114	33.396	15.168	18.228
	93-96	12.241	2.392	14.633	9.850	4.784	14.941	6.981	21.923	7.960	13.206	19.161	4.317	23.478	14.844	8.634
	99-04	9.452	12.902	22.354	-3.450	18.033	15.161	22.902	38.063	-7.740	27.809	12.236	18.137	30.373	-5.900	24.472
	99-12	12.638	9.221	21.859	3.418	15.022	19.864	17.640	37.505	2.224	26.859	16.206	13.343	29.549	2.864	21.572
Panel B: W Indexes based on sub-groups																
		Size			Industry			*Chaebol* Affiliation			Region			Listing		
		Total	Loans	Bonds	Total	Loans	Bonds	Total	Loans	Bonds	Total	Loans	Bonds	Total	Loans	Bonds
	81-12	0.572	0.629	0.610	0.519	0.555	0.435	0.596	0.672	0.606	0.524	0.575	0.444	0.616	0.684	0.658
	81-96	0.444	0.544	0.551	0.428	0.503	0.380	0.472	0.624	0.514	0.402	0.471	0.363	0.504	0.619	0.573
	93-96	0.400	0.514	0.633	0.490	0.559	0.402	0.419	0.604	0.428	0.427	0.536	0.406	0.419	0.534	0.534
	1997	0.227	0.307	0.693	0.255	0.245	0.407	0.174	0.191	0.285	0.240	0.285	0.462	0.228	0.243	0.397
	1998	0.821	0.807	0.516	0.691	0.648	0.493	0.918	0.717	0.497	0.703	0.679	0.434	0.929	0.770	0.658
	99-04	0.806	0.796	0.620	0.645	0.635	0.476	0.826	0.799	0.759	0.710	0.728	0.471	0.751	0.808	0.702
	99-12	0.725	0.736	0.677	0.630	0.630	0.497	0.745	0.759	0.742	0.670	0.707	0.535	0.749	0.784	0.772

Notes: The table shows the average credit flows in sales quintiles (Panel A) and the W indexes for four firm classifications (size, industry, chaebol affiliation, region and listing) (Panel B). In Panel A, the first (fifth) quintile is the quintile with the smallest (largest) firms. The Chow test statistics come from Chow tests for a structural break in 1997.

Table 1.3: Credit Reallocation in Sub-Groups

1.7 The Dynamic Pattern of Credit Reallocation

In the previous section, we found that the intensity of credit reallocation rose significantly after the 1997 financial crisis. We now turn to examine whether the dynamic pattern of credit reallocation also changed after the crisis.

1.7.1 Volatility

Table 1.4, Panel A, reports three measures of volatility of credit flows: the standard deviations of the original flows and of the Hodrick-Prescott filtered flows as well as the coefficient of variation (standard deviation/mean*100) of the flows. Although credit reallocation turns out to be less volatile than in the United States (see Herrera et al., 2011), its volatility is high: over the full sample period the coefficients of variation equal 31.73% for credit creation, 59.96% for credit destruction, 22.64% for gross credit reallocation, and 49.96% for excess credit reallocation. Similar to what found for the United States, credit destruction is more volatile than credit creation. The volatilities of credit creation, credit destruction, net credit change, gross and excess credit reallocation consistently increased after the crisis. We also computed the rolling standard deviations of credit reallocation using 5 year and 10 year moving windows. The results confirm that the volatility of credit reallocation rose after the financial crisis.

As noted, the relative importance of credit reallocation within industries and size classes grew after the crisis. A related question is to what extent the increase in the volatility of credit reallocation was driven by idiosyncratic, firm-level debt changes. To probe this point, we decompose the debt growth rate of each firm into the sector growth rate and an idiosyncratic component. Next, we recompute credit flows using only the idiosyncratic component. Finally, we decompose the variance of credit reallocation into three parts, the variance caused by idiosyncratic effects, the variance caused by sectoral or aggregate effects, and the covariance term,

$$var(SUM_t) = var(SUM_t^i) + var(SUM_t - SUM_t^i) + 2cov(SUM_t - SUM_t^i, SUM_t^i), \qquad (1.7)$$

where $\mathrm{SUM}_t{}^i$ denotes credit reallocation driven by idiosyncratic effects in year t. Table 1.5 sum-

marizes the relative contribution of idiosyncratic effects and of sectoral or aggregate effects to the variance of credit flows. Consistently across classification schemes, we find that the relative importance of sectoral or aggregate effects in the volatility of credit reallocation tended to shrink after the crisis while the importance of idiosyncratic effects rose. Using the classification in size classes, for example, we obtain that after the crisis the variance of the reallocation of loans explained by idiosyncratic effects amounted to almost 91%, versus 60% explained by sectoral or aggregate effects.

1.7.2 Cyclical Behavior

To examine the cyclical patterns of credit flows, we start by computing unconditional correlation coefficients between the credit flows and the GDP.

1.7.2.1 Unconditional Correlation

We extract cyclical components from the series using the Hodrick-Prescott filter. Table 1.4, Panel B, gathers the pairwise coefficients of correlation between the cyclical components of the credit flows and the cyclical components of real GDP; coefficients significant at the 5% level are in bold. Since 2008 appears to be an outlier, driven by **an economic crisis and** a program of credit subsidies, we also present correlation coefficients excluding 2008. Over the 1981-2012 period, credit creation was procyclical, while credit destruction was countercyclical. Gross credit reallocation exhibited a mildly procyclical pattern, and this procyclical behavior was present both before and (to a lesser extent) after the crisis.[11] Interestingly, however, when we consider separately the components of gross credit reallocation (the absolute value of the net credit change and the excess credit reallocation − see formula (1.4)), we find that the forces driving the cyclical behavior of gross credit reallocation changed after the crisis (see again Table 1.4, Panel B). While before the crisis credit growth exhibited a procyclical behavior and the excess credit reallocation was es-

[11] Herrera et al. (2011) also find a mildly procyclical behavior of credit reallocation for the United States.

Panel A: Volatility															
	Total Credit					Loans					Bonds				
	POS	NEG	SUM	NET	EXC	POS	NEG	SUM	NET	EXC	POS	NEG	SUM	NET	EXC
	s.d.					s.d.					s.d.				
81-12	4.499	4.345	4.850	7.397	6.602	6.126	7.067	7.918	10.594	9.573	8.306	5.807	7.698	12.089	9.699
81-96	2.387	1.208	2.074	3.164	2.416	3.916	4.074	3.205	7.321	6.120	7.454	5.461	8.230	10.151	10.699
99-12	5.406	3.807	4.364	8.271	4.835	6.372	5.761	4.118	11.429	5.565	6.560	5.036	6.921	9.428	8.027
	s.d. of H.P filtered flow					s.d. of H.P filtered flow					s.d. of H.P filtered flow				
81-12	3.587	1.921	2.710	5.076	3.122	4.440	3.955	2.954	7.873	5.125	5.730	3.247	5.045	7.830	6.739
81-96	2.065	1.085	1.799	2.765	2.038	3.376	3.467	2.896	6.201	5.078	5.993	3.798	4.699	8.866	7.367
99-12	4.095	2.237	3.383	5.666	3.445	4.312	3.818	3.155	7.510	4.880	4.868	2.655	5.195	5.874	6.523
	s.d./mean*100					s.d./mean*100					s.d./mean*100				
81-12	31.733	59.964	22.639	106.733	49.957	32.333	55.722	25.035	169.149	43.514	37.640	49.557	22.787	116.818	46.100
81-96	17.385	29.058	11.594	33.053	29.058	23.758	49.781	12.995	88.239	39.541	29.642	57.475	23.753	64.882	56.575
99-12	39.266	109.079	25.284	80.475	69.266	37.284	78.445	16.853	117.279	37.888	33.237	96.399	27.729	64.958	76.830
Panel B: Unconditional correlation of credit flows with GDP growth rate															
	1981-2012					1981-1996					1999-2012				
	t-2	t-1	t	t+1	t+2	t-2	t-1	t	t+1	t+2	t-2	t-1	t	t+1	t+2
	Panel B-1: Total credit														
POS	0.005	0.298	0.173	-0.695*	0.185	-0.010	0.044	0.219	-0.320	-0.168	-0.068	0.413	-0.079	-0.668*	0.362
NEG	0.248	-0.364*	-0.202	0.518*	-0.029	0.134	-0.250	-0.170	-0.205	0.597*	0.426	-0.449	0.102	0.460	-0.444
SUM	0.183	0.137	0.086	-0.552*	0.225	0.069	-0.100	0.149	-0.491	0.168	0.199	0.203	-0.028	-0.504	0.142
NET	-0.090	0.349	0.198	-0.687*	0.142	-0.060	0.131	0.230	-0.159	-0.359	-0.218	0.475	-0.097	-0.664*	0.437
EXC	0.037	-0.211	-0.208	0.536*	0.016	0.156	-0.230	-0.150	-0.206	0.548*	0.051	-0.217	0.115	0.549*	-0.363
	Panel B-2: Total credit (Excluding the year 2008)														
POS	-0.038	0.304	0.264	-0.718*	0.089	-0.010	0.044	0.219	-0.320	-0.168	-0.242	0.520	0.144	-0.527	-0.152
NEG	0.285	-0.357*	-0.241	0.489*	0.040	0.134	-0.250	-0.170	-0.205	0.597*	0.538	-0.447	0.005	0.301	-0.251
SUM	0.174	0.109	0.148	-0.535*	0.144	0.069	-0.100	0.149	-0.491	0.168	0.176	0.165	0.145	-0.284	-0.341
NET	-0.146	0.358*	0.282	-0.696*	0.044	-0.060	0.131	0.230	-0.159	-0.359	-0.450	0.589*	0.095	-0.516	0.032
EXC	0.068	-0.194	-0.260	0.507*	0.104	0.156	-0.230	-0.150	-0.206	0.548*	0.136	-0.182	-0.009	0.373	-0.057
	Panel B-3: Loans														
POS	-0.111	0.293	0.239	-0.663*	0.069	0.018	-0.014	0.064	-0.080	-0.312	-0.321	0.506	0.017	-0.725*	0.348
NEG	0.285	-0.365*	-0.257	0.598*	0.060	0.075	-0.394	-0.002	0.019	0.528*	0.586*	-0.412	-0.134	0.810*	-0.523
SUM	0.214	-0.048	0.014	-0.195	0.183	0.111	-0.488	0.072	-0.071	0.269	0.270	0.193	-0.138	-0.011	-0.157
NET	-0.206	0.348	0.264	-0.674*	0.009	-0.032	0.213	0.036	-0.054	-0.465	-0.482	0.500	0.078	-0.829*	0.466
EXC	-0.059	-0.182	-0.125	0.457*	0.122	0.124	-0.229	-0.060	-0.031	0.493	-0.150	-0.141	-0.050	0.654*	-0.220
	Panel B-4: Bonds														
POS	0.299	0.128	-0.557*	0.069	0.142	0.137	-0.120	-0.329	0.155	-0.093	0.438	0.302	-0.651*	0.077	0.235
NEG	0.141	-0.231	0.289	-0.039	0.053	0.110	-0.219	0.275	-0.331	0.320	0.293	-0.255	0.452	-0.151	-0.329
SUM	0.430*	-0.004	-0.446*	0.053	0.195	0.263	-0.329	-0.198	-0.070	0.140	0.560*	0.153	-0.379	-0.005	0.052
NET	0.161	0.189	-0.527*	0.067	0.082	0.045	0.013	-0.341	0.247	-0.200	0.231	0.366	-0.744*	0.132	0.343
EXC	0.189	-0.115	0.147	0.046	0.036	0.112	-0.226	0.277	-0.324	0.310	0.323	-0.021	0.184	0.150	-0.428

Notes: Panel A reports three volatility measures for credit flows: the standard deviation (1st to 3rd row), the standard deviation of the HP-filtered credit flows (4th to 6th row) and the coefficient of variation of the flows (standard deviation/mean) (7th to 9th rows). Panel B reports the unconditional correlation coefficients of the credit flows with the HP-filtered GDP growth rate. Panel B-1 refers to total credit, Panel B-2 to total credit excluding 2008, Panel B-3 to loans and Panel B-4 to bonds. Each panel displays correlations for the full sample (1981-2012) period and for the pre-crisis (1981-1996) period and for the post-crisis (1999-2012) period. * denotes statistical significance at the 5% level.

Table 1.4: Volatility and Unconditional Correlation

		Size			Manufacturing			*Chaebol* Affiliation		
		Credit	Loans	Bonds	Credit	Loans	Bonds	Credit	Loans	Bonds
Panel A: Gross credit reallocation										
Sectoral effects	81-12	0.609	0.760	0.723	0.830	0.689	0.532	0.574	0.414	0.342
	81-96	1.055	3.996	0.627	2.039	1.321	0.333	2.955	2.155	0.196
	99-12	0.602	1.404	0.361	0.368	0.860	0.560	0.286	1.107	0.440
Idiosyncratic effects	81-12	0.599	0.722	2.200	0.316	0.161	0.577	1.006	0.753	1.582
	81-96	1.748	3.843	2.147	1.595	0.842	0.363	4.123	1.765	1.374
	99-12	0.912	1.978	1.404	0.480	0.404	0.200	1.516	1.858	1.520
Covariance term	81-12	-0.209	-0.482	-1.923	-0.146	0.150	-0.109	-0.580	-0.167	-0.925
	81-96	-1.802	-6.839	-1.774	-2.633	-1.163	0.304	-6.078	-2.920	-0.570
	99-12	-0.514	-2.382	-0.765	0.152	-0.264	0.239	-0.802	-1.965	-0.960
Panel B: Excess credit reallocation										
Sectoral effects	81-12	1.086	0.929	1.340	0.986	0.772	1.104	0.791	0.527	1.288
	81-96	3.723	2.219	1.198	1.551	1.002	0.849	1.771	0.932	1.075
	99-12	1.873	2.038	0.514	1.352	1.243	0.658	1.693	1.581	0.734
Idiosyncratic effects	81-12	0.402	0.427	0.871	0.064	0.090	0.302	0.329	0.388	0.975
	81-96	3.518	1.000	0.749	0.524	0.148	0.222	1.735	0.176	0.852
	99-12	0.604	0.477	0.892	0.090	0.176	0.189	0.533	0.456	1.149
Covariance term	81-12	-0.489	-0.356	-1.211	-0.050	0.138	-0.406	-0.121	0.084	-1.263
	81-96	-6.241	-2.219	-0.947	-1.074	-0.150	-0.072	-2.506	-0.108	-0.927
	99-12	-1.476	-1.515	-0.406	-0.442	-0.419	0.153	-1.226	-1.037	-0.883

Notes: Panel A of this table shows the variance decomposition of the gross reallocation of total credit, loans and bonds. Panel B shows the variance decomposition of the excess reallocation of total credit, loans and bonds.

Table 1.5: Properties of Idiosyncratic Flows

sentially acyclical, after the crisis the patterns appear to have flipped, with the net credit change becoming almost acyclical and the excess reallocation becoming procyclical. Put differently, in the pre-crisis period the mildly procyclical pattern of gross credit reallocation mostly reflected the procyclical pattern of credit growth; in the post-crisis period, instead, it mostly reflected the dynamics of the excess credit reallocation.

Formally, we can decompose the correlation of gross credit reallocation with the GDP using the following formula

$$corr(SUM, GDP) = \frac{sd(EXC)}{sd(SUM)} corr(EXC, GDP) + \frac{sd(|NET|)}{sd(SUM)} corr(|NET|, GDP). \tag{1.8}$$

The results of this decomposition (displayed in Table 1.6), confirm that the comovement of gross credit reallocation with the business cycle was especially driven by the net credit change before the crisis and by the excess credit reallocation after it. Naturally, this does not inform us about causality. However, the finding is suggestive, as in the years leading up to the crisis a credit boom occurred while after the crisis an enhanced dynamism in credit reallocation could

	1981-2012					1981-1996					1999-2012				
	t-2	t-1	t	t+1	t+2	t-2	t-1	t	t+1	t+2	t-2	t-1	t	t+1	t+2
Panel A: Total credit															
SUM	0.103	0.071	0.040	-0.324	0.128	0.122	0.058	0.297	-0.375	-0.241	0.125	0.158	0.064	-0.391	0.092
SD ratio 1	1.361	1.361	1.361	1.361	1.349	1.165	1.165	1.165	1.165	1.165	1.108	1.108	1.108	1.108	1.177
EXC	0.005	-0.120	-0.091	0.281	0.031	0.203	-0.193	-0.112	-0.231	0.327	0.015	-0.100	0.192	0.400	-0.295
SD ratio 2	1.216	1.216	1.216	1.216	1.188	1.526	1.526	1.526	1.526	1.526	1.484	1.484	1.484	1.484	1.538
|NET|	0.079	0.193	0.135	-0.581	0.072	-0.075	0.185	0.280	-0.069	-0.408	0.073	0.181	-0.100	-0.562	0.285
Panel B: Loans															
SUM	0.079	-0.024	0.004	-0.072	0.077	0.170	-0.311	0.223	0.015	-0.083	0.204	0.219	-0.108	-0.052	-0.138
SD ratio 1	1.209	1.209	1.209	1.209	1.181	1.909	1.909	1.909	1.909	1.909	1.352	1.352	1.352	1.352	1.418
EXC	-0.033	-0.103	-0.050	0.276	0.087	0.150	-0.200	-0.054	-0.049	0.433	-0.071	0.027	-0.165	0.494	-0.180
SD ratio 2	0.954	0.954	0.954	0.954	0.931	1.896	1.896	1.896	1.896	1.896	1.912	1.912	1.912	1.912	1.941
|NET|	0.125	0.106	0.067	-0.425	-0.027	-0.062	0.037	0.171	0.057	-0.480	0.157	0.096	0.060	-0.377	0.060
Panel C: Bonds															
SUM	0.289	-0.023	-0.315	0.024	0.141	0.205	-0.219	-0.209	-0.197	0.124	0.368	0.074	-0.134	0.041	0.008
SD ratio 1	1.260	1.260	1.260	1.260	1.292	1.300	1.300	1.300	1.300	1.300	1.160	1.160	1.160	1.160	1.193
EXC	0.126	-0.098	0.122	0.054	0.038	0.121	-0.218	0.130	-0.328	0.297	0.254	0.049	0.195	0.099	-0.389
SD ratio 2	1.226	1.226	1.226	1.226	1.249	1.215	1.215	1.215	1.215	1.215	0.827	0.827	0.827	0.827	0.872
|NET|	0.106	0.082	-0.383	-0.036	0.073	0.039	0.053	-0.311	0.189	-0.216	0.089	0.021	-0.435	-0.089	0.541

Notes: This table reports the decomposition of the correlation between credit reallocation and the HP-filtered GDP growth rate.

Table 1.6: Decomposition of Correlation

have promoted economic activity.

1.7.2.2 Conditional Correlation

Unconditional correlations do not control for microeconomic variables that may affect credit reallocation. To address this issue, we now adopt the approach of Covas and Den Haan (2011) which allows to control for the impact of micro-variables on credit reallocation. We estimate the following regression

$$\begin{aligned}\frac{\mathbf{F}_{i,t}}{\mathbf{A}_{i,t-1}} &= \alpha_{0,i} + \sum_{j=1}^{J} \mathbf{I}_{i,t}(j)\{\alpha_{j,1}t + \alpha_{j,2}t^2 + \alpha_{j,3}\mathbf{Y}_t^c + \\ &\quad \alpha_{j,4}(\frac{\mathbf{CF}_{i,t-1}}{\mathbf{A}_{i,t-2}} - \frac{\overline{\mathbf{CF}}_{j,t-1}}{\mathbf{A}_{j,t-2}}) + \alpha_{j,5}(\mathbf{Q}_{i,t-1} - \overline{\mathbf{Q}}_{j,t-1})\} + \mathbf{u}_{i,t} \qquad (1.9)\end{aligned}$$

where $F_{i,t}$ is the credit change of firm i in year t; $\mathbf{A}_{i,t}$ denotes the total assets of the firm; t and t^2 denote a linear and a quadratic time trend, respectively; $I_{i,t}(j)$ is an indicator variable that takes the value of one if firm i belongs to the class j of firms, zero otherwise; and Y_t^c is the measure of the cycle, the HP-filtered GDP. Following Covas and Den Haan (2011), we insert lagged values of cash flows and Tobin's Q as independent variables. For unlisted firms, since we lack information on the Tobin's Q, we use the two-year-ahead sales growth rate as a proxy. The sample spans

	1987-2012			1987-1996			1999-2012		
	Credit	Loans	Bonds	Credit	Loans	Bonds	Credit	Loans	Bonds
1st quintile	0.057***	0.047***	-0.002***	0.263***	0.152***	0.011***	0.023*	0.040***	-0.001
	(0.007)	(0.006)	(0.001)	(0.020)	(0.017)	(0.004)	(0.012)	(0.010)	(0.001)
2nd quintile	0.036***	0.035***	-0.002***	0.194***	0.113***	0.002	0.008	0.033***	-0.002*
	(0.005)	(0.005)	(0.001)	(0.019)	(0.015)	(0.00408)	(0.009)	(0.008)	(0.001)
3rd quintile	0.034***	0.026***	-0.001	0.132***	0.073***	0.005	0.025***	0.036***	-0.007***
	(0.005)	(0.004)	(0.001)	(0.018)	(0.015)	(0.004)	(0.008)	(0.007)	(0.001)
4th quintile	0.039***	0.023***	0.003***	0.076***	0.038***	0.001	0.047***	0.052***	-0.009***
	(0.005)	(0.004)	(0.001)	(0.018)	(0.014)	(0.005)	(0.009)	(0.007)	(0.001)
5th quintile	0.030***	0.034***	-0.002	0.043**	0.020	-0.003	0.057***	0.070***	-0.009***
	(0.005)	(0.004)	(0.002)	(0.018)	(0.015)	(0.005)	(0.008)	(0.007)	(0.002)
Observations	145,026	145,026	145,026	23,281	23,281	23,281	113,666	113,666	113,666
R-squared	0.068	0.036	0.011	0.065	0.029	0.007	0.076	0.045	0.004

Notes: This table shows the coefficient estimates of firm level credit changes on the HP-filtered GDP for the five sales quintiles. The numbers in parentheses denote standard errors. *, ** and *** indicate 10%, 5 % and 1% statistical significance. The 1st quintile and the 5th quintile are the quintiles of the smallest and the largest firms, respectively.

Table 1.7: Conditional Correlation of Credit Reallocation

from 1987 to 2012 and the number of firm-year observations is 145,026 (data for cash flows and Tobin's Q are not available before 1987). The HP-filtered GDP is scaled to be zero at its minimum observed value and one at its maximum observed value. This enables us to interpret its estimated coefficient as the change in credit when the economy goes from through to peak over the business cycle. Moreover, we subtract the group mean from each variable to purge the effect of aggregate conditions on independent variables.

Table 1.7 reports the estimation results for each sales quintile (to conserve space, we only display the coefficient estimates for the HP-filtered GDP). As shown by Covas and Den Haan (2011), it is useful to distinguish firms of different size when studying the cyclical behavior of their debt. The results confirm the reduced procyclicality of the net credit change documented above with the unconditional correlation coefficients: after the crisis firm-level credit changes became less sensitive to the cycle.

1.7.2.3 Robustness Analysis

The reader might have some concern that for the post-crisis period the analysis of the dynamic behavior of credit flows relies on thirteen annual data (from 1999 to 2012). While higher frequency data for the whole sample period are not available, we have quarterly data for publicly traded firms

for essentially all the post-crisis period (from 2000Q1 to 2012Q4). We then replicated our analysis for the post-crisis period using quarterly data. The findings confirm those obtained using annual data. In particular, after the crisis excess credit reallocation exhibited a clearly procyclical behavior while the net credit change was countercylical. The results of the analysis with quarterly data are available on request.

1.8 Allocative Efficiency

Although a fully fledged analysis of the efficiency of the credit reallocation process is beyond the scope of this paper, in this section we take a step towards investigating whether the intensification of credit reallocation after the financial crisis was associated with enhanced efficiency of the reallocation process. To this end, we use various indicators of firm productivity and efficiency. The first two indicators consist of the firm ratios of operating profits to capital and sales to capital.[12]

Using the profits and sales to capital ratios, we construct an index to evaluate the efficiency of the allocation of credit. We adapt to our context the index for the efficiency of investment allocation proposed by Galindo, Schiantarelli and Weiss (2007). The index is constructed as a ratio. In the numerator, in state i and year t, the ratio includes the weighted sum of the sales or profits to capital ratios of the firms (s_{fit}/k_{fit}), with the weight for each firm given by the contribution of the firm debt to the total debt of the firms in the state in that year (c_{fit}/C_{it}). In the denominator, the ratio includes the sum of the sales to capital ratios of the same firms, weighted by the contribution of the firm debt to the total debt of the firms in the previous year (c_{fit-1}/C_{it-1}). Formally, the index reads

$$I_{it} = \frac{\sum_f \frac{s_{ft}}{k_{ft}} \frac{c_{ft}}{C_t}}{\sum_f \frac{s_{ft}}{k_{ft}} \frac{c_{ft-1}}{C_{t-1}}}. \tag{1.10}$$

[12] There are several reasons to use both sales and profits (see also Galindo et al., 2007). Sales are measured more accurately than operating profits. Moreover, operating profits are highly correlated with cash flow. Because cash flow is the main source of internal financing, a relationship between cash flow and a change in debt may bias the index. Last, operating profits are more volatile than sales.

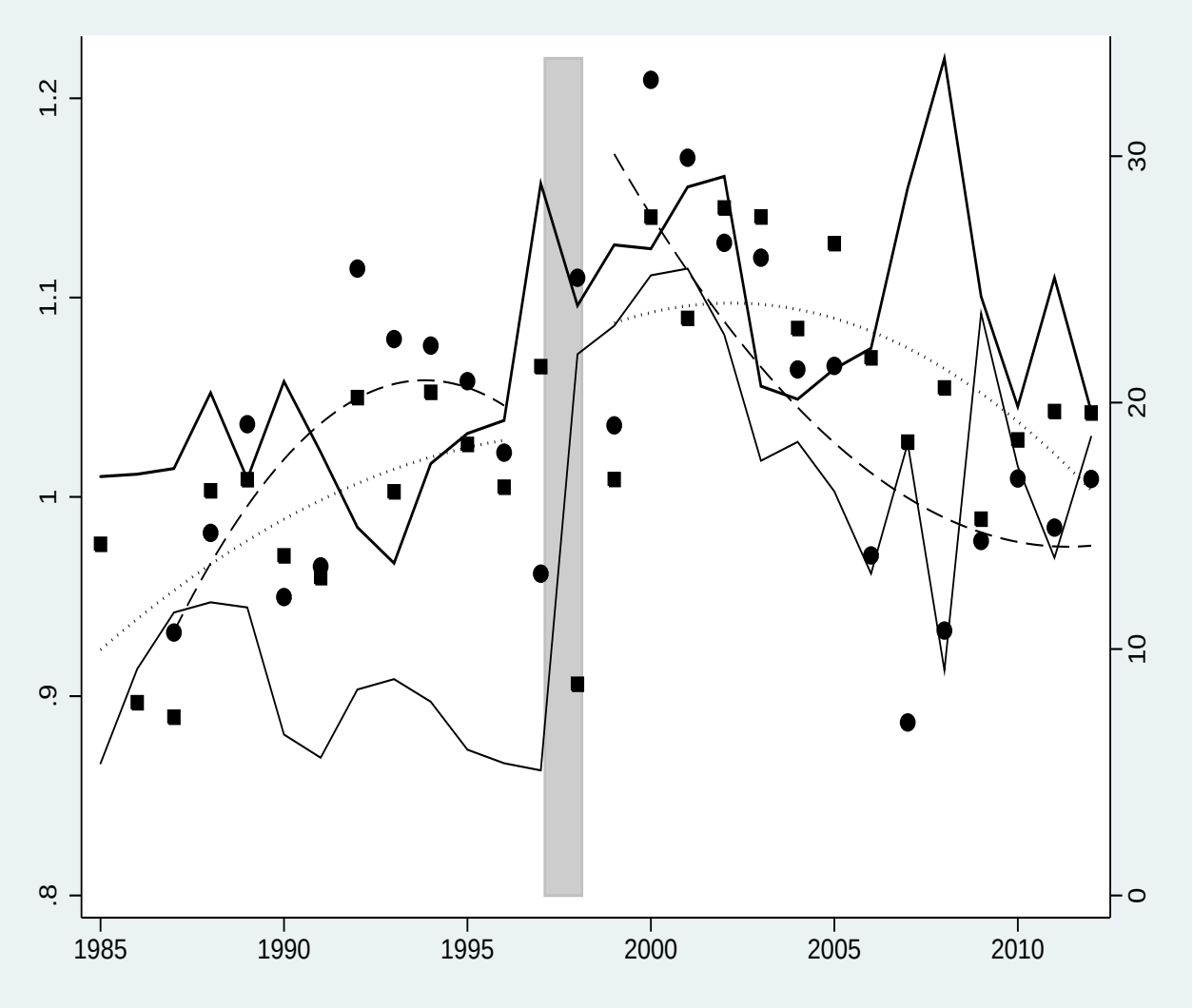

Figure 1.5: Efficiency of Credit Reallocation This figure shows the annual values of three efficiency indexes of credit reallocation computed using firms' sales to capital ratios (squares), profit to capital ratios (bullet points) and SFA efficiency (triangles). The figure shows six quadratic fitted lines for each index in the pre-crisis period and the post-crisis period (dotted lines for sales, dashed lines for profits and dash-dotted lines for SFA efficiency). The efficiency index using operating profits starts in 1987 due to data availability. The right Y-axis provides the scale for the magnitude of gross credit reallocation (solid bold line) and excess credit reallocation (solid light line).

		Total	*Chaebol* Affiliation		Size Quintile				
			Chaebols	Others	1st	2nd	3rd	4th	5th
Panel A: Total credit									
					Operating profits				
Average	87-96	1.022	0.942	0.983	0.490	0.420	0.462	0.385	0.481
	93-96	1.059	0.990	1.030	0.478	0.441	0.697	0.398	0.503
	99-12	1.040	1.009	0.977	0.932	0.783	0.983	0.934	0.478
					Sales				
Average	85-96	0.987	0.948	0.957	1.202	1.589	1.364	1.010	0.770
	93-96	1.022	0.996	0.975	1.309	1.716	1.311	1.300	0.738
	99-12	1.071	1.027	1.004	1.295	1.152	1.314	1.300	0.585
Panel B: Loans									
					Operating profits				
Average	87-96	1.038	0.958	1.004	0.513	0.432	0.444	0.436	0.518
	93-96	1.086	0.992	1.074	0.415	0.493	0.589	0.408	0.565
	99-12	1.029	1.160	0.948	0.824	0.770	0.978	0.855	0.665
					Sales				
Average	85-96	1.012	0.965	0.980	1.127	1.688	1.399	1.012	0.798
	93-96	1.040	1.006	1.015	1.240	2.102	1.282	1.273	0.801
	99-12	1.078	1.055	0.982	1.402	1.141	1.352	1.218	0.626

Notes: This table displays the values of the efficiency index of credit reallocation constructed using the profits to capital ratios of the firms, the sales to capital ratios and the SFA efficiency. Panel A refers to total credit, Panel B to loans. Each panel reports the values of the index for all firms, for *chaebol* and non-*chaebol* firms, and for firms of different size. It also reports values of the index for the pre-crisis (1981-1996) period, for the credit boom (1993-1996) period and for the post-crisis (1999-2012) period.

Table 1.8: Efficiency of Credit Reallocation

A value of the index greater than one signals that credit was allocated more efficiently in year t than if the credit distribution had remained as in year $t-1$.

Tables 1.8 and Figure 1.5 show the values of the index (the figure also plots fitted lines). The results consistently indicate that the efficiency of credit allocation jumped up after the crisis (indeed, the pattern of the index tracks that of credit reallocation).

1.9 Conclusion

This paper has investigated the effect of a major financial crisis and the associated corporate and financial reforms on the process of inter-firm credit reallocation. We have found that during the credit boom that preceded the 1997 Korean financial crisis, the intensity of credit reallocation was somewhat depressed. By contrast, after the crisis and the reforms enacted in its aftermath, credit reallocation rose significantly, while credit growth slowed down. The increase in the intensity of credit reallocation cannot be explained by episodes of "flight to quality": the share of credit reallocation occurring within groups of firms roughly homogeneous for size, industry or location,

rose substantially relative to the share of reallocation across such groups.

The analysis has further revealed that before the crisis credit growth comoved with the business cycle more than credit reallocation, while after the crisis credit reallocation became more procyclical than credit growth. Finally, we have uncovered preliminary evidence that the increase in the intensity of credit reallocation was associated with enhanced efficiency in the credit reallocation process.

A large body of research has recently investigated the behavior of credit growth before and after financial crises, focusing on the credit boom-and-busts that occur in coincidence with the crises. All in all, our results suggest that financial crises and the associated reforms can play a pivotal role not only in the dynamics of credit growth but also in the dynamism and flexibility of the dynamic process of credit reallocation. A credit boom characterized by a depressed dynamism in the credit reallocation process could be very different from a credit boom characterized by a fluid process of reallocation of liquidity. Similarly, a creditless recovery characterized by increased dynamism in the reallocation of credit could spur growth, despite the lower volume of liquidity flowing to the business sector. Accounting for the behavior of credit reallocation can significantly further our understanding of the causes and consequences of financial crises and of the impact of credit markets on aggregate economic activity.

CHAPTER 2

DRIVING FORCES BEHIND THE EVOLUTION OF CREDIT REALLOCATION

2.1 Introduction

The Great Recession has reignited the debate over the long-run effects of financial crises and of the reforms enacted in their aftermath (Allen et al., 2010; Gourinchas and Obstfeld, 2012; Dell'Ariccia, Igan, Laeven and Tong, 2012). Nonetheless, we know very little about the dynamic process of reallocation of credit before and after financial crises. The allocation of physical and financial inputs plays a role as relevant as their total volume in affecting aggregate economic activity. Numerous studies find that the impact of aggregate shocks and structural reforms on the macroeconomy occurs through the allocation of labor, capital, financial resources (Caballero and Hammour, 2001, 2005; Davis and Haltiwanger, 1999; Eisfeldt and Rampini, 2006; Caballero, Hoshi and Kashyap, 2008; Liu, 2013). In particular, the dynamism with which an economy is able to reallocate financial resources across firms is considered as crucial for efficiency and growth (Beck, Levine, Loayza, 2000; Wurgler, 2000; Galindo, Schiantarelli and Weiss, 2007). To fill the gap, Chapter 1 studied the dynamic process of reallocation of credit across Korean non-financial businesses in the 1981-2012 period. Especially, it investigated whether the credit reallocation process changed after the 1997 financial crisis and the subsequent reforms. However, it did not study either the driving forces behind dynamic process of credit reallocation or the impact of the crisis on the driving forces.

This chapter explores the evolution of credit reallocation across Korean non-financial firms in the 1981-2012 period from the geographical location perspective.[1] We examine the driving forces behind dynamic process of credit reallocation as well as whether the forces changed after the 1997 crisis and the subsequent reforms. To do so, we construct regional credit flows based on each

[1]This chapter is my own work. But, in the text, I use "we", which is accepted as a kind of a customary practice of academic publication.

16 administrative region. Then, we employ a Bayesian dynamic latent factor model to estimate common factor which explains common movement across the 16 regional credit reallocation rates. Furthermore, we decompose credit reallocation fluctuations into three parts (national, regional and idiosyncratic components) in order to examine the driving forces behind regional credit reallocation rates.

The Korean economy and our database constitute an ideal testing ground for our purposes. Credit is a key source of external finance for Korean firms. It accounts for 66.88% of their outstanding external funding in 2002. Our unique data set comprises rich microeconomic data on more than 33,000 non-financial firms and covers a long sample period, of which the 1997 crisis is in the middle. This enables us to examine the long-run effects of the 1997 crisis and the associated reforms on the evolution of credit reallocation and the driving forces behind it.

We uncover evidence that the common factor explaining regional reallocation flows across all the 16 regions increased after the 1997 crisis and is highly correlated with national excess credit reallocation. As Kose, Otrok, and Whiteman (2003) pointed out, because the factor is unobservable and we have merely extracted an estimate of it based on the observable time series variables that are credit flows in our study, it is not easy to define what the common factor is. So we use various combinations of credit flows to explore its properties. We use three types of credit: total credit, loans and bonds. We explore the common factor of regional credit reallocation rates after reconstructing credit flows based on chaebol-affiliated firms and non-affiliated firms, respectively. In all analyses, the common factors have common patterns. First, they increased after the 1997 financial crisis. Next, they comove with national credit flows and are highly correlated with them. In addition, the factors exhibit some cyclicality.

Some interesting patterns emerge when we investigate the roles played by the national, region-specific and idiosyncratic components in driving the fluctuation of regional credit reallocation rates. When it comes to regional excess reallocation rates of total credit and loans, the common factors explain a large fraction of the volatility in the rates. By contrast, idiosyncratic components contribute a large fraction of the volatility of regional bond excess reallocation rates, while the

common factor plays only a minor role in explaining the volatility in the flows.

This paper is organized as follows. Section 2 describes the spatial heterogeneity of the 16 regions which constitute South Korea. Section 3 describes the data source and introduces the dynamic latent factor model. Section 4 examines the common factor affecting credit reallocation across the 16 regions. Section 5 investigates the driving factors behind the credit reallocation from the geographical location. Section 6 concludes.

2.2 Spatial Heterogeneity

South Korea is divided into 16 administrative regions: 9 provinces (Kyunggi, Kangwon, Kyungbuk, Kyungnam, Jeonbuk, Jeonnam, Chungbuk, Chungnam, and Jeju) and 7 metropolitan cities (Seoul, Busan, Incheon, Daegu, Kwangju, Daejeon, and Ulsan). Seoul and the 7 metropolitan cities respectively account for 26.34% and 50.05% of the national GDP in 2000. The 47.74% of the national GDP in 2000 is attributed to Seoul, Incheon, and Kyunggi.[2]

Korea is a small country and the mobility between regions is quite easy. However, each region has its own economic characteristics in terms of industrialization, economic growth, credit market and financial development. For example, Jeonnam, Jeonbuk, Jeju and Kangwon are relatively rural areas, while Kyungnam, and Kyunggi are industrialized areas. Among metropolitan cities, Busan and Incheon are more industrialized and more populated than Kwangju and Daejeon. The development of regional loan markets varies. Regional banks are operating based on its own operation region and Seoul in the 6 regions (Busan, Daegu, Kwangju, Kyungnam, Jeonbuk, and Jeju). Furthermore, regions respond to aggregate shocks differently. For example, the Korean economy underwent a recession due to the adverse external shock in 2008 and 2009. Real GRDP growth rates of Seoul and Ulsan respectively decreased 4.37% and 4.20% in 2007 to 1.50% and -3.21% in 2009 due to decreased exports. On the other hand, those of Chungbuk and Jeju, in which service industries dominates, remained stable at 8.91% and 6.71% in 2009, respectively, compared 7.58% and 6.38% in 2007. Over the 1985-2012 period, the average standard deviation of GRDPs

[2]These three areas are called the capital area.

in the regions is 3.47.[3] Such different responses of regional growth rates to economic shocks are consistent with economic theories which imply that spatial heterogeneous properties lead regions to respond to economics shocks differently (Anas, Arnott, and Small, 1998; Bertola, 1993; Martin and Sunley, 1998).

When it comes to credit reallocation, the regions do not only have common properties but they also have their own properties. Tables 2.1 to 2.3 show that regional credit flows of total credit, loans, and bonds, respectively. Both gross reallocation and excess reallocation increased after the financial crisis in all regions. The averages of credit reallocation (total credit) range from 19% to 28% in the regions over the whole sample period. These uniform pattern of increased reallocation after the crisis and of intense credit reallocation rates indicate that every region underwent structural impact of the crisis on the credit market after the crisis and has substantial heterogeneity in the regional credit reallocation rates. Hence, region is a possible good source of differences in credit reallocation, hence exploring the common factor that explains common movement across regional credit flows would be very useful to get insight into the driving forces behind dynamics of credit reallocation.

2.3 Data and Methodology

2.3.1 Data

We obtained firm-level credit data from KISLINE, the business information source of the leading Korean credit rating agency, Korea Investors Service, which is affiliated with Moody's. Our data set covers all the publicly traded firms as well as all the privately held firms subject to annual external auditing. The data set includes 33,463 firms (2,245 publicly traded firms and 31,218 privately held ones) and 373,685 firm-year observations over the period 1980 to 2012. The firms in the data set account for a large fraction of economic activity in Korea. The bank loans they obtained amounted to 81.6% of the bank loans to all non-financial businesses in 2008. The long

[3]Data on Gross Regional Domestic Production (GRDP) are available since 1985.

sample period and the extensive coverage enable us to analyze the effects of the 1997 crisis on the evolution of credit reallocation. Using the methodology proposed by Davis and Haltiwanger (1992) for measuring job reallocation and employed by Herrera, Kolar, and Minetti (2011), we construct region-level credit flows of total credit, loans, and bonds (see Tables 2.1 to 2.3).

2.3.2 Methodology

This section outlines the Bayesian dynamic latent factor model, proposed by Kose, Otrok, and Whiteman (2003, 2008) and Crucini, Kose, and Otrok (2011) that is employed in this paper. The dynamic latent factor model is written as:

$$y_{ijt} = \beta_{ij}^{n} F_t + \beta_{ij}^{r} f_{it}^{r} + \varepsilon_{ijt} \tag{2.1}$$

$$\varepsilon_{ijt} = \rho_{ij1}\varepsilon_{ijt-1} + \cdots + \rho_{ijp}\varepsilon_{ijt-p} + u_{ijt} \tag{2.2}$$

$$F_t = \rho_1^F F_{t-1} + \cdots + \rho_p^F F_{t-p} + u_t^F \tag{2.3}$$

$$f_{it}^{r} = \rho_{i1}^{f} f_{it-1}^{r} + \cdots + \rho_{ip}^{f} f_{it-p}^{r} + u_{it}^{r} \tag{2.4}$$

where i and t respectively denote region (i = 1, ...,16) and year (t = 1981,...., 2012) and j denotes credit flow (j=1: gross reallocation and j=2: excess reallocation). F_t is a common factor shared by all variables across 16 regions. f_{it}^{r} is a region-specific factor for each region i. β_{ij}^{n} and β_{ij}^{r} are factor loads for the common and region-specific factors, respectively. They measure the degree to which variation in y_{ijt} can be explained by each factor. ε_{ijt} is an idiosyncratic component of each variable. As shown Equations (2) to (4), the two factors and idiosyncratic components follow an AR(p) process. We follow the Bayesian procedures proposed by Kose, Otrok, and Whiteman (2003, 2008) and Crucini, Kose, and Otrok (2011) to estimate factors and idiosyncratic components. Posterior distribution properties for the model parameters and factors are based on 50,000 Markov Chain Monte Carlo (MCMC) replications after 5,000 burn-in replications. To save space here, refer to Kose, Otrok, and Whiteman (2003, 2008) and Crucini, Kose, and Otrok (2011) for more technical details on the estimation procedure.

Region	Period	POS	NEG	SUM	NET	EXC
Seoul	1981-2012	13.521	7.036	20.557	6.484	12.842
	1981-1996	13.230	4.202	17.432	9.028	8.404
	1999-2012	13.014	10.190	23.204	2.825	17.690
Kyunggi	1981-2012	14.350	6.627	20.977	7.724	11.319
	1981-1996	14.171	3.677	17.848	10.494	7.175
	1999-2012	13.979	9.764	23.742	4.215	16.410
Incheon	1981-2012	14.927	8.102	23.029	6.825	11.844
	1981-1996	13.426	3.599	17.024	9.827	7.197
	1999-2012	15.466	13.780	29.246	1.686	17.595
Busan	1981-2012	16.658	9.180	25.838	7.478	16.074
	1981-1996	16.216	5.967	22.184	10.249	11.934
	1999-2012	17.187	12.857	30.044	4.331	20.488
Daegu	1981-2012	15.859	8.254	24.113	7.605	13.334
	1981-1996	18.278	3.870	22.148	14.407	7.741
	1999-2012	12.994	13.616	26.610	-0.622	19.975
Kyungbuk	1981-2012	13.431	6.225	19.656	7.206	9.347
	1981-1996	11.925	3.817	15.742	8.108	6.632
	1999-2012	15.201	8.640	23.840	6.561	12.887
Jeonbuk	1981-2012	17.082	8.412	25.495	8.670	15.376
	1981-1996	17.749	4.832	22.581	12.918	9.663
	1999-2012	15.656	12.313	27.968	3.343	21.314
Kyungnam	1981-2012	13.771	7.412	21.183	6.358	13.122
	1981-1996	11.144	4.325	15.468	6.819	8.649
	1999-2012	16.929	10.835	27.765	6.094	17.995
Kwangju	1981-2012	17.942	10.108	28.049	7.834	15.109
	1981-1996	16.833	3.582	20.415	13.251	6.001
	1999-2012	20.032	17.468	37.500	2.563	26.653
Ulsan	1981-2012	13.940	7.001	20.941	6.938	9.034
	1981-1996	14.385	5.830	20.214	8.555	8.101
	1999-2012	12.802	8.858	21.660	3.944	10.424
Kwangwon	1981-2012	16.394	7.489	23.883	8.905	12.541
	1981-1996	17.912	4.645	22.558	13.267	8.380
	1999-2012	14.603	10.074	24.678	4.529	17.027
Jeonnam	1981-2012	18.505	8.297	26.803	10.208	12.221
	1981-1996	20.339	3.262	23.602	17.077	5.567
	1999-2012	16.291	13.876	30.166	2.415	19.715
Daejeon	1981-2012	14.769	7.433	22.202	7.336	11.710
	1981-1996	13.700	3.820	17.521	9.880	7.193
	1999-2012	16.803	11.309	28.112	5.494	17.135
Chungbuk	1981-2012	15.860	9.655	25.515	6.205	12.766
	1981-1996	15.594	3.952	19.546	11.643	6.241
	1999-2012	15.286	15.547	30.833	-0.261	19.823
Chungnam	1981-2012	16.105	8.209	24.313	7.896	13.922
	1981-1996	16.450	4.328	20.778	12.121	8.415
	1999-2012	15.530	12.802	28.331	2.728	21.365
Jeju	1981-2012	16.424	7.006	23.430	9.419	12.228
	1981-1996	14.613	6.210	20.823	8.403	10.301
	1999-2012	18.683	7.754	26.437	10.929	13.829

Notes: This table reports the average flows of total credit of the 16 regions. The period 1981 to 1996 and the period 1999 to 2012 reflect the pre-crisis period and the post-crisis one, respectively.

Table 2.1: Magnitude of Gross Flows (Total Credit)

Region	Period	POS	NEG	SUM	NET	EXC
Seoul	1981-2012	18.212	12.941	31.152	5.271	20.949
	1981-1996	15.493	7.972	23.465	7.521	13.722
	1999-2012	20.669	18.551	39.220	2.117	29.889
Kyunggi	1981-2012	20.364	12.223	32.587	8.141	21.127
	1981-1996	19.091	8.099	27.191	10.992	16.199
	1999-2012	21.179	16.796	37.975	4.382	27.849
Incheon	1981-2012	18.663	12.159	30.822	6.505	18.966
	1981-1996	15.694	7.418	23.111	8.276	12.643
	1999-2012	21.015	18.164	39.179	2.852	26.602
Busan	1981-2012	20.979	13.454	34.432	7.525	22.736
	1981-1996	19.379	11.154	30.533	8.225	18.505
	1999-2012	23.269	16.075	39.344	7.194	28.612
Daegu	1981-2012	20.518	12.514	33.032	8.004	19.506
	1981-1996	21.622	7.848	29.470	13.774	12.142
	1999-2012	19.119	18.415	37.534	0.704	28.423
Kyungbuk	1981-2012	17.569	12.715	30.284	4.854	17.366
	1981-1996	13.423	7.802	21.224	5.621	9.494
	1999-2012	22.315	17.608	39.924	4.707	27.167
Jeonbuk	1981-2012	22.736	11.854	34.590	10.882	20.566
	1981-1996	23.167	8.250	31.417	14.918	13.451
	1999-2012	22.333	16.214	38.547	6.119	28.730
Kyungnam	1981-2012	17.784	11.356	29.141	6.428	19.644
	1981-1996	13.168	8.085	21.253	5.082	13.960
	1999-2012	22.773	14.609	37.383	8.164	26.217
Kwangju	1981-2012	22.037	14.185	36.222	7.852	19.910
	1981-1996	18.187	8.133	26.320	10.054	12.712
	1999-2012	25.970	22.439	48.409	3.530	29.603
Ulsan	1981-2012	20.701	15.238	35.939	5.463	16.305
	1981-1996	19.653	14.163	33.816	5.490	13.124
	1999-2012	22.243	17.719	39.963	4.524	20.711
Kwangwon	1981-2012	23.723	14.095	37.818	9.627	22.398
	1981-1996	21.789	9.866	31.655	11.923	12.193
	1999-2012	25.954	18.214	44.169	7.740	32.990
Jeonnam	1981-2012	23.410	13.399	36.808	10.011	20.604
	1981-1996	25.461	9.686	35.147	15.774	12.573
	1999-2012	21.142	17.519	38.661	3.623	29.203
Daejeon	1981-2012	20.450	13.248	33.698	7.201	20.479
	1981-1996	17.276	10.145	27.421	7.132	14.545
	1999-2012	24.802	16.821	41.623	7.981	28.286
Chungbuk	1981-2012	20.016	13.133	33.149	6.882	18.457
	1981-1996	17.897	5.758	23.655	12.139	9.581
	1999-2012	21.504	19.815	41.320	1.689	27.766
Chungnam	1981-2012	20.374	11.823	32.197	8.551	20.089
	1981-1996	19.932	6.675	26.607	13.257	13.036
	1999-2012	20.598	17.992	38.590	2.606	29.964
Jeju	1981-2012	23.038	11.984	35.022	11.054	16.933
	1981-1996	22.109	10.411	32.519	11.698	9.624
	1999-2012	23.435	14.351	37.785	9.084	25.420

Notes: This table reports the average loan flows of the 16 regions. The period 1981 to 1996 and the period 1999 to 2012 reflect the pre-crisis period and the post-crisis one, respectively.

Table 2.2: Magnitude of Gross Flows (Loans)

Region	Period	POS	NEG	SUM	NET	EXC
Seoul	1981-2012	20.994	10.604	12.779	10.391	18.819
	1981-1996	23.916	8.843	15.581	15.072	17.178
	1999-2012	15.709	13.411	7.176	2.297	21.944
Kyunggi	1981-2012	21.954	12.802	20.295	9.152	20.295
	1981-1996	24.377	11.900	18.757	12.477	18.757
	1999-2012	17.499	14.422	22.473	3.077	22.473
Incheon	1981-2012	21.698	11.926	18.693	9.771	18.693
	1981-1996	25.297	9.528	17.463	15.769	17.463
	1999-2012	14.761	15.652	21.332	-0.892	21.332
Busan	1981-2012	27.592	18.401	24.800	9.191	24.800
	1981-1996	29.848	14.184	23.592	15.663	23.592
	1999-2012	23.650	24.734	27.493	-1.084	27.493
Daegu	1981-2012	26.423	19.823	23.413	6.599	23.413
	1981-1996	30.678	11.032	13.979	19.646	13.979
	1999-2012	22.748	29.523	34.629	-6.775	34.629
Kyungbuk	1981-2012	26.810	11.850	12.296	14.960	12.296
	1981-1996	32.109	8.572	11.105	23.537	11.105
	1999-2012	21.581	16.223	13.483	5.358	13.483
Jeonbuk	1981-2012	24.878	18.345	22.064	6.533	22.064
	1981-1996	26.090	7.990	13.569	18.100	13.569
	1999-2012	25.587	28.837	32.003	-3.250	32.003
Kyungnam	1981-2012	24.287	15.765	24.650	8.522	24.650
	1981-1996	23.156	10.823	19.553	12.333	19.553
	1999-2012	26.362	20.324	28.624	6.038	28.624
Kwangju	1981-2012	26.270	18.105	11.719	8.165	11.719
	1981-1996	33.277	6.318	7.113	26.959	7.113
	1999-2012	21.620	27.491	17.867	-5.871	17.867
Ulsan	1981-2012	35.584	16.024	13.512	19.560	13.512
	1981-1996	54.224	13.394	13.285	40.830	13.285
	1999-2012	15.230	20.572	14.206	-5.342	14.206
Kwangwon	1981-2012	38.583	19.807	26.476	18.777	26.476
	1981-1996	46.855	8.444	14.157	38.411	14.157
	1999-2012	32.678	31.188	41.586	1.490	41.586
Jeonnam	1981-2012	26.346	18.465	15.682	7.881	15.682
	1981-1996	32.825	11.959	13.555	20.866	13.555
	1999-2012	20.504	26.950	18.322	-6.447	18.322
Daejeon	1981-2012	31.368	22.922	22.125	8.446	22.125
	1981-1996	23.358	12.279	16.884	11.078	16.884
	1999-2012	42.613	35.291	27.687	7.322	27.687
Chungbuk	1981-2012	37.244	25.672	33.071	11.572	33.071
	1981-1996	38.195	12.164	21.476	26.031	21.476
	1999-2012	33.080	41.667	44.826	-8.587	44.826
Chungnam	1981-2012	25.014	13.462	20.800	11.553	20.800
	1981-1996	28.481	7.692	13.556	20.788	13.556
	1999-2012	21.394	20.725	29.544	0.669	29.544
Jeju	1981-2012	43.638	28.931	18.725	14.707	18.725
	1981-1996	43.261	22.755	6.727	20.506	6.727
	1999-2012	48.790	34.469	32.088	14.321	32.088

Notes: This table reports the average bond flows of the 16 regions. The period 1981 to 1996 and the period 1999 to 2012 reflect the pre-crisis period and the post-crisis one, respectively.

Table 2.3: Magnitude of Gross Flows (Bonds)

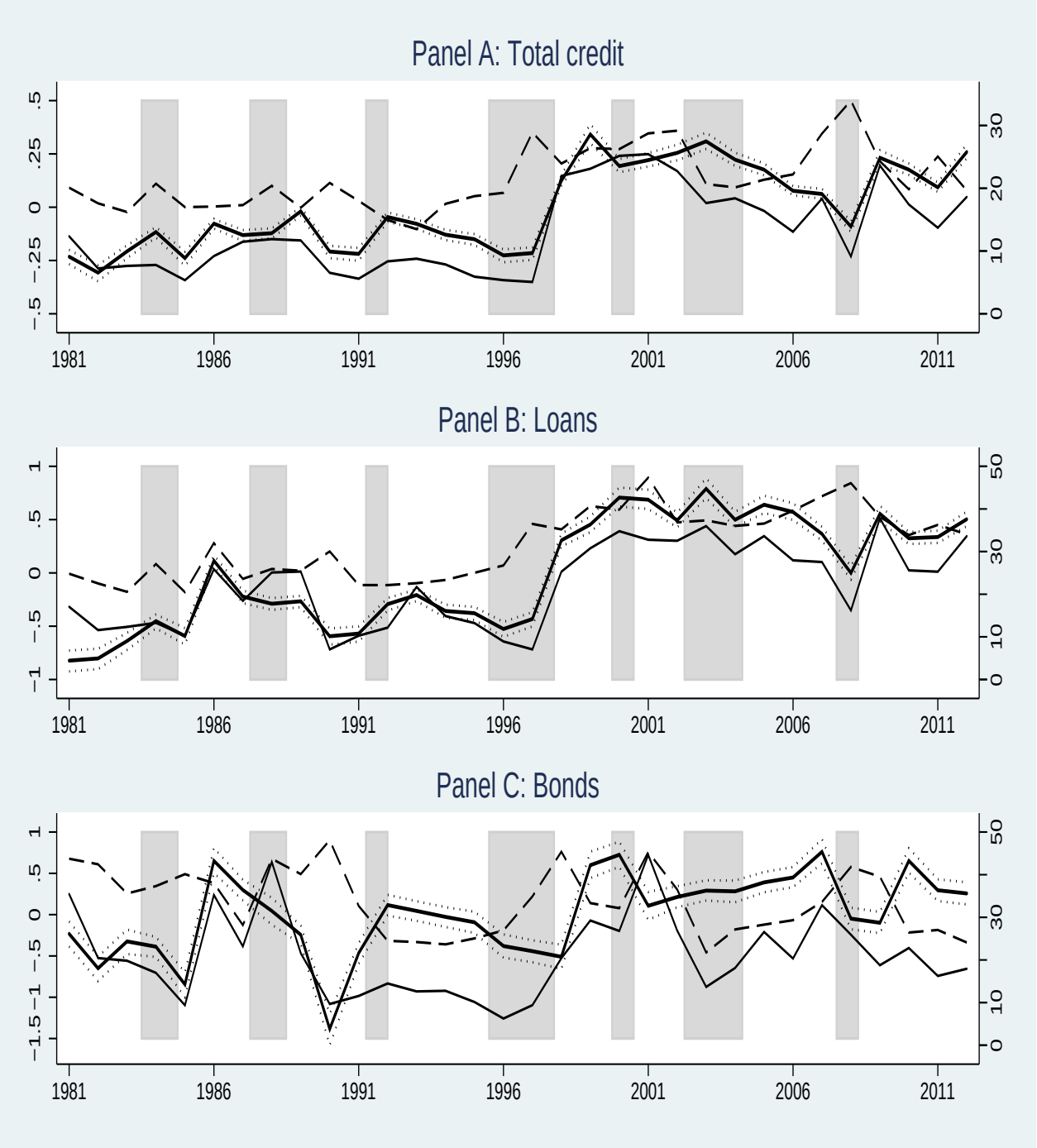

Figure 2.1: Evolution of Common Factor (1) This figure shows movements of common factors of regional credit flows for total credit (Panel A), loans (Panel B), and bonds (Panel C). The thick bold line surrounded by dotted lines in each panel indicates the median of the posterior distribution of the common factor. The two dotted lines in each panel indicate 33- and 66-percent quantile bands. The thin bold line and dashed line are respectively national excess credit reallocation and gross credit reallocation (scale on the right Y-axis)

2.4 What is the Common Factor?

2.4.1 Common factor: Total Credit, Loans, and Bonds

Figure 2.1 represents the median of the posterior distribution of the common factors explaining credit reallocation across 16 regions, along with 33- and 66-percent quantile bands. Panels A, B, and C respectively show the common factors of reallocation of total credit, loans and bonds. The narrowness of the bands indicates the factors are estimated quite precisely. In turn, we examine the features of common factors explaining the all regional reallocation of total credit, loans and bonds.

Panel A, Figure 2.1, exhibits two interesting patterns of the common factor. First, it increased after the crisis and picked up again in 2008. It tends to decrease during credit booms (1993-1996 and 2005-2007). Panel B shows that the common factor explaining regional loan reallocation rates follows the two patterns. Panel C depicts the common factor of regional bond reallocation rates. This factor does not follow the patterns.

2.4.2 Common factor: Chaebol Affiliation

We construct regional credit flows based on *chaebol*-affiliated firms and non-affiliated firms, respectively. Panel A of Figure 2.2 shows the common factor when we use regional excess reallocation rates of *chaebol*-affiliated firms and non-affiliated firms. The factor accounts for common movement across the 16 regions as well as across *chaebol*-affiliated firms and non-affiliated firms. It shows a sharp increase in the common factor in 1997. Since financial and corporate reforms completed in 2001, the common factor has reduced until 2008. Panel B plots the common factor that accounts for regional gross reallocation rates of *chaebol*-affiliated firms and non-affiliated firms. It tends to increase during the whole period. Panel C shows the common factor when we use regional excess reallocation rates and gross reallocation rates of *chaebol*-affiliated firms only. Interestingly, it dropped, then increased sharply in the 1997 financial crisis and in the 2008 recession. The common factor explaining regional excess reallocation rates and gross reallocation rates of non-affiliated firms exhibits different pattern which is similar to Panel A of Figure 2.1.

Credit	Period	POS	NEG	SUM	NET	EXC	GDP
Total credit	1981-2012	-0.780*	0.757*	-0.496*	-0.838*	0.771*	-0.090
	1981-1996	-0.702*	0.861*	-0.413	-0.794*	0.866*	-0.269
	1999-2012	-0.839*	0.680*	-0.566*	-0.875*	0.686*	0.229
Loans	1981-2012	-0.615*	0.732*	0.056	-0.715*	0.869*	-0.144
	1981-1996	-0.647*	0.919*	0.254	-0.827*	0.852*	-0.032
	1999-2012	-0.510	0.417	-0.193	-0.505	0.892*	0.005
Bonds	1981-2012	-0.896*	0.605*	-0.628*	-0.907*	0.521*	0.495*
	1981-1996	-0.937*	0.711*	-0.620*	-0.938*	0.724*	0.233
	1999-2012	-0.803*	0.305	-0.596*	-0.803*	0.168	0.843*
Total credit	1981-2012	-0.844*	0.693*	-0.676*	-0.855*	0.792*	-0.284
(Chaebols)	1981-1996	-0.910*	0.628*	-0.696*	-0.939*	0.649*	-0.134
	1999-2012	-0.833*	0.561*	-0.735*	-0.805*	0.725*	0.089
Total credit	1981-2012	-0.758*	0.625*	-0.401*	-0.793*	0.757*	-0.264
(Others)	1981-1996	-0.567*	0.801*	0.056	-0.809*	0.786*	-0.392
	1999-2012	-0.834*	0.503	-0.505	-0.809*	0.708*	-0.107

Notes: All variables are HP-filtered. The period 1981 to 1996 and the period 1999 to 2012 correspond to the pre-crisis period and the post-crisis one, respectively. * denotes statistical significance at the 5% level.

Table 2.4: Cyclicality of the Common Factor

2.4.3 Comovement with National Credit Flows and GDP

As Kose, Otrok, and Whiteman (2003) pointed out, because the factor is unobservable and we have merely extracted an estimate of it based on the observable time series variables that are credit flows in our study, we investigate the comovement of the factor with GDP growth and national credit flows in order to know about what the common factor is. Notably, the factor comoves with the national excess reallocation. The correlation coefficients range from 0.52 to 0.89. The correlation is the most stronger for loan reallocation. The only exception is bond reallocation in the post-crisis period. The corresponding correlation coefficient is 0.17 and is not statistically significant.

Table 2.4 reports another interesting tendency; common factors are negatively correlated with national net credit growths. The negative correlations are very strong and statistically significant, ranging from -0.71 to - 0.94, except for bond reallocation in the post-crisis period (-0.51). In addition, the common factors tend to be negatively correlated with national credit creation, while they are positively correlated with national credit destruction. However, the factors do not seem to have cyclicality. Except for bond reallocation, they are mildly counter-cyclical, but statistically insignificant.

Based on the findings, we can interpret the pattern of the common factor as follows. Despite

spatial heterogeneity and different regional responses of credit flows to aggregate shocks, the pattern of national credit flows well explains the common factor accounting for regional credit reallocation rates. As the credit reallocation, whether gross or excess, increased after the 1997 financial crisis, the common factor also increased after the crisis. In particular, the increase in the common factor is largely attributable to the policy reforms on the financial sector during the financial crisis. Lenders started extending and renewing bank loans based on a profit and risk basis after the crisis. The uniform financial regulation, which applied to all the banks, could raise the magnitude of the common factor that influences the regional loan reallocation rates in all the regions. In addition, the reduced influence of regional banks and continued mergers between banks made the factor increasing after the crisis. [4]

2.5 Variance Decomposition

As noted in chapter 1, the volatility of regional credit reallocation rates are high and the reshuffling of credit within a region is relatively more active than the reallocation of credit between regions. A related question is to what extent the fluctuation of credit reallocation is driven by national, region-specific and idiosyncratic components. In order to measure the relative contributions of the common and region-specific factors to variations in credit flows, we estimate the share of the variance of credit flows due to each factor. We decompose the variance of each credit flow into the fraction that is due to each of the two factors and idiosyncratic component. The variance of credit flows for orthogonal factors can be written as Equation (5). θ_{ij}^{n} is the proportion of the total variability in credit reallocation of the region i attributable to the common factor, as shown in Equation (6). Similarly, θ_{ij}^{r} and θ_{ij}^{c} are defined as the proportion due to the region-specific factor and the idiosyncratic component.

[4]The common factor of regional bond reallocation rates reflects two bond market reforms. The factor increased sharply in 1986 when credit rating system was introduced and in 2000 to 2001 when the financial authority brought out several incentives to issue bonds in order to develop bond markets (e.g., reduction in bond issuance fees).

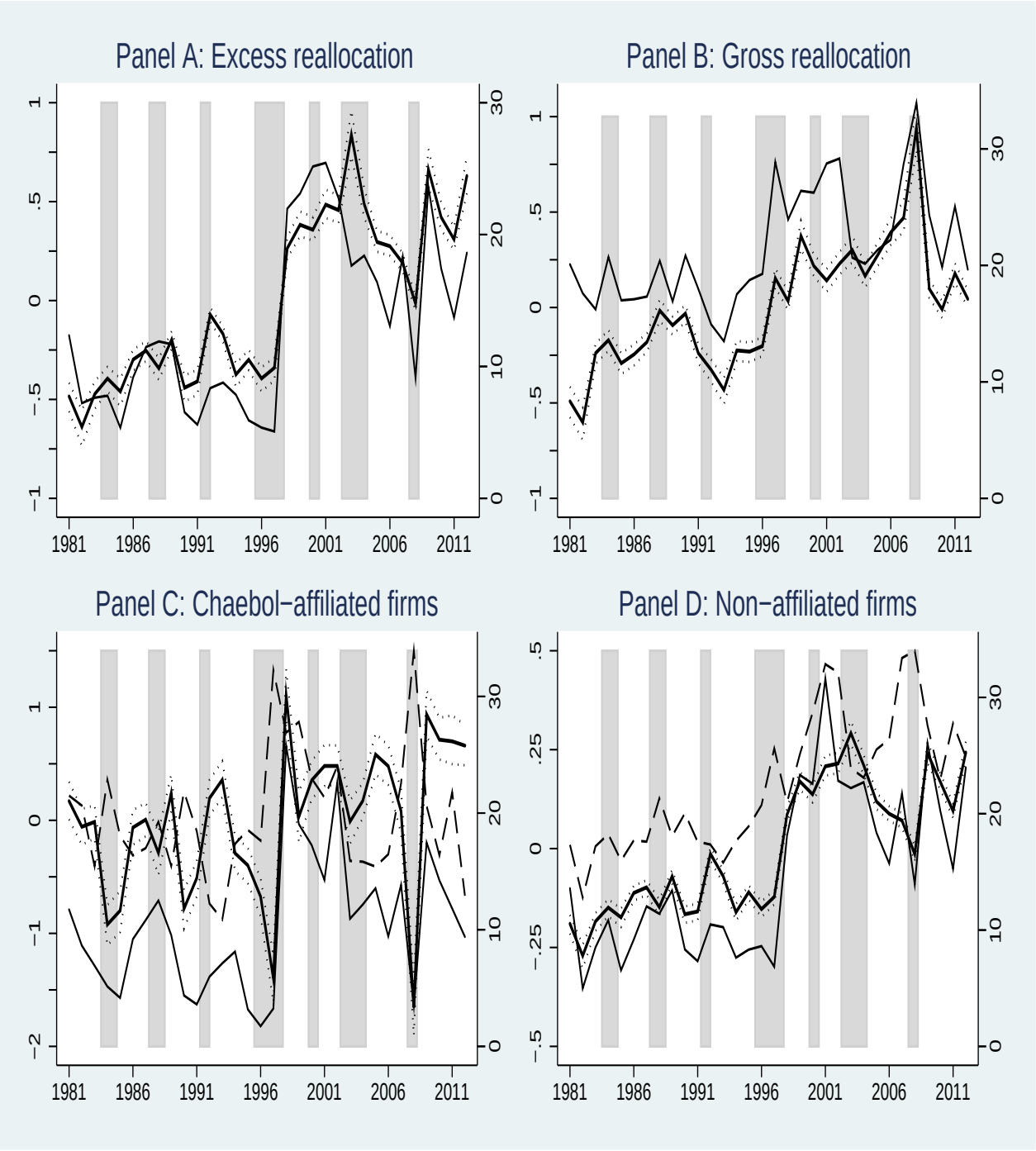

Figure 2.2: Evolution of Common Factor (2) This figure shows the movements of common factors of credit flows for the 16 regional credit reallocation rates (Panel A: excess reallocation for chaebol-affiliated firms and non-affiliated firms, Panel B: gross reallocation for chaebol-affiliated firms and non-affiliated firms, Panel C: gross and excess reallocation for chaebol-affiliated firms, and Panel D: gross and excess realloca-tion for non-affiliated firms). The thick bold line surrounded by dotted lines in each panel indicates the median of the posterior distribution of the common factor. The two dotted lines in each panel indicate 33- and 66-percent quantile bands. The thin bold line and dashed line are respectively national excess credit reallocation and national gross credit reallocation (scale on the right Y-axis)

		1981-2012			1981-1996			1999-2012		
		33%	50%	66%	33%	50%	66%	33%	50%	66%
Seoul	National	0.563	0.585	0.607	0.006	0.016	0.065	0.180	0.211	0.241
	Region-specific	0.130	0.184	0.240	0.117	0.270	0.453	0.509	0.581	0.650
	Idiosyncratic	0.173	0.226	0.278	0.382	0.582	0.799	0.128	0.194	0.268
Kyunggi	National	0.612	0.633	0.655	0.167	0.229	0.365	0.344	0.382	0.420
	Region-specific	0.011	0.032	0.078	0.088	0.160	0.251	0.233	0.297	0.369
	Idiosyncratic	0.274	0.315	0.346	0.267	0.471	0.650	0.223	0.300	0.377
Incheon	National	0.512	0.533	0.554	0.006	0.013	0.025	0.055	0.070	0.087
	Region-specific	0.028	0.072	0.154	0.084	0.259	0.494	0.058	0.182	0.392
	Idiosyncratic	0.308	0.384	0.428	0.478	0.713	0.882	0.533	0.738	0.855
Busan	National	0.387	0.406	0.424	0.154	0.253	0.341	0.057	0.077	0.098
	Region-specific	0.260	0.314	0.375	0.245	0.357	0.468	0.687	0.757	0.817
	Idiosyncratic	0.218	0.279	0.333	0.212	0.337	0.482	0.098	0.156	0.226
Kyungnam	National	0.733	0.752	0.771	0.289	0.349	0.399	0.426	0.472	0.518
	Region-specific	0.005	0.013	0.030	0.015	0.038	0.092	0.097	0.170	0.260
	Idiosyncratic	0.195	0.219	0.242	0.496	0.569	0.633	0.227	0.326	0.420
Ulsan	National	0.216	0.232	0.250	0.101	0.171	0.213	0.249	0.277	0.305
	Region-specific	0.072	0.171	0.312	0.214	0.359	0.517	0.040	0.106	0.272
	Idiosyncratic	0.451	0.593	0.688	0.330	0.483	0.615	0.433	0.593	0.669
Daegu	National	0.474	0.498	0.523	0.015	0.037	0.123	0.019	0.029	0.042
	Region-specific	0.104	0.147	0.204	0.036	0.102	0.214	0.272	0.406	0.591
	Idiosyncratic	0.290	0.345	0.390	0.496	0.775	0.913	0.373	0.556	0.687
Kyungbuk	National	0.368	0.388	0.409	0.012	0.028	0.049	0.280	0.308	0.340
	Region-specific	0.145	0.237	0.326	0.145	0.292	0.477	0.197	0.309	0.428
	Idiosyncratic	0.284	0.373	0.461	0.483	0.669	0.813	0.253	0.370	0.480
Jeonbuk	National	0.525	0.546	0.567	0.004	0.011	0.028	0.181	0.214	0.251
	Region-specific	0.079	0.132	0.193	0.062	0.164	0.352	0.398	0.470	0.547
	Idiosyncratic	0.255	0.316	0.370	0.609	0.794	0.893	0.209	0.292	0.377
Kwangju	National	0.495	0.515	0.534	0.035	0.062	0.104	0.068	0.090	0.116
	Region-specific	0.344	0.372	0.402	0.459	0.560	0.671	0.752	0.794	0.832
	Idiosyncratic	0.086	0.112	0.138	0.245	0.352	0.447	0.071	0.106	0.145
Jeonnam	National	0.589	0.607	0.625	0.007	0.019	0.047	0.266	0.298	0.331
	Region-specific	0.055	0.093	0.139	0.161	0.343	0.565	0.483	0.533	0.584
	Idiosyncratic	0.250	0.296	0.334	0.391	0.608	0.779	0.121	0.165	0.209
Daejeon	National	0.733	0.753	0.772	0.350	0.562	0.685	0.420	0.454	0.488
	Region-specific	0.014	0.029	0.059	0.056	0.109	0.183	0.091	0.156	0.252
	Idiosyncratic	0.177	0.206	0.231	0.158	0.246	0.390	0.277	0.366	0.437
Chungbuk	National	0.713	0.734	0.753	0.319	0.420	0.488	0.243	0.279	0.316
	Region-specific	0.021	0.040	0.069	0.038	0.091	0.193	0.128	0.237	0.393
	Idiosyncratic	0.184	0.215	0.244	0.343	0.439	0.533	0.317	0.468	0.574
Chungnam	National	0.756	0.776	0.794	0.532	0.725	0.827	0.198	0.228	0.260
	Region-specific	0.059	0.079	0.102	0.012	0.030	0.068	0.600	0.639	0.681
	Idiosyncratic	0.115	0.140	0.164	0.112	0.189	0.325	0.088	0.123	0.158
Kwangwon	National	0.374	0.392	0.409	0.059	0.091	0.125	0.113	0.134	0.158
	Region-specific	0.176	0.265	0.358	0.152	0.347	0.553	0.688	0.727	0.767
	Idiosyncratic	0.245	0.341	0.431	0.347	0.552	0.740	0.094	0.129	0.164
Jeju	National	0.103	0.115	0.127	0.129	0.162	0.199	0.005	0.010	0.017
	Region-specific	0.104	0.192	0.341	0.161	0.299	0.478	0.100	0.259	0.474
	Idiosyncratic	0.541	0.690	0.778	0.346	0.525	0.659	0.510	0.726	0.884

Notes: This table reports the variance decomposition for excess reallocation of total credit by 16 regions (9 provinces and 7 metropolitan cities).

Table 2.5: Variance Decomposition for Credit Reallocation by 16 Regions

		1981-2012			1981-1996			1999-2012		
		33%	50%	66%	33%	50%	66%	33%	50%	66%
Seoul	National	0.747	0.764	0.780	0.092	0.119	0.151	0.352	0.401	0.453
	Region-specific	0.008	0.019	0.040	0.085	0.216	0.402	0.221	0.313	0.403
	Idiosyncratic	0.182	0.206	0.226	0.464	0.642	0.765	0.148	0.240	0.350
Kyunggi	National	0.541	0.562	0.583	0.525	0.568	0.611	0.347	0.389	0.430
	Region-specific	0.023	0.073	0.159	0.025	0.074	0.156	0.096	0.167	0.281
	Idiosyncratic	0.271	0.351	0.401	0.241	0.320	0.385	0.302	0.413	0.500
Incheon	National	0.597	0.615	0.633	0.390	0.426	0.464	0.036	0.057	0.082
	Region-specific	0.095	0.127	0.165	0.120	0.214	0.320	0.421	0.487	0.563
	Idiosyncratic	0.218	0.256	0.289	0.242	0.346	0.436	0.363	0.441	0.513
Busan	National	0.464	0.481	0.499	0.137	0.170	0.206	0.227	0.273	0.322
	Region-specific	0.133	0.194	0.268	0.222	0.322	0.452	0.384	0.464	0.547
	Idiosyncratic	0.250	0.324	0.385	0.381	0.508	0.599	0.156	0.235	0.318
Kyungnam	National	0.631	0.648	0.665	0.482	0.517	0.553	0.058	0.083	0.110
	Region-specific	0.017	0.040	0.081	0.045	0.082	0.134	0.110	0.210	0.368
	Idiosyncratic	0.265	0.300	0.326	0.336	0.383	0.424	0.525	0.680	0.790
Ulsan	National	0.217	0.232	0.247	0.007	0.013	0.023	0.011	0.021	0.034
	Region-specific	0.187	0.297	0.414	0.042	0.140	0.355	0.397	0.510	0.628
	Idiosyncratic	0.351	0.469	0.579	0.623	0.837	0.932	0.340	0.460	0.571
Daegu	National	0.664	0.683	0.702	0.543	0.589	0.635	0.058	0.085	0.116
	Region-specific	0.106	0.135	0.166	0.131	0.191	0.258	0.267	0.398	0.539
	Idiosyncratic	0.146	0.178	0.209	0.155	0.208	0.258	0.353	0.495	0.630
Kyungbuk	National	0.646	0.663	0.680	0.174	0.205	0.238	0.023	0.038	0.057
	Region-specific	0.092	0.144	0.198	0.156	0.273	0.425	0.079	0.193	0.369
	Idiosyncratic	0.136	0.192	0.244	0.366	0.519	0.629	0.574	0.753	0.869
Jeonbuk	National	0.656	0.673	0.689	0.158	0.193	0.232	0.252	0.288	0.326
	Region-specific	0.045	0.067	0.096	0.028	0.078	0.187	0.468	0.529	0.590
	Idiosyncratic	0.225	0.254	0.279	0.581	0.680	0.749	0.113	0.165	0.223
Kwangju	National	0.392	0.408	0.425	0.008	0.014	0.022	0.112	0.141	0.174
	Region-specific	0.226	0.298	0.375	0.661	0.736	0.803	0.168	0.297	0.435
	Idiosyncratic	0.216	0.293	0.365	0.177	0.243	0.318	0.411	0.545	0.669
Jeonnam	National	0.421	0.440	0.459	0.102	0.125	0.149	0.235	0.278	0.324
	Region-specific	0.157	0.206	0.266	0.177	0.263	0.387	0.299	0.382	0.465
	Idiosyncratic	0.291	0.348	0.400	0.479	0.605	0.692	0.241	0.322	0.403
Daejeon	National	0.495	0.513	0.531	0.352	0.397	0.444	0.187	0.224	0.262
	Region-specific	0.113	0.162	0.229	0.091	0.200	0.322	0.417	0.500	0.587
	Idiosyncratic	0.256	0.324	0.374	0.231	0.365	0.497	0.169	0.257	0.346
Chungbuk	National	0.797	0.814	0.830	0.435	0.484	0.538	0.202	0.244	0.288
	Region-specific	0.006	0.017	0.040	0.021	0.066	0.160	0.021	0.062	0.167
	Idiosyncratic	0.132	0.155	0.177	0.292	0.386	0.467	0.543	0.644	0.714
Chungnam	National	0.654	0.671	0.687	0.203	0.239	0.280	0.088	0.119	0.155
	Region-specific	0.043	0.070	0.110	0.060	0.187	0.385	0.419	0.477	0.541
	Idiosyncratic	0.215	0.253	0.282	0.337	0.531	0.667	0.314	0.382	0.447
Kwangwon	National	0.480	0.498	0.515	0.200	0.231	0.264	0.019	0.032	0.048
	Region-specific	0.296	0.335	0.373	0.368	0.461	0.559	0.805	0.850	0.892
	Idiosyncratic	0.130	0.167	0.204	0.195	0.294	0.391	0.063	0.102	0.149
Jeju	National	0.312	0.330	0.348	0.010	0.020	0.033	0.041	0.062	0.087
	Region-specific	0.053	0.067	0.084	0.413	0.588	0.736	0.379	0.468	0.579
	Idiosyncratic	0.569	0.599	0.623	0.234	0.383	0.556	0.352	0.462	0.549

Notes: This table reports the variance decomposition for excess reallocation of loans by 16 regions (9 provinces and 7 metropolitan cities).

Table 2.6: Variance Decomposition for Loan Reallocation by 16 Regions

		1981-2012			1981-1996			1999-2012		
		33%	50%	66%	33%	50%	66%	33%	50%	66%
Seoul	National	0.122	0.179	0.244	0.042	0.094	0.170	0.010	0.025	0.056
	Region-specific	0.347	0.472	0.587	0.717	0.801	0.862	0.311	0.456	0.609
	Idiosyncratic	0.261	0.341	0.426	0.049	0.077	0.114	0.301	0.460	0.619
Kyunggi	National	0.051	0.083	0.122	0.005	0.014	0.032	0.026	0.058	0.105
	Region-specific	0.179	0.309	0.458	0.082	0.213	0.442	0.641	0.715	0.785
	Idiosyncratic	0.452	0.601	0.716	0.482	0.712	0.862	0.120	0.180	0.252
Incheon	National	0.043	0.068	0.097	0.115	0.186	0.267	0.007	0.017	0.036
	Region-specific	0.258	0.372	0.489	0.319	0.418	0.518	0.288	0.453	0.637
	Idiosyncratic	0.442	0.551	0.653	0.221	0.324	0.441	0.320	0.501	0.662
Busan	National	0.023	0.036	0.051	0.030	0.048	0.070	0.005	0.012	0.025
	Region-specific	0.175	0.270	0.401	0.043	0.114	0.299	0.204	0.319	0.491
	Idiosyncratic	0.554	0.686	0.778	0.635	0.813	0.890	0.480	0.652	0.768
Kyungnam	National	0.058	0.083	0.110	0.007	0.019	0.039	0.027	0.055	0.093
	Region-specific	0.324	0.403	0.494	0.625	0.704	0.775	0.431	0.516	0.618
	Idiosyncratic	0.412	0.502	0.581	0.178	0.248	0.328	0.285	0.387	0.482
Ulsan	National	0.008	0.016	0.026	0.029	0.045	0.066	0.004	0.009	0.019
	Region-specific	0.081	0.168	0.311	0.094	0.203	0.394	0.216	0.365	0.554
	Idiosyncratic	0.666	0.808	0.892	0.544	0.738	0.844	0.425	0.615	0.764
Daegu	National	0.034	0.054	0.077	0.057	0.084	0.115	0.079	0.128	0.185
	Region-specific	0.138	0.247	0.383	0.381	0.483	0.590	0.131	0.341	0.558
	Idiosyncratic	0.551	0.688	0.797	0.307	0.409	0.518	0.259	0.459	0.668
Kyungbuk	National	0.015	0.028	0.045	0.016	0.034	0.063	0.132	0.192	0.260
	Region-specific	0.368	0.499	0.625	0.409	0.567	0.708	0.125	0.214	0.359
	Idiosyncratic	0.334	0.462	0.592	0.216	0.355	0.515	0.399	0.540	0.648
Jeonbuk	National	0.163	0.202	0.244	0.035	0.057	0.082	0.024	0.049	0.082
	Region-specific	0.057	0.140	0.270	0.045	0.091	0.169	0.061	0.228	0.524
	Idiosyncratic	0.501	0.623	0.716	0.757	0.832	0.879	0.400	0.666	0.835
Kwangju	National	0.067	0.089	0.115	0.047	0.081	0.119	0.011	0.025	0.052
	Region-specific	0.088	0.174	0.317	0.520	0.605	0.685	0.101	0.217	0.398
	Idiosyncratic	0.577	0.718	0.804	0.204	0.287	0.382	0.535	0.720	0.849
Jeonnam	National	0.003	0.007	0.014	0.030	0.061	0.100	0.066	0.102	0.146
	Region-specific	0.071	0.147	0.261	0.516	0.611	0.694	0.050	0.116	0.228
	Idiosyncratic	0.724	0.839	0.914	0.205	0.298	0.411	0.620	0.731	0.817
Daejeon	National	0.060	0.084	0.111	0.264	0.320	0.370	0.016	0.035	0.064
	Region-specific	0.129	0.210	0.313	0.215	0.365	0.509	0.289	0.461	0.631
	Idiosyncratic	0.580	0.687	0.773	0.197	0.314	0.436	0.310	0.479	0.646
Chungbuk	National	0.141	0.177	0.215	0.033	0.065	0.114	0.005	0.013	0.027
	Region-specific	0.036	0.108	0.235	0.291	0.448	0.586	0.046	0.119	0.281
	Idiosyncratic	0.575	0.684	0.759	0.330	0.455	0.564	0.683	0.842	0.921
Chungnam	National	0.147	0.189	0.232	0.014	0.030	0.053	0.008	0.018	0.037
	Region-specific	0.169	0.266	0.368	0.126	0.242	0.414	0.283	0.394	0.519
	Idiosyncratic	0.441	0.534	0.619	0.535	0.701	0.815	0.436	0.564	0.679
Kwangwon	National	0.198	0.246	0.299	0.008	0.020	0.045	0.045	0.086	0.146
	Region-specific	0.025	0.046	0.074	0.104	0.260	0.518	0.070	0.162	0.303
	Idiosyncratic	0.622	0.686	0.740	0.413	0.647	0.813	0.515	0.701	0.834
Jeju	National	0.113	0.141	0.173	0.065	0.095	0.127	0.007	0.017	0.036
	Region-specific	0.103	0.203	0.332	0.205	0.418	0.611	0.188	0.372	0.568
	Idiosyncratic	0.506	0.636	0.738	0.279	0.467	0.674	0.390	0.583	0.765

Notes: This table reports the variance decomposition for excess reallocation of bonds by 16 regions (9 provinces and 7 metropolitan cities).

Table 2.7: Variance Decomposition for Bond Reallocation by 16 Regions

		1981-2012			1981-1996			1999-2012		
		33%	50%	66%	33%	50%	66%	33%	50%	66%
Seoul	National	0.308	0.370	0.435	0.034	0.066	0.110	0.453	0.546	0.630
	Region-specific	0.239	0.306	0.379	0.117	0.243	0.401	0.048	0.109	0.200
	Idiosyncratic	0.222	0.289	0.362	0.476	0.642	0.780	0.194	0.280	0.373
Kyunggi	National	0.129	0.166	0.206	0.016	0.036	0.065	0.163	0.215	0.269
	Region-specific	0.039	0.074	0.139	0.019	0.053	0.147	0.195	0.332	0.489
	Idiosyncratic	0.650	0.723	0.781	0.741	0.864	0.925	0.289	0.437	0.560
Incheon	National	0.087	0.112	0.140	0.018	0.045	0.107	0.003	0.009	0.018
	Region-specific	0.062	0.162	0.310	0.047	0.164	0.387	0.074	0.254	0.527
	Idiosyncratic	0.562	0.705	0.803	0.438	0.655	0.825	0.448	0.718	0.899
Busan	National	0.003	0.007	0.014	0.006	0.015	0.033	0.075	0.117	0.164
	Region-specific	0.039	0.109	0.242	0.230	0.399	0.583	0.056	0.153	0.313
	Idiosyncratic	0.740	0.872	0.942	0.370	0.550	0.715	0.517	0.674	0.783
Kyungnam	National	0.003	0.007	0.014	0.021	0.053	0.111	0.288	0.358	0.421
	Region-specific	0.088	0.182	0.325	0.141	0.362	0.524	0.054	0.110	0.208
	Idiosyncratic	0.661	0.803	0.896	0.370	0.514	0.721	0.379	0.481	0.572
Ulsan	National	0.048	0.067	0.090	0.034	0.063	0.103	0.161	0.216	0.279
	Region-specific	0.537	0.602	0.671	0.661	0.723	0.784	0.068	0.150	0.276
	Idiosyncratic	0.249	0.319	0.386	0.127	0.181	0.239	0.423	0.569	0.688
Daegu	National	0.045	0.064	0.087	0.040	0.098	0.192	0.014	0.029	0.049
	Region-specific	0.325	0.438	0.562	0.288	0.400	0.535	0.273	0.442	0.631
	Idiosyncratic	0.355	0.484	0.600	0.229	0.373	0.536	0.322	0.512	0.679
Kyungbuk	National	0.079	0.107	0.139	0.107	0.159	0.231	0.034	0.060	0.094
	Region-specific	0.121	0.235	0.393	0.070	0.209	0.409	0.112	0.283	0.491
	Idiosyncratic	0.484	0.641	0.751	0.333	0.517	0.697	0.424	0.627	0.789
Jeonbuk	National	0.002	0.005	0.011	0.035	0.058	0.086	0.022	0.041	0.064
	Region-specific	0.671	0.730	0.787	0.735	0.788	0.838	0.546	0.628	0.711
	Idiosyncratic	0.201	0.258	0.317	0.094	0.138	0.185	0.233	0.315	0.397
Kwangju	National	0.026	0.041	0.060	0.074	0.143	0.250	0.091	0.139	0.195
	Region-specific	0.085	0.191	0.351	0.119	0.231	0.394	0.049	0.113	0.240
	Idiosyncratic	0.591	0.751	0.861	0.359	0.503	0.646	0.550	0.676	0.771
Jeonnam	National	0.075	0.109	0.149	0.035	0.059	0.097	0.148	0.202	0.257
	Region-specific	0.488	0.554	0.621	0.429	0.533	0.642	0.335	0.435	0.535
	Idiosyncratic	0.248	0.315	0.382	0.261	0.365	0.469	0.237	0.337	0.441
Daejeon	National	0.078	0.110	0.147	0.179	0.334	0.506	0.003	0.008	0.017
	Region-specific	0.342	0.363	0.383	0.257	0.399	0.536	0.092	0.223	0.431
	Idiosyncratic	0.482	0.520	0.555	0.157	0.221	0.287	0.550	0.755	0.885
Chungbuk	National	0.010	0.021	0.036	0.152	0.266	0.412	0.119	0.173	0.227
	Region-specific	0.711	0.748	0.788	0.060	0.136	0.264	0.669	0.730	0.790
	Idiosyncratic	0.181	0.220	0.257	0.238	0.403	0.600	0.069	0.091	0.115
Chungnam	National	0.076	0.100	0.127	0.004	0.011	0.024	0.303	0.378	0.453
	Region-specific	0.014	0.038	0.091	0.041	0.099	0.197	0.046	0.107	0.215
	Idiosyncratic	0.775	0.833	0.875	0.766	0.866	0.929	0.325	0.439	0.542

Notes: This table reports the variance decomposition for excess reallocation of total credit for chaebol-affiliated firms by 14 regions (7 provinces and 7 metropolitan cities).

Table 2.8: Variance Decomposition (Chaebol-affiliated firms)

		1981-2012			1981-1996			1999-2012		
		33%	50%	66%	33%	50%	66%	33%	50%	66%
Seoul	Natoinal	0.586	0.604	0.622	0.008	0.019	0.037	0.324	0.344	0.364
	Region-specific	0.161	0.200	0.241	0.213	0.401	0.597	0.270	0.328	0.390
	Idiosyncratic	0.156	0.196	0.232	0.367	0.564	0.746	0.272	0.333	0.387
Kyunggi	National	0.743	0.759	0.775	0.004	0.010	0.020	0.167	0.184	0.202
	Region-specific	0.007	0.020	0.045	0.034	0.103	0.234	0.058	0.144	0.267
	Idiosyncratic	0.183	0.208	0.229	0.743	0.872	0.941	0.549	0.671	0.749
Incheon	National	0.463	0.480	0.496	0.142	0.188	0.243	0.185	0.199	0.214
	Region-specific	0.031	0.067	0.139	0.330	0.437	0.546	0.100	0.214	0.366
	Idiosyncratic	0.379	0.445	0.481	0.219	0.327	0.447	0.434	0.587	0.699
Busan	National	0.363	0.380	0.398	0.311	0.382	0.445	0.087	0.099	0.111
	Region-specific	0.275	0.325	0.380	0.151	0.256	0.369	0.459	0.538	0.619
	Idiosyncratic	0.238	0.293	0.343	0.221	0.333	0.446	0.284	0.363	0.443
Kyungnam	National	0.563	0.583	0.603	0.006	0.013	0.024	0.055	0.065	0.075
	Region-specific	0.085	0.123	0.173	0.028	0.084	0.218	0.244	0.359	0.498
	Idiosyncratic	0.242	0.290	0.328	0.758	0.888	0.946	0.439	0.577	0.691
Ulsan	National	0.684	0.702	0.719	0.259	0.301	0.344	0.351	0.369	0.387
	Region-specific	0.026	0.071	0.129	0.034	0.108	0.243	0.017	0.048	0.123
	Idiosyncratic	0.167	0.220	0.259	0.434	0.550	0.631	0.504	0.569	0.604
Daegu	National	0.727	0.744	0.761	0.086	0.113	0.144	0.096	0.108	0.119
	Region-specific	0.039	0.067	0.102	0.038	0.105	0.254	0.097	0.179	0.291
	Idiosyncratic	0.148	0.183	0.212	0.600	0.745	0.828	0.604	0.715	0.792
Kyungbuk	National	0.702	0.718	0.734	0.028	0.057	0.094	0.280	0.301	0.323
	Region-specific	0.004	0.009	0.024	0.523	0.609	0.700	0.011	0.058	0.147
	Idiosyncratic	0.239	0.259	0.279	0.231	0.319	0.400	0.548	0.621	0.667
Jeonbuk	National	0.492	0.509	0.525	0.107	0.134	0.164	0.169	0.181	0.193
	Region-specific	0.327	0.357	0.389	0.324	0.437	0.559	0.552	0.601	0.650
	Idiosyncratic	0.101	0.132	0.162	0.294	0.415	0.531	0.171	0.219	0.268
Kwangju	National	0.224	0.239	0.254	0.292	0.338	0.385	0.087	0.097	0.108
	Region-specific	0.505	0.553	0.601	0.098	0.204	0.350	0.570	0.623	0.681
	Idiosyncratic	0.158	0.207	0.254	0.298	0.438	0.536	0.223	0.279	0.332
Jeonnam	National	0.420	0.436	0.452	0.330	0.409	0.476	0.001	0.003	0.005
	Region-specific	0.063	0.111	0.188	0.039	0.105	0.236	0.113	0.207	0.347
	Idiosyncratic	0.374	0.448	0.497	0.317	0.425	0.521	0.650	0.789	0.883
Daejeon	National	0.674	0.691	0.706	0.081	0.103	0.127	0.048	0.055	0.063
	Region-specific	0.047	0.070	0.105	0.024	0.102	0.306	0.246	0.401	0.567
	Idiosyncratic	0.198	0.232	0.260	0.578	0.765	0.847	0.379	0.544	0.699
Chungbuk	National	0.767	0.784	0.800	0.507	0.590	0.659	0.249	0.265	0.281
	Region-specific	0.006	0.020	0.050	0.030	0.076	0.152	0.038	0.112	0.245
	Idiosyncratic	0.153	0.183	0.206	0.203	0.282	0.367	0.488	0.618	0.686
Chungnam	National	0.783	0.797	0.811	0.339	0.396	0.458	0.498	0.520	0.541
	Region-specific	0.041	0.061	0.085	0.058	0.147	0.293	0.107	0.164	0.228
	Idiosyncratic	0.117	0.139	0.159	0.251	0.386	0.500	0.259	0.319	0.366
Kwangwon	National	0.682	0.700	0.717	0.500	0.565	0.623	0.248	0.265	0.282
	Region-specific	0.029	0.058	0.098	0.114	0.172	0.239	0.060	0.129	0.233
	Idiosyncratic	0.195	0.233	0.265	0.163	0.231	0.305	0.504	0.607	0.667
Jeju	National	0.102	0.112	0.123	0.331	0.376	0.421	0.031	0.037	0.044
	Region-specific	0.379	0.486	0.594	0.321	0.410	0.489	0.268	0.328	0.407
	Idiosyncratic	0.293	0.400	0.507	0.132	0.203	0.286	0.554	0.634	0.694

Notes: This table reports the variance decomposition for excess reallocation of total credit for non chaebol-affiliated firms by 16 regions (9 provinces and 7 metropolitan cities).

Table 2.9: Variance Decomposition (Nonl-affiliated firms)

$$Var(y_{ijt}) = (\beta_{ij}^{n})^2 Var(F_t) + (\beta_{ij}^{r})^2 Var(f_{it}^{r}) + Var(\varepsilon_{ijt}) \tag{2.5}$$

$$\theta_{ij}^{n} = \frac{(\beta_{ij}^{n})^2 Var(F_t)}{Var(y_{ijt})} \tag{2.6}$$

Tables 2.5 to 2.7 respectively contain the variance decomposition for excess reallocation of total credit, loans and bonds in the 16 regions.[5] Table 2.5 uncovers evidence that the common factor explains a large fraction of the volatility in regional excess reallocation rates. It accounts for more than 40% of the variation in the flow in the 12 regions (Seoul, Kyunggi, Incheon, Busan, Daegu, Kyungnam, Kwangju, Jeonbuk, Jeonnam, Daejeon, Chungbuk, and Chungnam). In rural or underdeveloped areas (Kangwon and Jeju), the idiosyncratic components account for a large fraction of the variation in the reallocation rates. An interesting finding is that the idiosyncratic component explains a large fraction of the variation in Ulsan. The city is the most industrialized city in which several large companies including Hyundai Auto and Hyundai Shipping are located. In addition, the common factor is the most strong driving force of regional excess loan reallocation rates (see Table 2.6). By contrast, Table 2.7 shows that idiosyncratic components capture the greatest share of excess bond reallocation fluctuations.

Tables 2.8 and 2.9 respectively report the variance decomposition for excess reallocation based on *chaebol*-affiliated firms and non-affiliated firms. It is noteworthy that the idiosyncratic components are the main driving force for credit reallocation of chaebol-affiliated firms, while the common factor plays a dominant role in driving credit reallocation of non-affiliated firms.

The variance decomposition results for the pre-crisis period (1981-1996) and the post-crisis period (1999-2012) are also reported in Tables 2.5 to 2.9. Note that the results for the sub-sample periods and the whole sample period are somewhat different, because factors and factor loads are separately estimated for the two periods and the volatility of the observable variables are different in the two periods. When we look at excess reallocation and gross reallocation in the two periods separately, the fluctuation in the two variables are not huge, hence different results came out.

[5]The results for gross reallocation are available on request.

2.6 Conclusion

We explored the evolution of credit reallocation from the geographical location perspective over the 1981–2012 period. The hypothesis that has motivated this chapter is that the 1997 financial crisis and the subsequent corporate and financial reforms can change the driving forces behind evolution of credit reallocation across non-financial firms in Korea. We employed a Bayesian dynamic latent factor model to decompose credit reallocation fluctuations into national, regional-specific and idiosyncratic allocation components.

We uncovered evidence that the common factor explaining regional reallocation flows of total credit across all the regions increased after the crisis. It was highly positively correlated with national excess credit reallocation, while it was negatively correlated with national gross reallocation. The factor turned out to be correlated with other credit flows. It was positively correlated with national credit destruction, while it was negatively correlated with national credit creation and net credit growth. However, it did not exhibit clear cyclicality; it was mildly counter-cyclical. This pattern also applied to loan reallocation.

Some interesting patterns emerged when we investigated the roles played by the national, region-specific and idiosyncratic components in driving the fluctuation of regional credit reallocation rates. When it comes to regional excess reallocation rates of total credit and loans, the common factors explained a large fraction of the volatility in the rates. By contrast, idiosyncratic components contributed a large fraction of the volatility of regional bond excess reallocation rates, while the common factor played only a minor role in explaining the volatility in the flows. When we examined the variance decomposition for excess reallocation based on chaebol-affiliated firms and non-affiliated firms. It was noteworthy that the idiosyncratic components were the main driving force for credit reallocation of *chaebol*-affiliated firms, while the common factor played a dominant role in driving credit reallocation of non-affiliated firms.

The analysis raises interesting topics for future research. Using other categories rather than geographical location would be useful to shed lights on what the driving forces behind credit reallocation are. For example, using the 2-digit industry category is very interesting to explore the

evolution of credit reallocation, because industry sectors in the Korean economy exhibit asymmetric and heterogeous responses to aggregate shocks.

CHAPTER 3
RELIGION AND BANK PERFORMANCE: EVIDENCE FROM CREDIT UNIONS IN KOREA

3.1 Introduction

Religion is an important institution and culture that affects economic performance (Weber 1930). The economics of religion literature shows that religion has influences on economic growth, a countrys legal system and economic attitudes (Iannaccone, 1998; Barro and McCleary, 2003, 2006; Guiso et al., 2003; Stulz and Williamson, 2003). In the economics of education, a lot of attention has been paid to the effect of Catholic high school attendance on students academic achievement (Bryk et al., 1993, Altonji et al, 2005; Cohen-Zada and Elder, 2009). Likewise, religion may influence bank performance. To my knowledge, the empirical banking literature has not explored the relationship between religion and bank performance. To fill the gap in this literature, this article uses data on credit unions in Korea for the period 2000 to 2007 to investigate the effects of religion on bank performance. A credit union, based on a region, is a member owned depository institution controlled by its members. Some credit unions are owned by religious institutions such as the Catholic Church, protestant churches and Buddhist temples. Unique characteristics of religion may affect the performance of the Religious Credit Unions (hereafter RCUs), such as loan default rate and profit. This article is organized as follows: Section 1 provides the research motivation; Section 2 explores the specific mechanisms by which RCUs may achieve better performance; Section 3 introduces data and methodologies; Section 4 shows empirical results and Section 5 concludes.

3.2 Sources of Better Performance of RCUs

The RCUs have unique features, which create specific mechanisms by which they can achieve better performance. Above all, potential clienteles of the RCUs are not random because their potential customers are members of their religious institution who have not joined credit unions yet. In fact, a religious institution is a strong common bond, which is so advantageous that it can reduce the cost of assessing the creditworthiness of potential borrowers as well as the marketing costs. Rather than attracting customers through standard marketing channels, they can achieve this through private channels, which contribute to a reduction in costs. However, non RCU should put efforts to gather customers living within an operation area. In addition, RCUs can screen and monitor closer than other credit unions because they have several channels to acquire information about their customers. For instance, the employees and customers of a RCU regularly attend the same religious institution and some participate in religious activities such as volunteering groups and prayer meetings. Through these channels, they can acquire extensive information, such as economic attitudes, sincerity and family history. Hence, RCUs are able to utilize richer information in making decisions on loan approval, withdrawal and renewal. But ordinary credit unions can hardly get this type of information. On the borrower side, borrowers may have strong incentives to repay their RCU loans. Borrowers who are in default on the RCU loans face the more severe damage than those of ordinary credit unions because their reputation in a religious society would be marred and their religious activity can be affected by loan default. In other words, borrowers have a reputational incentive to pay back their loans to RCUs. Thus, it is possible that disutility of RCU loan default is big enough to make an expected net utility of loan default less than that of repayment. These features that facilitate RCUs to make more profits and suffer less from loan default are not only reflected in RCUs in itself but also work through specific channels. First, the number of members per employee accounts for the advantage of rich soft information, closer screening and monitoring because the more employees are the more private information they get. As this variable increases, the advantage that results in lower loan default rate weakens. Next, sales and advertising costs have a different meaning for RCUs and non RCUs. RCUs, thanks to

	Total Sample (n=5,063)	RCUs (n=4,603)	Non RCUs (n=460)	t-test
Default rate	5.592	4.008	6.146	-9.237
ROE	0.064	0.06	0.065	-0.737
ROA	0.004	0.006	0.004	6.047
Size	9.806	8.952	9.891	-23.432
Capital	0.076	0.112	0.073	16.429
S1	262.045	148.342	273.408	-19.577
S2	31.210	30.787	31.252	-1.057

Table 3.1: Summary Statistics

non random clienteles, do not need to spend marketing costs as much as non RCUs do. Saving the costs is an important source of profits. The lower this ratio is, the more profits RCUs make. However, the opposite is true for ordinary credit unions because they should spend marketing costs to gain customers and to make profits.

3.3 Data and Model Specification

The data on credit unions come from the Financial Supervisory Service which gathers annual reports from credit unions. Data about regional economies are obtained from the Bank of Korea. There are three types of credit unions: regional, occupation and work place. I exclude credit unions based on jobs and work places because the performance of these types is correlated with which occupation or work place they are based on. The sample includes regional credit unions which include RCUs. The RCUs are also based on a region as religious institutions are. Thus, religion is the sole difference between a RCU and an ordinary credit union which are located in the same region. The sample starts from 2000 to avoid the effects of the financial crisis that occurred in 1997. For a similar reason, the sample ends in 2007 because massive savings bank failures started in 2008 and have lasted until 2012. Eventually, the final sample consists of 5,063 observations of 816 credit unions among which 76 credit unions are RCUs: 35 Catholic, 36 protestant and 5 Buddhist. The model specification is as follows.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 religion + \beta_3 S_{it} * religion + \beta_4 region_j + \beta_5 year_t + \varepsilon_{it} \quad (3.1)$$

where Y_{it} is loan default rate, ROE or ROA for credit union i at year t. A set of X_{it} includes natural logarithm of total assets (Size) and core captial divided by total assets (Capital). A set of S_{it} comprises the number of members per employees (S1) and proportion of marketing costs (S2) and religion is a dummy variable that equals 1 for RCUs, otherwise 0. Region$_j$ includes real GRDP growth rate and business bankruptcy rate for region j. Year$_t$ represents year fixed effects and ε_{it} is an error term. Table 3.1 reports summary statistics for the variables used in this study and t test results.

3.4 Empirical Results

The empirical results are reported in Table 3.2. Column 1 shows that RCUs suffer from troubled loans 5% less than ordinary credit unions. As the number of members per employee increases, loan default rate also increases for both types of credit unions. However, it increases more for RCUs than others because RCUs advantage of soft information weakens. This finding can be interpreted that RCUs keep low loan default rate through relation oriented banking in which employees play key roles. However, the extent that the positive effect of religion is offset by an increase in the ratio is relatively small. Holding other things fixed, the positive effect is completely offset when S1 increases by 593.89. Given the fact that the range of the variable is from 22.16 at the 1% percentile to 492.43 at the 99% percentile, RCUs in most cases benefit from the positive effect of religion, although the effect differs depending on the variable.

In addition, an increase in sales and advertising costs helps non RCUs lower loan default rate because these costs include acquiring customer information and monitoring. Interestingly, it has no effect on lowering troubled loans for RCUs that rely on soft information acquired through private channels. For robust check, I transform the loan default rate into a proportion by dividing it by 100 and do fractional logit analysis using a QMLE approach. Column 4 indicates qualitatively

	Default Rate	ROE	ROA	Default Rate (Fractional Logit)
Size	-0.772***	-0.001	0.126***	-0.007***
	(0.005)	(0.886)	(0.000)	(0.000)
Capital	-0.011	-0.004***	0.038***	-0.0004**
	(0.698)	(0.000)	(0.000)	(0.000)
Religion	-5.345***	0.090***	0.619***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
S1	0.005***	0.000*	-0.0002**	-0.0001***
	(0.000)	(0.063)	(0.017)	(0.000)
S1*Relgion	0.009***	0.000	0.0001	0.0001***
	(0.004)	(0.913)	(0.705)	(0.005)
S2	-0.080**	0.001**	0.008***	-0.0004***
	(0.083)	(0.040)	(0.000)	(0.027)
S2*Religion	0.078**	-0.002***	-0.018***	0.0004
	(0.032)	(0.000)	(0.000)	(0.237)
GRDP (%)	-0.054**	-0.000	0.004	-0.0002
	(0.015)	(0.755)	(0.108)	(0.484)
Bankruptcy (%)	2.275***	-0.054***	-0.201***	0.028***
	(0.000)	(0.006)	(0.002)	(0.000)
Constant	13.259***	0.051	-1.278***	
	(0.000)	(0.335)	(0.000)	
Observations	5,063	5,063	5,063	5,063
R2	0.231	0.064	0.246	0.095
Log likelihood				-850.01

Notes: *, ** and *** denote statistical significance at the 10%, 5%, and 1% level. The numbers in parentheses indicate p value. column 4 indicates average marginal effects.

Table 3.2: Empirical Results

same results to Column 1. Turning to profitability, Column 2 and Column 3 show that RCUs enjoy higher profitability relative to non RCUs. Interestingly, the proportion of marketing costs has negative effects on profits of RCUs, whereas it has positive effects on non RCUs profits. Consistent with Section 2, non RCUs should spend on marketing costs to attract deposits and to make profits; by contrast, RCUs should save the costs to improve profitability, which is possible due to the non random potential clientele. Holding other things fixed, the positive effect of religion on ROA (ROE) eventually disappears when a RCU increases the proportion of marketing costs by 34.39 (45.00)%. Given that the proportion ranges from 12.20 at the 1% percentile to 66.67 at the 99%

percentile, most RCUs benefit the positive effect of religion irrespectively of their expenditure on marketing.

3.5 Conclusion

This article found evidence that RCUs do not only suffer less from troubled loans but they also enjoy higher profits relative to ordinary ones. The features intrinsic to RCUs, such as non random potential clientele, rich soft information and large disutility of loan default, are likely to be what enables RCUs to outperform. The findings of this study have important policy implications on microfinance institutions and cooperative banks, particularly in emerging economies where these institutions play important roles in their banking industries; a policy promoting cooperative banks based on a religious institution can reduce social costs derived from loan defaults and let their members share more profits. This paper is a preliminary step to explore the relationship between religion and bank performance. Later, I will add other possible variables which can mitigate a potential endogeneity problem or a omitted variable problem.

BIBLIOGRAPHY

BIBLIOGRAPHY

[1] Allen, F., Babus, A., Carletti, E., 2010. Financial crises: theory and evidence, Annual Review of Financial Economics 1, 97-116.

[2] Altonji, J.G., Elder, T., Taber, C.R., 2005. Selection on observed and unobserved variables: assessing the effectiveness of Catholic schools. Journal of Political Economy 113, 151184.

[3] Anas, A., Arnott, R., Small, K.A., 1998. Urban spatial structure. Journal of Economic Literature 36, 1426-1464.

[4] Bank of Korea, 2003. Financial Stability Report, Bank of Korea, April.

[5] Banker, R.D., Chang, H., Lee, S., 2010. Differential impact of Korean banking system reforms on bank productivity. Journal of Banking and Finance 34, 1450−1460.

[6] Barro, R.J., McCleary, R.M., 2003. Religion and economic growth across countries. American Sociological Review 68, 760781.

[7] Barro, R.J., McCleary, R.M., 2006. Religion and economy. Journal of Economic Perspective 20, 4972.

[8] Bazdresch, S., 2013. The role of non-convex costs in firms' investment and financial dynamics. Journal of Economic Dynamics and Control 37, 929−950.

[9] Beck, T., Levine, R., Loayza, N., 2000. Finance and the sources of growth. Journal of Financial Economics 58, 261−300.

[10] Berger, A.N., Clarke, G.R.G., Cull, R., Klapper, L., Udell, G.f., 2005. Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership. Journal of Banking and Finance 29, 2179−2221.

[11] Bernanke, B., Gertler, M., Gilchrist, S., 1999. The financial accelerator in a quantitative business cycle framework. Handbook of Macroeconomics 1, 1341−1393.

[12] Bertola, G., 1993. Models of economic integration and localized growth. In:Torres, F., Giavazzi, F. (Eds.), Adjustment and Growth in the EMU. Cambridge University Press, Cambridge, 159-179.

[13] Blalock, G., Gertler, P., Levine, D.I., 2008. Financial constraints on investment in an emerging market crisis. Journal of Monetary Economics 55, 568−591.

[14] Bordo, M.D., Haubrich, J.G., 2010. Credit crises, money and contractions: An historical view. Journal of Monetary Economics 57, 1−18.

[15] Borensztein, E., Lee, J., 2002. Financial crisis and credit crunch in Korea: evidence from firm-level data. Journal of Monetary Economics 49, 853−875.

[16] Borensztein, E., Lee, J., 2005. Financial reform and the efficiency of credit allocation in Korea. Journal of Policy reform 8, 55−68.

[17] Bryk, A.S., Lee, V.S., Holland, P.B., 1993. Catholic schools and the common good. Harvard University Press, Cambridge.

[18] Caballero, R., Hammour, M., 2001. Institutions, restructuring, and macroeconomic performance. In: Advances in Macroeconomic Theory, Dreze, J.(Ed.), Palgrave New York.

[19] Caballero, R., Hammour, M., 2005. The costs of recessions revisited: A reverse-liquidationist view. Review of Economic Studies 72, 313−341.

[20] Caballero, R., Hoshi, T., Kashyap, A., 2008. Zombie lending and depressed restructuring in Japan. American Economic Review 98, 1943−77.

[21] Chang, H., 2006. The East Asian development experience: the miracle, the crisis and the future. Third World Network.

[22] Chen, K., Irarrazabal, A., 2012. Misallocation and the recovery of manufacturing TFP after a financial crisis. Working paper, Emory University.

[23] Claessens, S., Kose, M.A., Terrones, M. E., 2012. How do business and financial cycles interact? Journal of International Economics 87, 178−190.

[24] Cohen-Zada, D., Elder, T., 2009. Historical religious concentrations and the effects of Catholic schooling. Journal of Urban Economics 66, 6574.

[25] Covas, F., Den Haan, W., 2011. The cyclical behavior of debt and equity finance. American Economic Review 101, 877−899.

[26] Cruicini, M.J., Kose, M.A., Otrok, C., 2011. What are the driving forces of international business cycles? Review of Economic Dynamics. 14, 156-175.

[27] Davis, S.J., Faberman, R.J., Haltiwanger, J.C., 2006. The flow approach to labor markets: New data sources and micro-macro links. Journal of Economic Perspectives 20, 3−26.

[28] Davis, S.J., Haltiwanger, J.C., 1992. Gross job creation, gross job destruction, and employment reallocation. Quarterly Journal of Economics 107, 819−863.

[29] Davis, S.J., Haltiwanger, J.C., 1999. On the driving forces behind cyclical movements in employment and job reallocation. American Economic Reivew 89, 1234-1258.

[30] Dell'Ariccia, G., Garibaldi, P., 2005. Gross credit flows. Review of Economic Studies 72, 665−685.

[31] Dell'Ariccia, G., Igan, D., Laeven, L., Tong, H., 2012. Policies for macrofinancial stability: How to deal with credit booms. IMF Staff Discussion Note, Washington, D.C.

[32] Dunchin, R., Ozbas, O., Sensoy, B., 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis. Journal of Financial Economics 97, 418−435.

[33] Eisfeldt, L., Rampini, A., 2006. Capital reallocation and liquidity. Journal of Monetary Economics 53, 369−399.

[34] Eisfeldt, L., Muir, T., 2013. Aggregate issuance and savings waves. Working paper, University of California, Los Angeles.

[35] Galindo, A., Schiantarelli, F., Weiss, A., 2007. Does financial liberalization improve the allocation of investment? Micro-evidence from developing countries. Journal of Development Economics 83, 562−587.

[36] Gilchrist, S., Sim, J., Zakrajsek, E., 2013. Misallocation and financial market frictions: some direct evidence from the dispersion in borrowing costs. Review of Economic Dynamics 16, 159−176.

[37] Gourinchas, P.O., Obstfeld, M., 2012. Stories of the twentieth century for the twenty-first. American Economic Journal: Macroeconomics 4, 226−65.

[38] Gourio, F., Kashyap, A.K., 2007. Investment spikes: New facts and a general equilibrium exploration. Journal of Monetary Economics 54S1, 1−22.

[39] Guiso, L., Sapienza, P., Zingales, L., 2003. Peoples opium? religion and economic attitudes. Journal of Monetary Economics 50, 225282.

[40] Haggard, S., Lim, W., Kim, E., 2010. Economic Crisis and Corporate Restructuring in Korea: Reforming the Chaebol. Cambridge Asia-Pacific Studies, Cambridge University Press, Cambridge. United Kingdom.

[41] Herrera, A.M., Kolar, M., Minetti, R., 2011. Credit reallocation. Journal of Monetary Economics 58, 551−563.

[42] Iannaccone, L.R., 1998. Introduction to the economics of religion. Journal of Economic Literature 36, 14651496.

[43] IMF, 2004. Are credit booms in emerging markets a concern" In: World Economic Outlook, April 2004: Advancing Structural Reforms, Washington, D.C.

[44] Joh, S., 2003. Corporate governance and firm profitability: evidence from Korea before the economic crisis. Journal of Financial Economics 63, 287−322.

[45] Kashyap, A., Stein, J., Wilcox, D., 1993. Monetary policy and credit conditions: evidence from the composition of external finance. American Economic Review 83, 78−97.

[46] Kim, M., Maksimovic, V., 1990. Debt and input misallocation. Journal of Finance 3, 795−815.

[47] Korajczyk, R., Levy, A., 2003. Capital structure choice: macroeconomic conditions and financial constraints. Journal of Financial Economics 68, 75−109.

[48] Kose, M.A., Otrok, C., Whiteman, C.H., 2003. International business cycles: world, region, and country-specific factors. American Economic Review 93, 1216-1239.

[49] Kose, M.A., Otrok, C., Whiteman, C.H., 2008. Understanding the evolution of world business cycles. Journal of International Economics 75, 110-130.

[50] Lang, W., Nakamura, L.I., 1995. Flight to quality in banking and economic activity. Journal of Monetary Economics 36, 145−164.

[51] Lee, J., Rhee, C., 2007. Crisis and recovery: what we have learned from the South Korean experience? Asian Economic Policy Review 2, 146−164.

[52] Levy, A., Hennessy, C., 2007. Why does capital structure choice vary with macroeconomic conditions? Journal of Monetary Economics 54, 1545−1564.

[53] Lim, K., 2010. Structural fundamentals of Korean corporations: this time was different. KDI Conference.

[54] Liu, D.C. 2013. The evolution of excess job reallocation in the U.S. Journal of Macroeconomics 36. 188-206.

[55] Martin, R., Sunley, P., 1998. Slow convergence? The new endogenous growth theory and regional development. Economic Geography 74, 201-227

[56] Mendoza, E., Terrones, M., 2012. An anatomy of credit booms and their demise. Working Papers Central Bank of Chile 670.

[57] Midrigan, V., Xu, D.Y., 2013. Finance and misallocation: Evidence from plant-level data. American Economic Review, forthcoming.

[58] Neumeyer, P.A., Sandleris, G., 2010. Understanding productivity during the Argentine crisis. Business School Working Papers, Universidad Torcuato Di Tella.

[59] Nilsen, J.H., 2002. Trade credit and the bank lending channel. Journal of Money, Credit and Banking 34, 226−253.

[60] Oliner, S.D., Rudebush, G.D., 1995. Is there a bank lending channel for monetary policy? Economic Review, FRB of San Francisco 2, 1−20.

[61] Park, Y., Lee, J., 2003. Recovery and sustainability in east Asia. In: Dooley, M., Frankel, J. (Eds.), Managing Currency Crises in Emerging Markets.

[62] Rajan, R., Zingales, L., 1995. What do we know about capital structure? Some evidence from international data. Journal of Finance 50, 1421−1460.

[63] Stock, J. H., Watson, M.W., 2003. Has the business cycle changed and why? In: NBER Macroeconomics Annual 2002, Volume 17, 159-230, MIT Press.

[64] Stulz, R.M., Williamson R., 2003. Culture, openness, and finance. Journal of Financial Economics 70, 313349.

[65] The Economist, 2012. Deleveraging. The bad, the Good, and the Ugly. May 2nd.

[66] Törnqvist, L., Vartia, P., Vartia, Y.O., 1985. How should relative changes be measured? American Statistician 39, 43−46.

[67] Weber, M., 1930. The protestant ethic and the spirit of capitalism. Harper Collins, New York.

[68] World Bank, 2000. East Asia: recovery and beyond.

[69] Wurgler, J., 2000. Financial markets and the allocation of capital. Journal of Financial Economics 58, 187−214.