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CHAPTER 1

Lessons on Financial Stability from Japan's 1980s Bubble Years

Hyun Song Shin

I. SOURCE

Hattori, Shin and Takahashi (2009)

"A Financial System Perspective on Japan's Experience in the Late 1980s"
Paper presented at Bank of Japan Conference, May 2009

II. Japan's Late 1980s Experience

Role of large (non-financial) firms channeling funds from capital markets to banking sector

- Raise funding in securities market
- Lend on to banking sector as time deposits

Made possible by

- Progress in financial liberalization in securities market and banking sector
- Permissive liquidity conditions

Figure 1. Stylized Financial System Before Liberalization

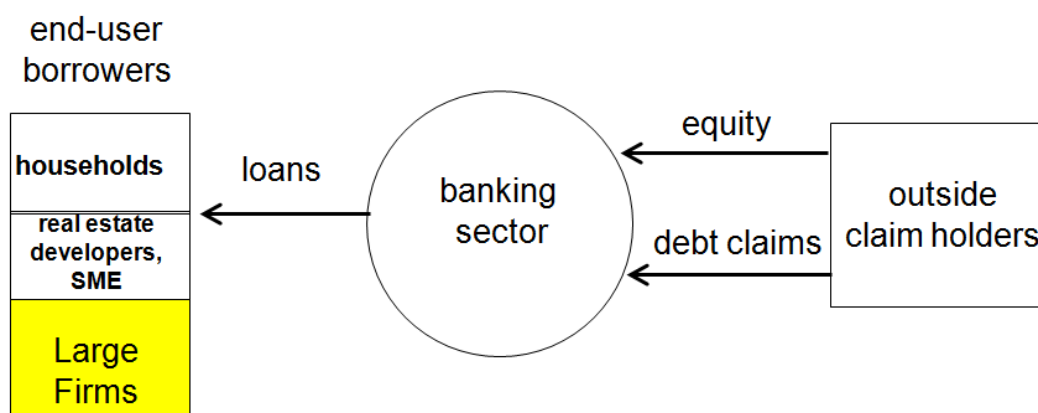


Figure 2. After Liberalization

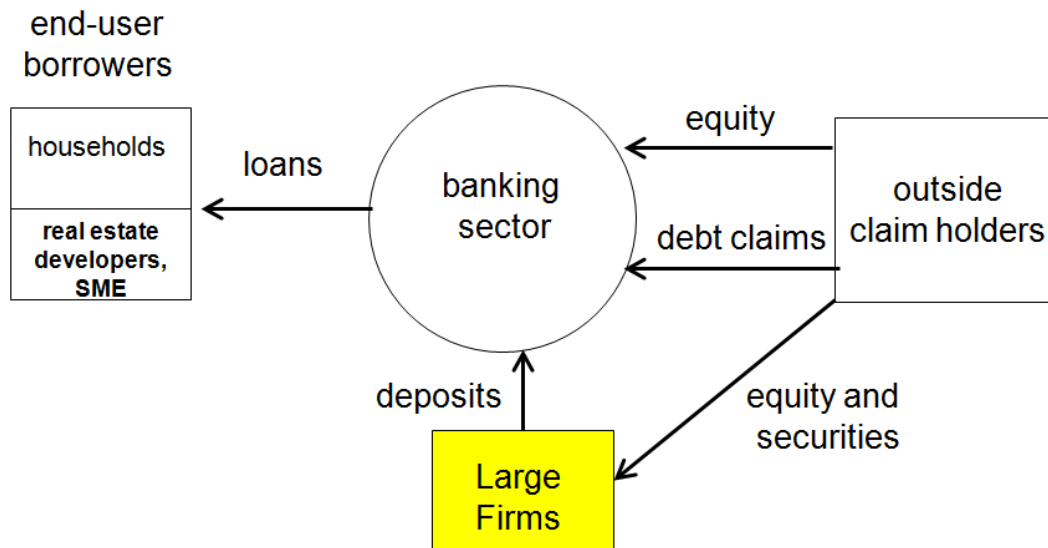


Figure 3. Financial Intermediation Redefined

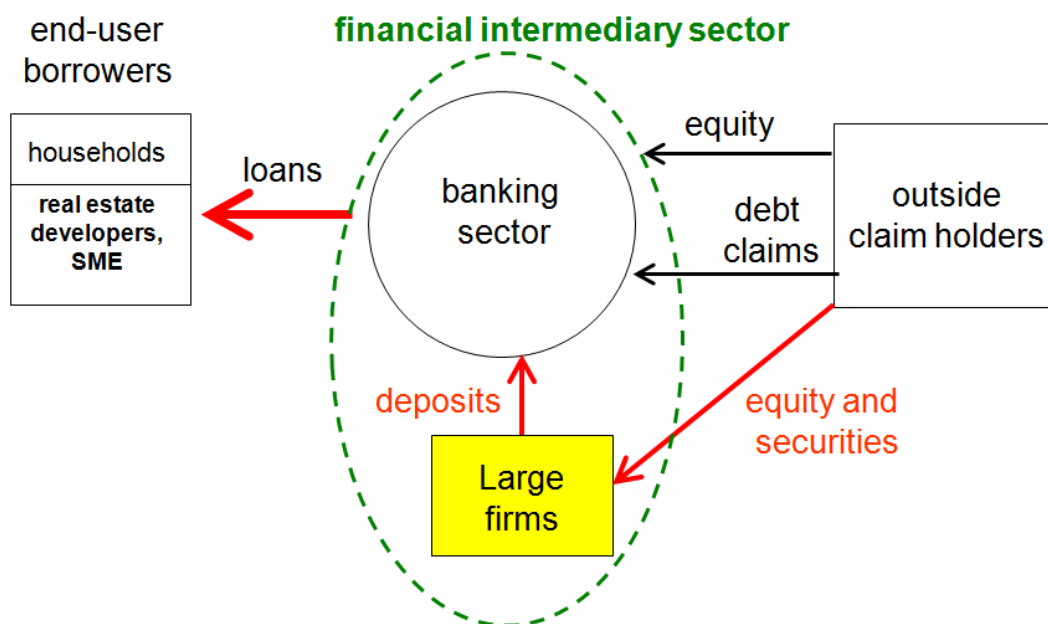


Table 1. Security Financing by Listed Firms, 1972-98

year	Total securities (million yen)	Distribution (%)		Foreign bonds	
		Stock	Bonds	as % total	as % total bonds
1972	1,784,689	58.4	41.6	0.0	0.0
1973	2,240,766	41.9	58.1	0.1	0.2
1974	1,741,396	31.2	68.8	3.4	4.9
1975	3,187,449	31.4	68.6	11.7	17.0
1976	2,302,001	29.9	70.1	18.1	25.8
1977	2,543,740	36.3	63.7	14.7	23.1
1978	2,972,270	30.2	69.8	16.4	23.5
1979	3,298,028	28.9	71.1	24.0	33.8
1980	2,883,285	36.5	63.5	24.1	37.9
1981	4,400,028	43.8	56.2	19.8	35.2
1982	4,084,502	33.0	67.0	27.7	41.3
1983	4,048,420	19.8	80.2	44.8	55.9
1984	5,409,408	19.3	80.7	44.0	54.5
1985	6,890,503	12.5	87.5	51.0	58.2
1986	8,395,196	10.4	89.6	48.2	53.8
1987	14,455,291	20.8	79.2	39.9	46.6
1988	17,636,098	27.1	72.9	30.5	41.9
1989	28,410,407	31.1	68.9	41.4	60.0
1990	14,441,448	26.3	73.7	35.8	48.5
1991	12,500,454	6.5	93.5	63.5	67.9
1992	9,619,910	4.4	95.6	60.2	62.9
1993	11,143,567	7.4	92.6	45.0	48.6
1994	8,499,604	11.0	89.0	22.6	25.4
1995	8,094,650	7.9	92.1	23.2	25.1
1996	13,616,878	15.2	84.8	18.3	21.6
1997	10,162,545	11.4	88.6	23.4	26.4
1998	15,906,750	9.7	90.3	10.0	11.1

Figure 4. Fundraising by Private Non-financial Corporations (Securities)

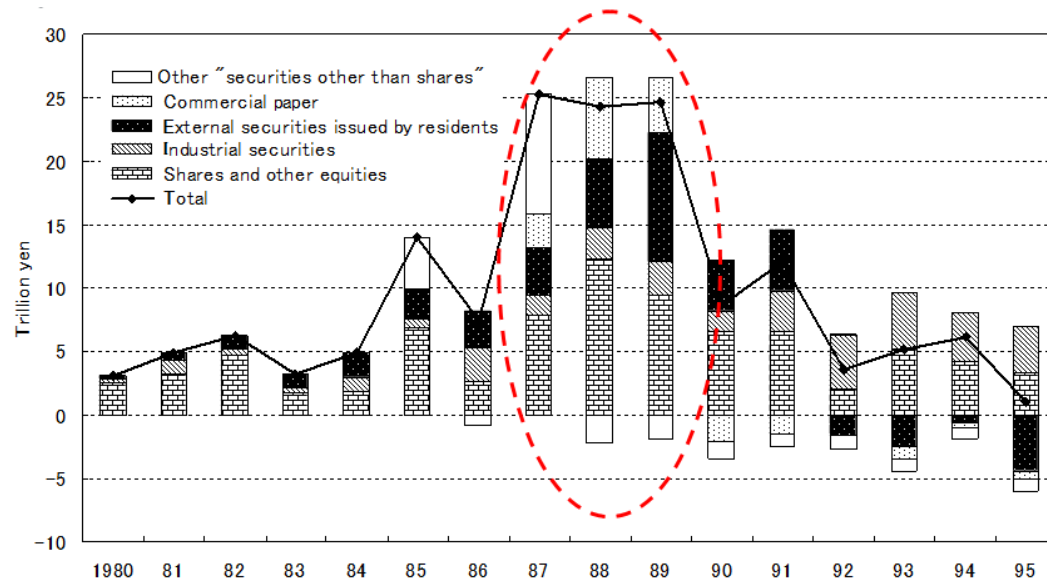


Figure 5. Financial Investments by Private Non-financial Corporations (currency & deposits)

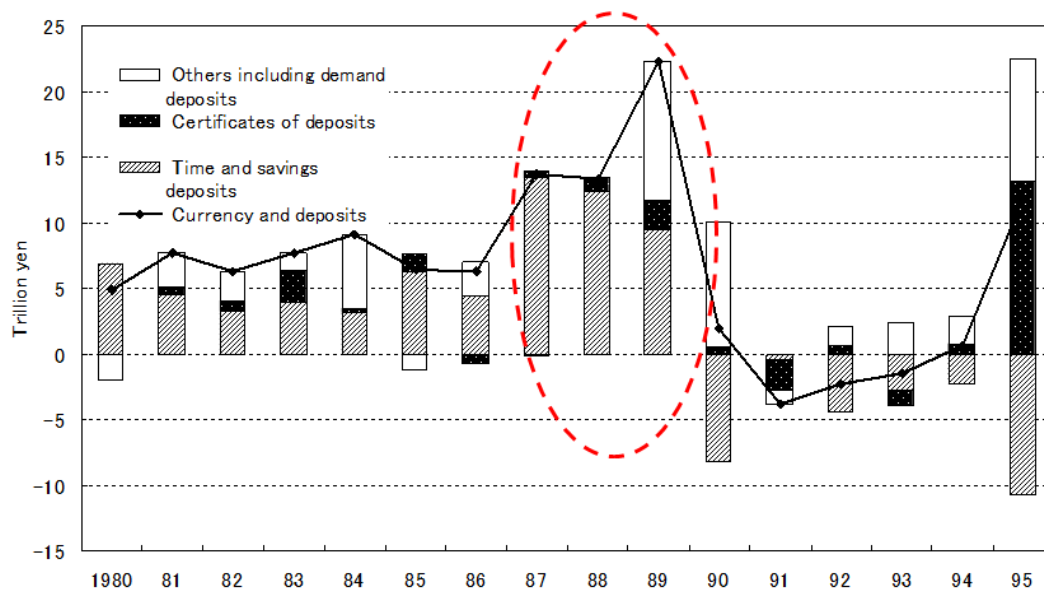


Figure 6. Net Financial Position of Private Non-financial Corporations

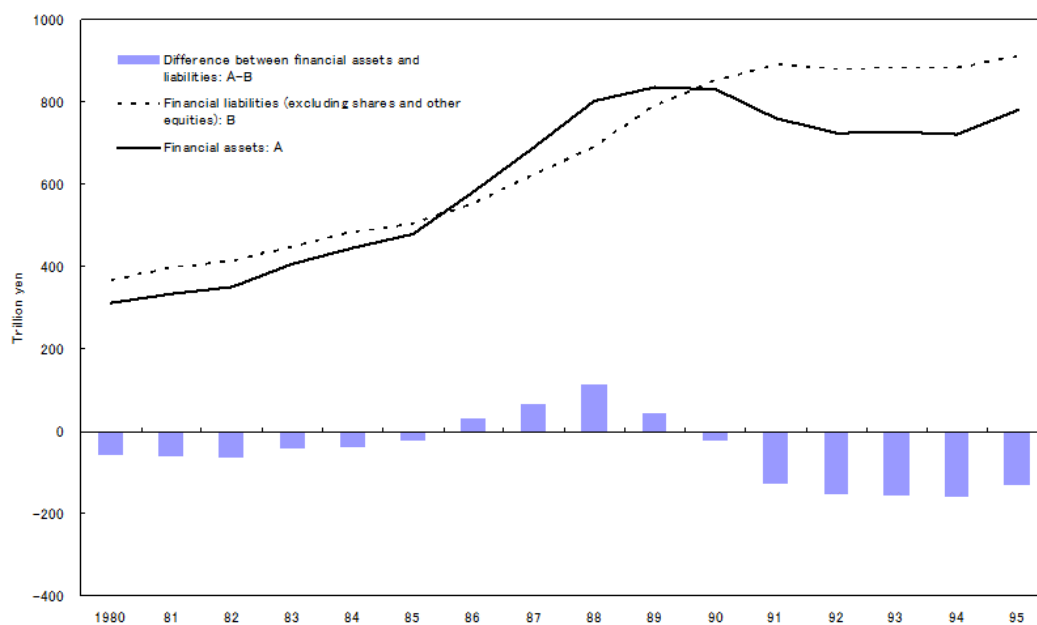


Figure 7. Liquidity Ratio = (cash and deposits + securities assets) / sales Manufacturing Firms

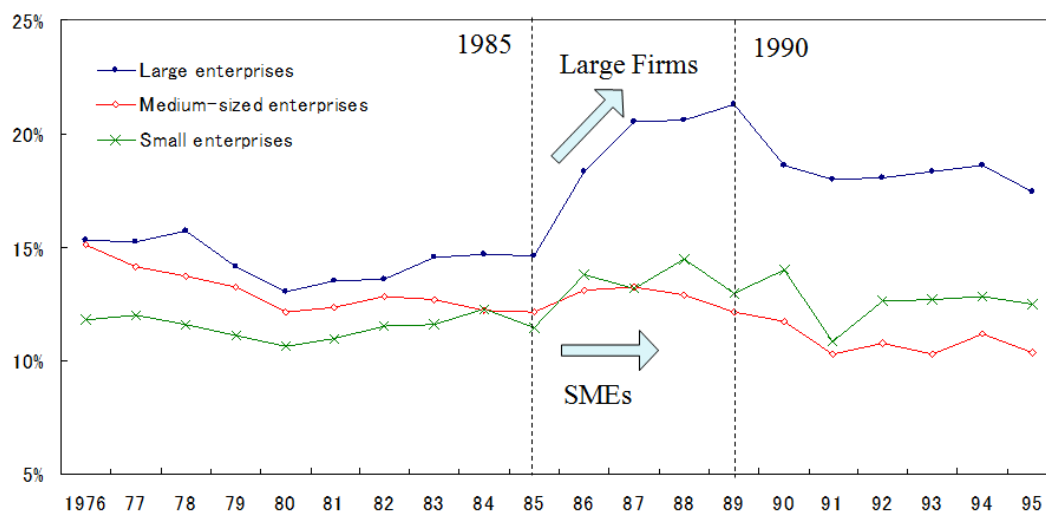


Figure 8. But Cash Not Used for Investment

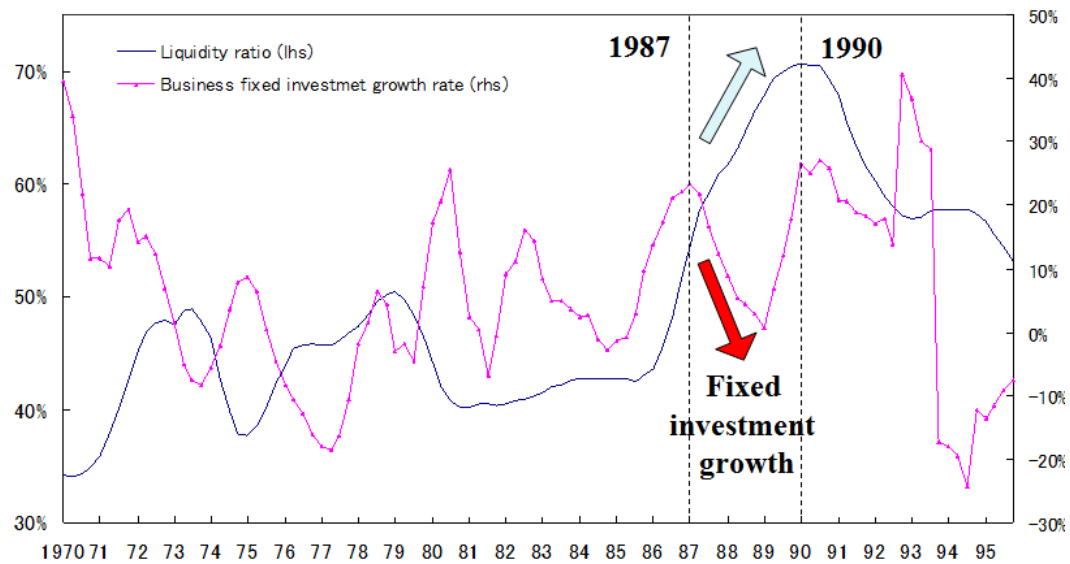


Figure 9. Share of Time Deposits in Total Outstanding Deposits

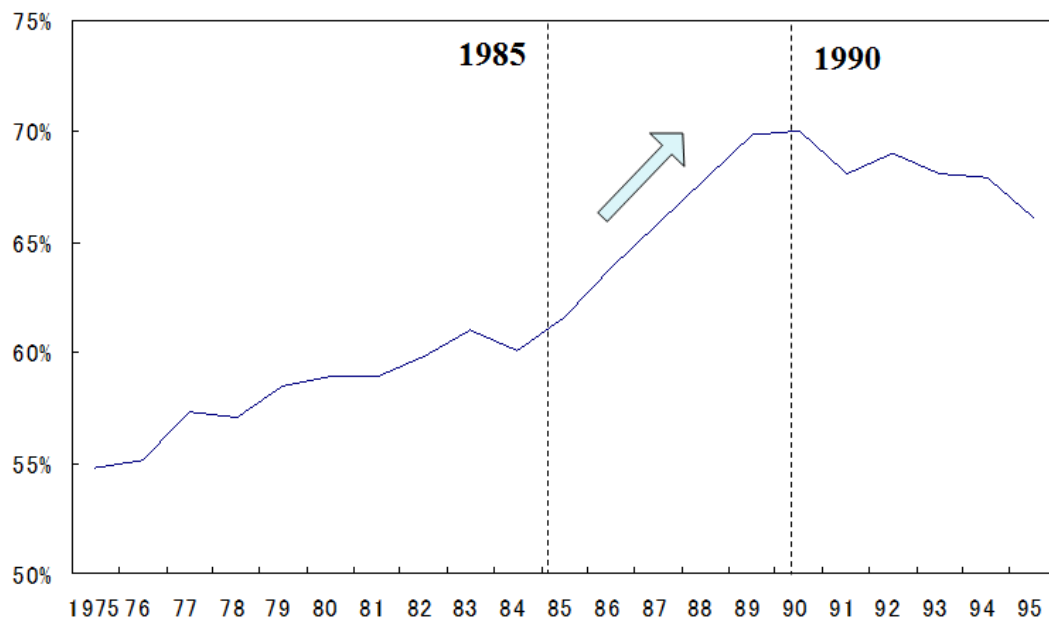


Figure 10. Bank Lending to Real Estate-Related Sectors

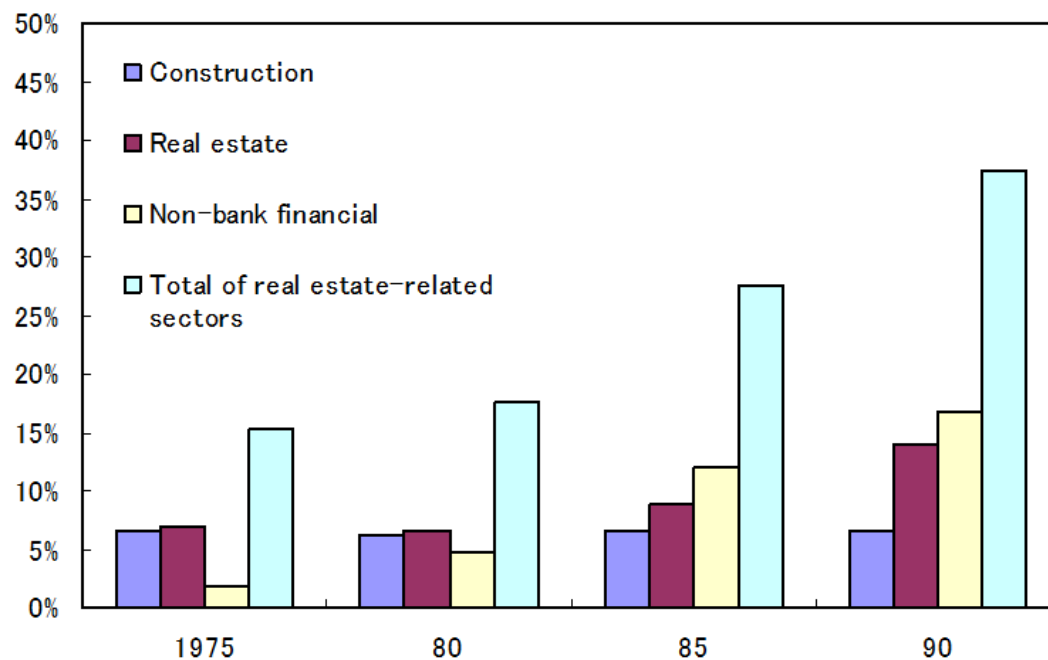


Figure 11. Loan Default Rate

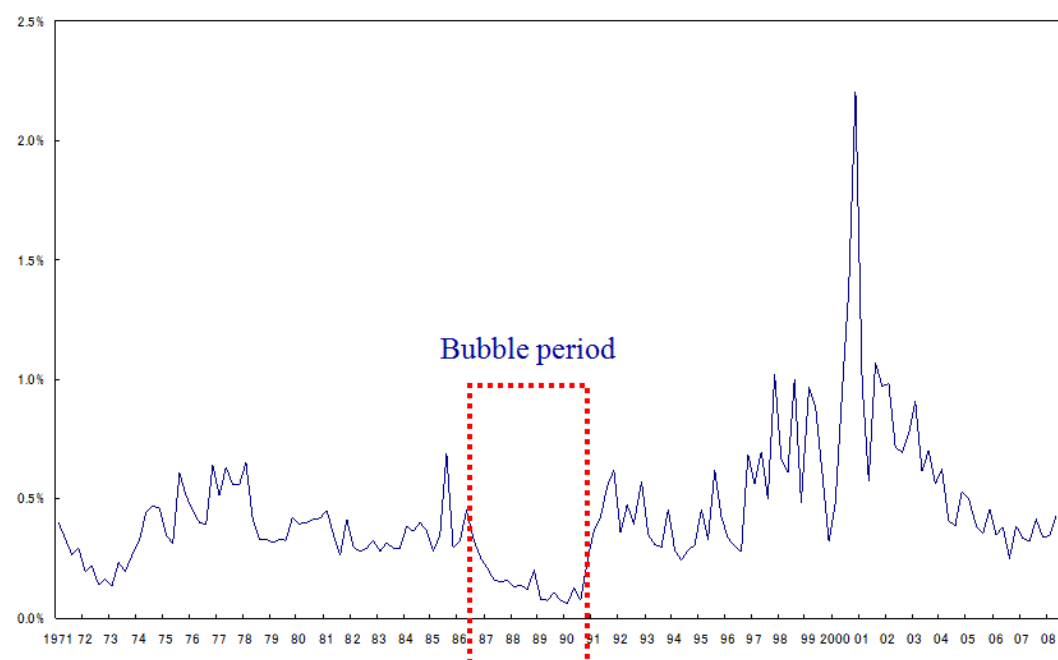


Figure 12. Composition of Bank Capital

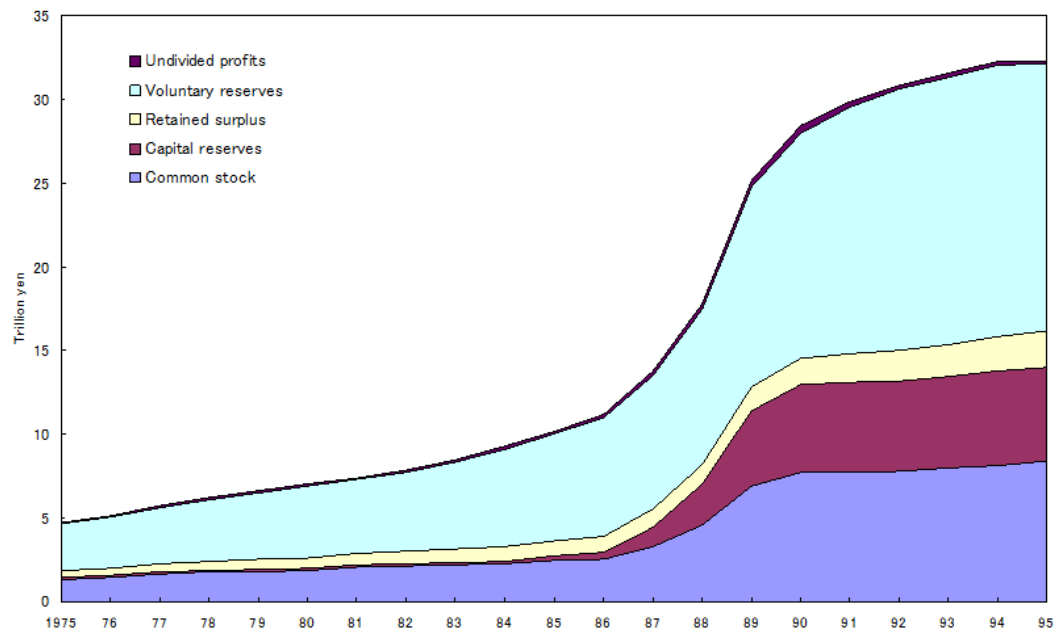


Figure 13. Common Stock and Capital Reserves

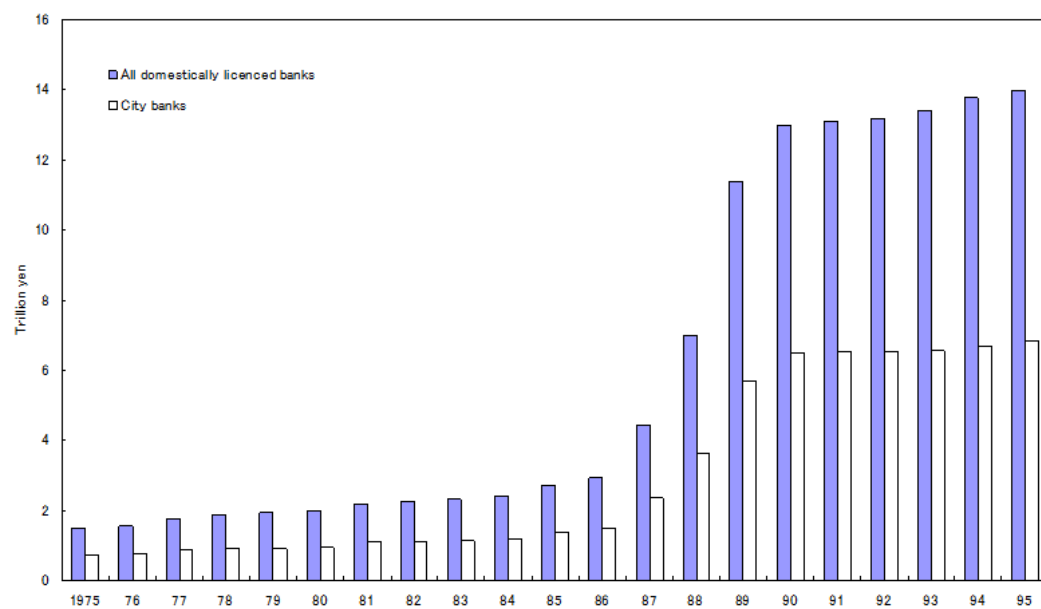
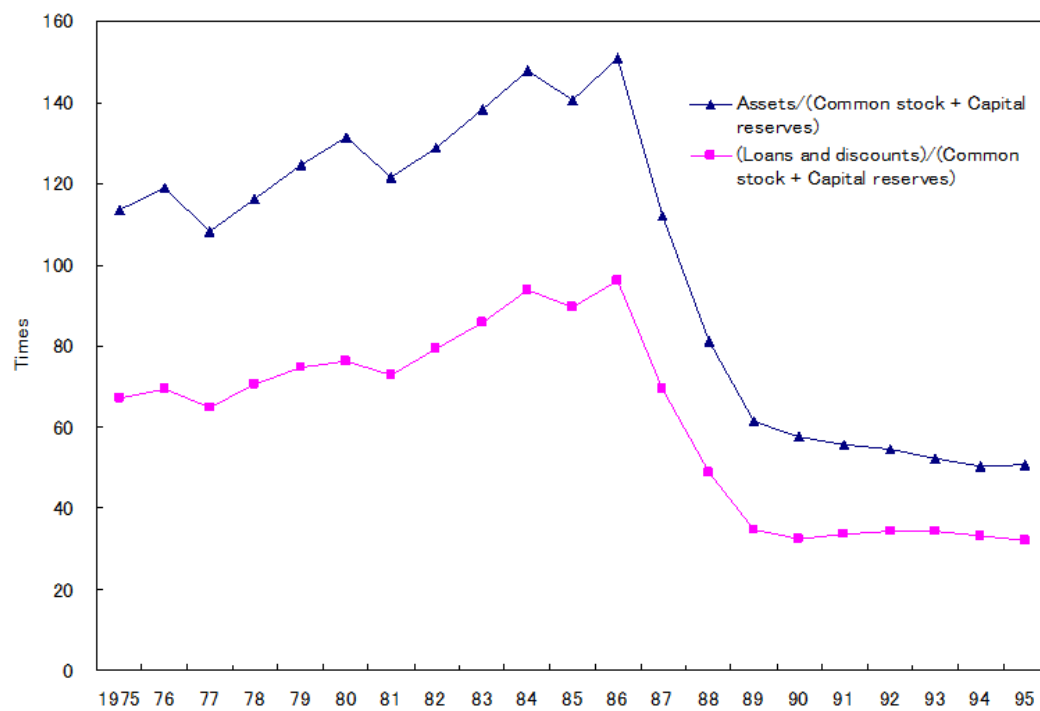


Figure 14. Leverage



III. Macroeconomic Backdrop

Financial Liberalization

- Securities market
- Banking sector

Expectations of continued easy monetary policy

- Government commitment
- International context

IV. Some Lessons for Current Debates

Need for more comprehensive assessment of financial institutions

- **Ratios** are less informative than **total quantities**
- **Falling leverage ratio** is no guarantee of stability
- Importance of **system perspective**

Importance of liquidity conditions

- International perspective on liquidity
- Focus on both sides of balance sheet, not just on instantaneous credit risk

CHAPTER 2

A Macroprudential Approach to Financial Supervision and Monetary Policy in Emerging Economies

Yung Chul Park
Korea University

I. Introduction

A series of financial crises in the 1990s and the 2008-09 global economic crisis have brought to light a number of new developments in the financial system - both domestic and global - that have a bearing on managing financial crisis. They have certainly contributed to a better understanding of the causes and consequences of the building of financial imbalances. It is now widely accepted that contrary to the long held view, consumer price stability is not a sufficient condition for financial stability. Financial imbalances in the form of the boom and bust, excessive leverage in financial institutions and households, and deterioration in maturity and currency mismatches in the balance sheets of banks and other financial institutions could mount up in a non-inflationary environment. The unwinding of these imbalances could destabilize the financial system and even trigger a financial crisis. The cumulative effects of financial imbalances could then cause serious disruptions to the economy and interfere with real sector development.

There has also been a sharp increase in the volatility as well as the volume of cross-border capital movements as a result of deeper integration of financial markets of individual economies both at the regional and global level. In a globalized economy, financial turbulences in one country could easily spill over into neighboring economies including even those with strong and sound fundamentals, thereby destabilizing their financial systems as well. Financial globalization therefore calls for creating a system of policy harmonization and coordination at the regional and possibly at the global level for effective surveillance of capital movements and the soundness of national financial systems. Finally, experiences with coping with financial crises suggest that the conduct of monetary policy could exacerbate rather than preventing the buildup of systemic risk: they may need to be complemented by other policy measures.

These changes in the financial landscape have underlined the need to strengthen the foundation of the domestic financial system to improve resilience to external shocks as well as the need to develop new policy instruments that could complement monetary and fiscal policy in safeguarding the economy against financial instability. The search for new policy tools has led to a reorientation of macroeconomic dimensions of microprudential supervision for a new approach to ensuring stability of the financial system.

In the wake of the 1997-90 Asian financial crisis, Crockett (2000) proposed that microprudential supervision and regulation, which had been traditionally directed to protecting depositors and investors, should be reoriented toward maintaining financial stability by "marrying the micro and macro-prudential dimensions of financial stability." This was followed by the construction of a macroprudential framework for financial supervision and regulation (Borio 2003), which has been further refined by a series of papers by the staff of the BIS. Since the eruption of the 2008-09 global economic crisis, macroprudential policy has taken center stage of the discussion of the assessment of health and safety of the financial system and prevention of future financial crises. The IMF program for the assessment of systemic financial stability and the growing attention central banks and other policy authorities are paying to monitoring, analyzing, and formulating policy responses to ensure the soundness and safety of the financial system all bear witness to the growing importance of macroprudential supervision as a new macroeconomic policy. Although there has been a growing literature on macroprudential policy in recent years, there appears to be a considerable disagreement on its scope and effectiveness. Indeed, there is neither a widely accepted definition of financial stability nor an appropriate operational framework for macroprudential policy. Although efficiency of monetary policy is expected to improve when it is complemented by macroprudential supervision, it is difficult to identify the contour of a new system of coordination of the two policies. This is because the new system of coordination needs to be designed in a way that will avoid the

potential conflict in which the effects of the two policies cancel out each other because macroprudential policy has macroeconomic spillovers, whereas monetary policy affects risk-taking behavior of financial market participants.¹

In this paper an attempt is made to clarify some of the analytical as well as operational issues related to the construction of a macroprudential policy framework for financial supervision and regulation, in particular the interactions between monetary and macroprudential policy. To set the stage for the discussion. Section 2 examines the operational definition, the rationale behind, and the scope of macroprudential policy in the context of emerging economies. This is followed in Section 3 by a discussion of independence of macroprudential supervision as an instrument for financial stability and its interactions with monetary policy. Section 4 is devoted to outlining an appropriate operational scope and modality of macroprudential supervision. Concluding remarks are in a final section.

II. Systemic Risk and Macroprudential Policy

1. Definition of Macroprudential Policy

Although monetary policy should be an integral component of any policy framework for managing financial turbulences it may not be effective in leaning against the surge of the financial cycle. As will be shown in the following section, macroprudential supervision may come into conflict with the conduct of monetary policy in particular when consumer and asset prices move in the opposite directions. In economies adopting inflation targeting the policy rate is not an efficient tool to restrain excessive leverage and risk taking. For example, a higher policy rate may be able to stabilize high asset prices, but when speculation sets in, it is likely to do so at the cost of a larger output gap, if consumer price inflation is below the target rate (Blanchard et al. 2010). This limitation has stimulated interest in and brought on efforts to develop and refine macroprudential policy as a means of managing excessive leverage, procyclicality in bank lending, and real and financial asset speculation.

Macroprudential policy is defined as "the use of prudential tools with the explicit objective of promoting the stability of the financial system as a whole, not necessarily of the individual institutions within it" (Clement 2010). It is intended to prevent the buildup of systemic risk, that is, to protect the financial system as a whole and, by extension, the broader economy.² To be more specific, it has two objectives. One is to mitigate the financial cycle or procyclicality over time, that is, leaning against the wind when systemic risk is accumulating. Another is to make the financial system more resilient-given the cycle-by moderating systemic risk caused by "interlinkages between the common exposures of all financial institutions" at a point in time, that is to stem risks related to interconnections and spillovers in the financial system (CGFS 2010 and Hanoun 2010). To be sure, these objectives are not mutually exclusive as a greater resilience of the financial system would enable the system to adjust to financial cycles better.

¹ For example, more stringent bank capital and liquidity requirements in the Basel III are desirable to stem systemic risk, but they may delay economic recovery unless implemented in a gradual manner over time.

² According to a BIS paper (CGFS 2010), systemic risk is "a risk of disruption to financial services that is caused by an impairment of all or parts of the financial system and has the potential to have serious negative consequences for the real economy". Borio (2009) and Hannoun (2010) identify two types of disruption that could cause the accumulation of financial imbalances. One type is the financial cycle – the procyclicality over the business cycle in lending at banks and other non-bank financial institutions. Another is a cross dimensional disruption arising from a direct exposure of financial institutions to a set of common shocks or risk factors as in the case of holding the same or similar assets or an indirect exposure through the network linkages as in the case of assuming counterparty risks. See Crockett 2000, Borio 2003, and White 2004 on the procyclicality of lending.

2. Rationale

Among the policy authorities, the central bank is primarily responsible for maintaining price stability. Although it is expected to monitor financial market developments and to respond to financial disruptions when they occur in excesses. The central bank would not normally consider implementing monetary policy to counter financial market instability, and more so if its policy actions could put in danger attaining its price stability objective and when it does not have regulatory authority. For this reason, the central bank has to coordinate conduct of its monetary policy with those of other policy authorities including the supervisory agency. It is often suggested that given the limitations of monetary policy in preventing the buildup of systemic risk the financial regulatory authorities need to shoulder much of the responsibility for the assessment and management of financial stability.

By enforcing traditional prudential standards and codes of good behavior at individual institutions, which will keep in check contagion of the failure of a financial institution, financial supervisory institutions help reduce the incidence of the run on the financial system and thereby preserve financial stability. Indeed, if individual financial institutions are healthy, sound, and efficiently managed, the likelihood of financial distress is expected to decline. The need to strengthen microprudential supervision is no less essential than before.

However, microprudential supervision alone is inadequate in alleviating the common exposure of financial institutions and market participants to an increasing array of common macroeconomic risk factors such as terms of trade deterioration, large capital inflows and outflows, incipient asset market bubbles, herding, and sudden changes in market sentiment and expectations. With the rapid progress in financial technology that has spawned an explosion of sophisticated financial products, it has become increasingly difficult to identify and monitor the distribution and the final resting places of new risks that these products create. Under these circumstances, the traditional microprudential approach is not sufficient to diffuse adverse market developments and market failures. Macroprudential supervision can complement the traditional surveillance of individual institutions in lessening systemic risk and diffuse financial vulnerabilities. This is one of the arguments for the rationale behind the advocacy of macroprudential policy.

Another argument is related to the creation of a unified financial supervising system independent from the central bank. If a central bank was engaged in some types of macroprudential supervision before the supervisory oversight was separated out and transferred to a new independent institution, it would certainly use microprudential tools to complement its monetary policy, tightening in the up phase while relaxing them in the down phase of the business cycle. With an independent supervising authority, then it stands to reason that the stability function needs to be shared by both the central bank and the supervisory authority.

A third argument for macroprudential supervision is that a growing number of central banks have adopted inflation targeting as a framework for monetary policy in which their primary responsibility is to stabilize prices of goods and services measured by a CPI or core price index. It is rather natural then that the regulatory authorities assume at least in part the financial stability function.

Finally, there is the problem of pro-cyclicality in the lending behavior of banks and other financial institutions (Crockett 2000, Borio 2003, and White 2004). When the economy enters into an upswing phase of the business cycle, financial institutions expand their lending more than before in the belief that credit risk of their loans has decreased. In fact, lending for the financing of housing and commercial estate often is the major cause of a boom and a bubble. The credit expansion feeds and is often fed by the asset market boom.

These institutions may realize that their lending operations may indeed create an asset market boom, sowing the seeds of a bubble, which will eventually burst. It would be in their interest to restrain their lending collectively, but there is no market mechanism that could bring about such collective actions among financial institutions.

Eventually the expansion phase or boom comes to an end and the economy enters the contractionary period of the business cycle. At this point, financial institutions become conscious of the potential increase in the credit risk of their loans and begin to recall the existing loans while refusing new credit extensions as the prices of assets, which are in part held as collateral, begin to fall. For an individual institution, cutting credit exposure is a rational decision, but if all institutions do the same, they end up deepening the contraction. This coordination failure dictates intervention on the part of policy authorities. Given the nature of the supervisory operations, the supervisory agency may be the authority to assume the market intervention.

Over the business cycle, the central bank is expected to tighten monetary policy to slow down the expansion and to reverse the policy stance during the downswing. However, depending on how vigorously it is tightened, monetary policy may not be effective in curbing the credit expansion, in particular when speculation sets in, in the asset markets. Furthermore, the central bank may be disadvantaged in gauging accurately the response of financial institutions to changes in the stance of monetary policy in the absence of supervisory oversight. Some of the prudential supervisory tools and scheme of dynamic provisioning could therefore be employed to strengthen the effect of monetary policy.

In view of the preceding discussion, the relevant question to be raised is not whether the supervisory institutions should orient their operations towards macroprudential supervision but how they should do it in cooperation with the central bank. However, the supervisory agencies are not specifically entrusted with stability functions; they may also have not developed the expertise or culture of macroprudential orientation, while the central bank cannot exercise supervisory control at the level of individual institutions. These institutional constraints could hamper coordination of macroprudential policy, creating the danger that the policy authorities including the ministry responsible for fiscal and exchange rate policy may not be able to agree on the seriousness of financial distress once it arises and hence fail to devise a required collective policy response.

3. Micro and Macroprudential Policies³

Crockett (2000) and Borio (2002) highlight the differences between micro and macroprudential dimensions in terms of the objectives of financial supervision and regulation and the supervisory mechanism influencing economic outcomes. The macroprudential objective is to limit the systemic risk as a systemic crisis could result in the failure of the financial system whereas the microprudential objective is to limit idiosyncratic risk individual financial institutions are exposed to. The macroprudential perspective focuses on the overall health and soundness of the financial system. The

³ For its guidance on conducting financial sector assessments, the IMF (2005) has developed a general analytical framework and specific technique and methodologies for assessing the overall stability and development needs of financial systems in individual countries and designing policy responses. One of these tools and techniques is macroprudential analysis, which includes "stress testing, scenario analysis, and analysis of financial soundness indicators and of macrofinancial linkages" (p.4).

The IMF Handbook (2005) points out that a sound and well-functioning financial sector is built on the three pillars that are necessary to support orderly financial development and sustained financial stability. One of the three pillars is macroprudential surveillance and financial stability analysis, which is to monitor the impact of potential macroeconomic and institutional factors on the soundness (risks and vulnerabilities) and stability of financial systems. The other two pillars are (i) financial supervision and regulation and (ii) financial system infrastructure.

macroprudential supervisory standard is derived from a top-down approach whereas the microprudential one is a bottom-up approach. In terms of conceptions, the systemic risk the macroprudential approach focuses on is endogenous as it is determined by the collective behavior of individual institutions whereas the idiosyncratic risk is exogenous.

The differences between the two supervisory and regulatory approaches are summarized in Table 1.

Table 1. Micro and Macro Approach

	Macroprudential	Microprudential
Objective	Limiting systemic risk of the financial system: mitigating the failure of a large segment of the financial system.	Limiting idiosyncratic risk of individual institutions: protection of depositors and investors
Implementation of supervisory controls	Top-down: setting prudential control in terms of the probability and costs of systemic distress	Bottom-up: setting and aggregating prudential control in relation to the risk of each institution
Characteristics of risk	Endogenous: Originating in the collective behavior of and interactions between institutions	Exogenous: Given to individual institutions and the disregard of feedback of collective actions
Common exposure to systemic risk	Relevant and important: causes of the fallacy of composition	Irrelevant
Use of instruments	Standard prudential tools plus linking provisioning and pricing of risk to the volume of loan	Uniform solvency standards and codes of conduct
Focus of supervision	(i) A greater weight given to banks and larger and more complex institutions; (ii) Market monitoring; and (iii) Countercyclical orientation	Protection of individual institutions

Sources: Crockett (2000) and Borio (2003 and 2009)

According to Crockett (2000), microprudential supervision is liable to two critical weaknesses. The emphasis on the soundness of individual institutions may result in excessive protection which will weaken market disciplinary and allocative mechanisms without necessarily securing the safety of these institutions. Indeed the soundness of individual institutions is neither a necessary nor sufficient condition for the stability of the financial system as a whole. As Goodhart (2004) points out, depending on the nature of the interlinkages among financial institutions and markets it is possible that financial systems containing individually weak institutions may nevertheless be systemically robust and vice versa (p.9).⁴ Another weakness is that the microprudential approach may not be able to deal with common exposures of financial institutions and markets to macroeconomic risk factors, thereby failing in monitoring the increase in the systemic risk and taking appropriate remedial actions. The macroeconomic factors include such exogenous

⁴ Goodhart cites the Japanese experience in the 1980s as an example in which banks were strong individually, but they were systemically weak in the face of the bursting of the real estate bubble.

developments as a sudden supply-induced change in the price of oil, but also endogenous changes as in speculation in the asset market that would feed and be fed by rapid credit expansion.

What then would be the precise nature of the role of the supervisory institution in formulating policy response to an impending financial disturbance? While it is intuitively clear that the supervisory institution has an important role to play in assessing financial stability and in responding to emerging financial imbalances, the precise contour of the macroprudential supervision in monitoring, analyzing, and participating in the designing of policy responses to an impending financial stress is not clearly defined. The proponents of the macroprudential framework for financial supervision do not necessarily propose either the creation of new prudential controls at or adding new functional responsibilities to the supervisory authority; they are advocating the adjustment of the traditional modality of supervision in a way that will contribute to mitigating systemic risks.

There are few new tools for macroprudential supervision.⁵ Most of the main tools of macroprudential policy are similar to those of microprudential policy. They take the form of restrictions or incentives related to financial firms' balance sheets. That is, a large number of microprudential instruments could be recalibrated for macroeconomic objectives of sustaining financial stability.⁶ These tools are basically designed and implemented to contain distress of individual financial institutions, but Hannoun (2010) argues that they could be utilized to mitigate systemic risk as they can complement the instruments of monetary policy. Some of the instruments that may be used to strengthen financial system resilience include capital and liquidity requirements and restrictions on leverage in particular types of lending and currency mismatches. In particular, the regulatory authorities may separate out vital requirements to reflect their potential threat to the stability of the financial system (Borio 2009).⁷

A host of microprudential tools may also be reoriented to help lessen the procyclicality. They include: countercyclical capital charges, forward-looking provisioning for loan losses, capital conservation rules for banks that ensure prudent profit retention, the loan-to-value ratio, the repayment period, and margin requirements, capital requirements against real estate lending, and the countercyclical adjustment of exposure to the real estate sector – to be tightened in the upswing and loosened in the downswing phase (Hannoun 2010).⁸ These tools could be adjusted frequently and quantitatively.

It should be noted that the preceding categorization is based on broad correspondence between the instruments and the two objectives of macroprudential policy as some of these instruments such as the LTV ratio, which can improve the resilience of the financial system, but also serve as an automatic stabilizer for the financial system (CGFS 2010).

In controlling systemic risk over and at a point in time in a cross sectional dimension, how does macroprudential policy work? How effective is it? Is it independent or complementary to monetary policy? The next section turns to these questions.

⁵ See section 5 for details on macroprudential tools.

⁶ CGFS (2010) and Hannoun (2010) provide a list of these instruments categorized by the disruptions to the financial system they constrain. CGFS (2010) discusses how to design macroprudential frameworks and reviews experience in a range of countries.

⁷ Brio (2009) proposed a top-down approach in employing prudential tools in which contribution of each institution to system wide risk is calculated. On the basis of this information higher standards are imposed on institutions with a larger contribution.

⁸ These instruments can be complemented by the dynamic provisioning, but with caution. This is because the dynamic provisioning scheme may have an inherent bias against small and medium-sized firms and households that have increasingly accounted for a large share of customers at banks. Large firms have access to international as well as domestic capital markets for the financing of their investment. Denied credit at banks, they could issue commercial paper, bonds, and equities to raise funds they need. These financing alternatives are often not available to small and medium-sized firms. During an economic boom, the dynamic provisioning may discriminate against small and medium-sized firms, which are likely to be perceived as high-risk clients.

III. The Role and Effectiveness of Macroprudential policy in Leaning against Financial Cycle⁹

Faced with growing systemic risk, both monetary and supervisory authorities would come into action to forestall a financial crisis. It is easy to see that when both consumer and asset prices are rising or falling together the stance of the two policies would be the same and there are no spillover problems. For instance when the build up of inflationary pressure is accompanied by asset price bubbles, both policies will be tightened-the interest rate is raised while the loan-loss provisioning will be increased - and they will reinforce each other. But when the two prices move in the opposite directions, a serious problem of working at cross-purposes arises.

Citing the literature on the target-tool assignment, Yellen (2010) argues that “it is perfectly possible to attain good outcomes even if monetary policy and macroprudential policy are carried out separately and independently, and the goals of each are pursued using entirely separate tool kits”. Yellen acknowledges that satisfactory results can be attained without policy coordination, even though fully optimal policy generally calls for coordination when spillovers occur, for instance situations may arise in which the Federal Reserve, in its conduct of monetary policy, might not be able to fully offset the macroeconomic effects of macroprudential interventions.¹⁰ In what follows it is argued that the independence of macroprudential policy is at best questionable.

In order to discuss the scope and effectiveness of macroprudential policy in leaning against the financial cycle, this section considers a situation in which consume prices are not expected to rise beyond a target range, but there are signs of incipient speculation that may create a bubble in the housing market. Faced with the growing instability in the housing market, the central bank could increase the policy rate to suppress unwarranted high expectations of capital gains, but would be reluctant to do so, unless the speculation has the danger of increasing inflationary pressure. The fiscal authorities may raise the property tax rate and impose additional taxes on the transactions in and transfer of properties, but these types of taxation may not be desirable as they distort property markets to impair their efficiency. As a third alternative policy measure, the financial regulatory authorities may consider imposing microprudential regulations on mortgage lending at banks and other non bank financial intermediaries for the macroeconomic purpose of stabilizing the housing market. In this regard, the regulatory authorities could employ two types of macroprudential instruments. The first includes some of the microprudential instruments - such as the LTV and DTI (Debt to Income) ratios - which are adjusted to control the supply of credit to a particular sector such as housing. The second type comprises those tools for controlling the supply of aggregate bank credit such as countercyclical capital charges, dynamic loan-loss provisioning, and capital conservation rules for banks. These tools are mostly implemented to moderate procyclicality in bank lending. Implementation of these two types of instruments entails quantitative - rather than price - control of the availability of sectoral as well as aggregate bank credit.

⁹ This section draws on Park (2010).

¹⁰ Yellen (2010) points out that higher supervisory standards for capital following the real estate-related loan losses of the early 1990s may have slowed the economy's recovery from the recession. More stringent bank capital and liquidity requirements to stem systemic risk, but with high unemployment in so many economies, they may delay economic recovery unless implemented in gradual manner over time, the new Basel III agreement recognizes the desirability of a phase in period for these standards. The implementation of tighter standards over a multi-year period should mitigate the concern that the macroprudential policies we are putting in place to control systemic risk will unduly restrict the availability of credit, thereby retarding economic recovery.

1. Fungibility of Money: Ineffectiveness of Selective Credit Control

In an effort to stave off a housing market boom, suppose that the regulatory authorities lower the two micro-prudential ratios – LTV and DTI – and that there is no change in the stance of monetary policy. The squeeze on mortgage lending is likely to discourage borrowing for consumption demand – the purchases of houses for their services – but not necessary for the investment demand by those seeking higher capital gains if housing prices are expected to rise continuously. Under these circumstances, as long as the level of total bank lending is left unchanged, banks will be able to extend more of other types of business and consumer loans with the funds released from housing finance they curtail. But if the expected real return on housing investment is perceived to be higher than the returns on other assets, many of the borrowers taking out other non-mortgage bank loans are likely to invest the bulk of their loan proceeds in housing.¹¹ This results from the fungibility of money and imperfections in ex post loan use monitoring that may not be able to prevent the loan diversion.

Given the fungibility of money, it appears that in countries where housing has become good substitutes for financial assets and banks dominate financial intermediation and the financial system as a whole restrictions on mortgage lending alone may not be effective in preventing the housing market bubble: they need to be complemented by an overall cut back of aggregate bank credit through, for instance, an increase in loan-loss provisioning. But once housing speculation gathers forces, as shown by the Korean experience discussed in section 4.3, even the simultaneous squeeze on both the sectoral and aggregate supply of bank credit may not be effective. This is because despite the overall tightening of bank credit, some of the loans extended to non-housing borrowers could be drawn away to be invested in housing as long as real property speculation picks up speed.

2. Macroprudential and Monetary Policy: Are they Independent?

In the preceding discussion, tightening of macroprudential policy is likely to move banks to raise interest rates on their loans. It will also drive many of their loan customers out of the bank loan market and into money and capital markets for direct financing at a higher cost. This increase in the debt and equity financing will then increase market interest rates. If this happens, contractionary macroprudential policy will dampen the aggregate demand for goods and services (with a possible exception of construction investment) as many borrowers without access to the capital market will be rationed out of the bank loan market, while it has limited effects on suppressing housing market speculation. The tighter stance of macroprudential policy may therefore widen the output gap depending on the extent to which bank loans are shifted to housing finance. Macroprudential measures may strengthen the financial system but do not necessarily help enhance financial macroeconomic stability. It follows then that if the policy rate is a poor tool to deal with financial market instability, so are macroprudential tools for moderating financial cycles.

The preceding discussion raises an important question as to whether the division of labor in policy management in which the central bank follows an interest rate rule in conducting monetary policy for price stability whereas the regulatory authorities are engaged in quantitative control in managing macroprudential policy for financial stability is a viable institutional arrangement.

¹¹ A housing market boom often coincides with land speculation. Business borrowers may decide to use a fixed investment loan to build a plant on a larger site of land than otherwise.

This question arises because most of the macroprudential instruments leaning against financial cycles work through changes in the availability of sectoral and aggregate credit and in this respect they are similar to reserve requirements. That is, macroprudential tools operate through effects on bank lending: changes in bank loans cause investment and consumer spending to change. Since this bank lending channel is one of many channels of monetary policy, it follows that in emerging economies where the banking system dominates financial intermediation, as far as the channel of transmission is concerned, macroprudential policy geared to controlling procyclicality in bank lending and monetary policy targeted for price stability are one and the same, although they have different objectives.

3. Korea's Experience with Macroprudential Policy

A recent survey by the BIS on the use of macroprudential instruments in 33 countries shows that in most cases the objective was to enhance the resilience of the financial system rather than moderating financial cycles and that the evidence on the effectiveness of macroprudential measures is not conclusive (CGFS 2010). In part these findings are supported by the recent experience with managing the real estate boom in Korea. Over a seven-year period beginning in 2001, the Korean government tightened monetary policy and imposed various macroprudential and tax measures on twelve occasions to break off an impending real estate speculation.

In October 2003, they not only increased the policy rate but also lowered the LTV ratio to 40 from 60 percent on mortgage loans with maturity less than 10 years for apartment purchases.¹² But the LTV control turned out to be less than effective, because of the leakage: banks were able and in fact started to extend mortgage loans with maturity longer than 10 years to avoid the restriction. In order to plug this loophole, two years later, mortgage lending was tightened further by lowering the LTV ratio on those loans with maturity longer than 10 years for the purchase of an apartment valued at more than 600 million won (or approximately 600 thousand US dollars). At the same time DTI ratio was lowered below 40 percent for apartment financing in some of the districts of the Seoul metropolitan area where there were signs of real estate speculation and in 2009, this restriction was extended to all of the same area.

Despite the implementation of these macroprudential measures housing speculation did not subside. It was clear that stronger doses of anti-speculation measures were needed and the stronger measures implemented included the requirement for registration of and imposition of transfer and transaction taxes on transactions in properties, which eventually ended the boom in the housing market. In retrospect it is unclear whether the real estate speculation would have been brought under control if the government had not resorted to the tax and other direct control measures. It is difficult to examine empirically the extent to which the 20 percentage-point reduction in the LTV contributed to slowing down if not stopping the speculation. In retrospect it was more of a symbolic move on the part of the regulatory agency (FSS) to signal that it was serious about stabilizing expectations on future prices of apartment, although it is unclear as to how successful the signaling was.

In general, the effectiveness of macroprudential tools may vary depending on the circumstances in which it is implemented. When the CPI and asset prices move in the same direction, it is likely that the stance of both monetary and macroprudential policy would be

¹² In Korea, there is a liquid market for apartments, which are standardized in terms of size and actively traded. In particular, smaller ones are easily marketable, making them a tradable investment asset and a good substitute for financial assets.

the same: they reinforce each other to restore both price and asset market stability.¹³ On the other hand, when movements of consumer and asset prices diverge, the two policies run into conflict with each other as in the case of stable CPI and rising asset prices in preceding section.

In particular, the conflict between the two policies appears to be more severe if rising consumer prices are accompanied by stagnation in the housing market as shown by the recent experience in Korea. In August 2010 the central bank raised the policy rate as it was concerned about the buildup of inflationary pressure. At the same time the regulatory authorities lifted up the DTI ratio on specific mortgage loans to revive the sagging demand for housing loans. Although it is too early to judge, the higher DTI ratio did not seem to have elicited any positive housing market response.¹⁴

Macroprudential tools such as the LTV and DTI are rather inflexible instruments that cannot be fine-tuned frequently to alter price expectations in real property markets. Fungibility of money makes their effectiveness at best ambiguous. Macroprudential policy for controlling the quantity of aggregate credit needs to be coordinated with the conduct of monetary policy, but given the different policy objectives and approaches to policy management of the monetary and regulatory authorities, such a coordination would be difficult to institutionalize.¹⁵ The financial regulatory authorities would find it difficult to decide on timing and the extent of adjustment of its tools. For an effective management of macroprudential policy the regulatory authorities should be able to detect signs of real asset speculation well before they get out of control and to identify the turning points in cyclical developments in the economy. Equipping the regulatory authorities with this macroeconomic forecasting function would mean entrusting them with a role in the conduct of monetary policy. It is not clear what that role should be.

IV. Making Operational a Macroprudential Framework for Financial Supervision

1. Macroprudential Framework

In addressing systemic risk, the financial supervisory authorities are responsible for providing information on the health and efficiency of financial institutions and developments in financial markets pertinent to the assessment of financial stability, including the monitoring of various financial indicators, interpretation of scenario analyses, and stress testing for both individual financial institutions and banking and other financial industries. While this responsibility of supplying information and data is of crucial importance, the major task of the supervisory authority is to construct and manage a macroprudential policy regime. Like any other policy regime, this one is also structured around the goal, intermediate targets, and tools of financial supervision.

¹³ A recent BIS report (CGFS 2010) argues that the use of macroprudential policies targeting the real estate sector in Asian countries helped make banking systems more resilient to real estate downturns but did not make much difference either to the strength of the boom or to the depth of the bust.

¹⁴ During first seven months of 2010, consumer prices rose by about one percent, whereas housing prices in some parts of the Seoul metropolitan area began to fall beginning in the second quarter of 2010.

¹⁵ The regulatory authorities may have not developed the expertise or culture of macroprudential policy, while the central bank cannot exercise supervisory control at the level of individual institutions. These institutional constraints could hamper coordination between the two policy authorities.

• The Objective

Broadly speaking, the goal of the macroprudential approach to financial supervision is to sustain overall stability of the financial system in cooperation with other policy authorities. In order to determine the goal of the macroprudential approach, it would be instructive to identify some of the most likely sources from which financial distress originates. In emerging economies, which is the focus of this paper, one of the most prevalent sources is speculation in asset markets, in particular in those markets for land, housing, and commercial real estate, which often leads to the boom-bust cycle of asset prices. In the run-up to a financial crisis or during the upswing phase of the business cycle, financial imbalances are often manifested in sharp increases in the prices of real and financial assets and investment in the construction industry, regardless of whether the causes of the imbalances are of domestic or foreign origin.

Other sources are likely to be speculative capital outflows and inflows, an unsustainable current account deficit, and a high degree of volatility in the foreign exchange rate. Of these potential sources of financial instability, it appears that the supervisory authority has the comparative strength in controlling speculation in and stabilizing prices of real and financial assets as it has detailed information on and influence over the asset-liability management of banks and other financial institutions, which are often the major culprits of asset market speculation. Given this advantage in gathering necessary information, it would be logical to assign the task of stabilizing asset prices to the supervisory authority – in particular those of real assets.

In stabilizing asset prices, the most difficult decision to make would be to evaluate whether asset price speculation is surging in a way that justifies a policy response in terms of prudential controls. In the conduct of monetary policy, the goals are clearly defined. When inflation targeting is the framework for monetary policy, the ultimate goal of price stability is represented by a predetermined rate of change in the CPI or core price index. In this framework, the central bank has a set of policy tools at its disposal and operational or intermediate targets to aim for. The central bank monitors and analyzes a large number of economic indicators and makes use of macroeconomic forecasting models. In a similar manner, the supervisory authority will find it necessary to analyze and monitor a large number of financial stability indicators such as those identified by the IMF¹⁶. This analysis will not be sufficient, however, because it cannot tell whether financial distress is in the making *ex ante* and explain the consequences of interactions of these variables, which are mostly endogenous. For this type of analysis, macroprudential analyses need to be supported by general equilibrium models of systemic stability that can analyze and quantify aggregate financial stability (Goodhart 2004).¹⁷

Most of the financial stability reports published by central banks are not backed by quantitative analyses using a coherent general equilibrium model that defines and quantifies financial fragility. As such, they are descriptive and lack the diagnosis and forecasting of financial stability.

Other studies on financial sector assessments have developed less sophisticated and partial equilibrium approaches to defining and measuring financial distress, an extreme form of which is a financial crisis. Borio and Lowe (2004) propose a scheme in which the

¹⁶ See IMF (2005).

¹⁷ Goodhart (2004 and 2006) shows that a general equilibrium model based on a microeconomic foundation can be constructed to measure and predict fragility of the banking sector, not the overall financial system. This model includes incomplete financial markets, heterogeneous banks, heterogeneous bank customers, endogenous default, and credit and deposit markets. An index of financial distress of the banking sector is defined in terms of the probability of default of the banking sector, which is chiefly related to bank profitability and the bank repayment rate. Despite its potential, the reliability and usefulness of the general equilibrium approach is not proven in emerging economies and is focused on the fragility of the banking system, not the overall financial system.

probability of financial distress is evaluated in terms of a small set of variables that include the ratio of private credit to GDP, real asset prices, and investment. They show that over a three-year horizon, close to 60 percent of the crises are predicted in a sample of 34 industrial and emerging economies over the 1960-1999 period during which there were 38 crises. In a subsequent paper (2004), they find a similar pattern in emerging economies when an over-valued exchange rate is included as an additional variable.¹⁸

In the absence of a general equilibrium model that can be used for determination and forecasting of asset prices, the supervisory authority will be constrained to rely on identification and observation of a number of asset market indicators that may help predict impending financial stability *ex ante*. In this regard, the most realistic option available to the supervisory authority is to construct an index of asset market stability *à la* methods developed by Borio and Lowe (2002). Illing and Liu (2003) also derive an index of financial stress in terms of such variables as the probable loss, risk, and uncertainty compiled from the banking foreign exchange, bond and equity markets, and the banking sector of Canada. The authors show that their measures perform better than others in predicting the emergence of financial distress for Canada.

• Intermediate Targets

Like the central bank's strategy of using operational and intermediate targets, the supervisory authority engaged in the macroprudential supervision needs to choose and aim at a set of variables that lie between its tools and the goal of stabilizing financial markets. The strategy to work with the intermediate target is desirable for two reasons. One is the difficulty of assessing and forecasting impending asset market instability. The difficulty is often compounded by the fact that the supervisory authority is not likely to be confident about its ability to influence the goal directly. Another reason for relying on the intermediate targets is that whatever operational mechanism is instituted for macroprudential supervision, it is not likely to be managed on a day-to-day basis, but to be activated only when threats to financial stability become visible. By then it may be too late to deflect the threats. By installing a system of monitoring and analyzing a set of intermediate targets, which may also serve as early warning indicators, the supervisory institution may have a better chance of detecting the signs of impending financial distress early on.

The criteria for choosing the intermediate targets are rather straightforward: they should be measurable, they should have predictable effects on financial stability, and the supervisory authority should command a certain degree of control over the variables. Which variables would then qualify as intermediate targets? It is neither possible nor practical to consider all those indicators identified by the IMF Handbook (2005). A more realistic strategy would choose a manageable number of indicators that send clear signals of an impending asset market boom on the basis of the experience with past financial crises. They are likely to vary from country to country, but some of the candidate variables include the volume of lending, sectoral allocation of loans, risk spreads, and provisions at banks and financial institutions.

• Tools and Management of Macroprudential Supervision

As for the supervisory tools, it should be noted that in theory as well as in practice, macroprudential supervision does not necessarily need new ones but can utilize most of the traditional supervisory control measures (see Table 2).

¹⁸ The performance of the three variables is measured in terms of the noise-to-signal ratio. And in order to capture the buildup of financial distress, the authors use the deviations of the three variables from the levels of the time of assessment.

Table 2. Macroprudential Instruments by Vulnerability and Financial System Component

		Financial system component				
		Bank or deposit-taker		Non-bank investor	Securities market	Financial infrastructure
		Balance sheet*	Lending contract			
Vulnerability	Leverage	<ul style="list-style-type: none"> capital ratio risk weights provisioning profit distribution restrictions credit growth cap 	<ul style="list-style-type: none"> LTV cap debt service / income cap maturity cap 		<ul style="list-style-type: none"> margin/haircut limit 	
	Liquidity or market risk	<ul style="list-style-type: none"> liquidity / reserve requirements FX lending restriction currency mismatch limit open FX position limit 	<ul style="list-style-type: none"> valuation rules (eg. MMMFs) 	<ul style="list-style-type: none"> local currency or FX reserve requirements 	<ul style="list-style-type: none"> central bank balance sheet operations 	<ul style="list-style-type: none"> exchange trading
	Interconnectedness	<ul style="list-style-type: none"> concentration limits systemic capital surcharge subsidiarisation 				<ul style="list-style-type: none"> central counterparties (CCP)

* Capital and other balance sheet requirements also apply to insurers and pension funds, but we restrict our attention here to the types of institutions most relevant for credit intermediation.

Source: CGFS (2010)

Dynamic provisioning is often regarded as a new macroprudential tool. It is true that by linking provisioning to the volume of lending, this policy tool may contribute to building up capital and slowing down the expansion of banks credit during the expansionary phase of the business cycle and reversing the process during the downswing phase. However, it is not a new tool; an existing tool is used in a way to dampen the amplitude of the business cycle. Other tools could also be tightened during the upswing and relaxed during the downswing.

In conducting macroprudential supervision, it would be instructive to think of it as a two-stage process of policy implementation. The first stage is characterized by an assessment of asset market stability. If potential threats to asset market stability are detected, the supervisory authority may respond to the growing imbalances by tightening microprudential tools at its disposal.¹⁹ At this first stage, the macroprudential response would be tailored to treat all financial institutions the same, as if there were “n” number of identical financial institutions.

At the second stage of the policy response, microprudential supervision would dominate. The task of the second stage supervision consists of (i) monitoring the extent to which financial institutions adjust their asset and liability management in response to the tightening of prudential controls and (ii) enforcing these controls if they do not adapt to the change.

In executing prudential controls, microprudential supervision should take into consideration that different financial institutions including banks behave in different ways and are heterogeneous. This means that the level of risk financial institutions are exposed to is likely to be different and idiosyncratic from institution to institution. Therefore, microprudential supervision carried out to achieve the objective of macroprudential supervision may have to exercise considerable discretion in differentiating between financial institutions on the basis of their relative importance.

¹⁹ The central bank will also be alerted to the disruption and called into action. On its part, the bank may raise its policy rate to discourage speculation and transaction.

For example, macroprudential operations have to weigh up the knock-on effect of financial distress (Crockett 2000 and White 2004). Banks as the suppliers of liquidity to the system and large and more complex institutions, in particular those engaged in universal banking, should be subject to closer scrutiny in monitoring their imprudent behavior than smaller financial firms whose failure may not necessarily pose serious systemic risks.

As discussed in Section 2, one of the main objectives of the macroprudential approach is to preserve financial stability by subduing pro-cyclicality in the lending behavior. To this end, prudent tools including the loan-to-value ratio, the repayment period, collateral and margin requirements, capital requirements against real estate lending, and the exposure to the real estate sector are to be tightened in the upswing and loosened in the downswing phase.

These instruments can be complemented by the dynamic provisioning, but with caution. This is because the dynamic provisioning scheme may have an inherent bias against small and medium-sized firms and households that have increasingly accounted for a large share of customers at banks and other financial institutions. Large firms have access to international as well as domestic capital markets for the financing of their investment. Denied credit at banks, they could issue commercial paper, bonds, and equities to raise funds they need. These financing alternatives are often not available to small and medium-sized firms. During an economic boom, those banks that are subject to the dynamic provisioning may discriminate against small and medium-sized firms, which are likely to be perceived as high-risk clients, in cutting down their lending.

On implementing prudential tools, questions have been raised as to the extent to which the supervisory authorities should be allowed to exercise discretion as opposed to relying on a set of rules. In view of the fact that the supervisory authority will have difficulty in diagnosing the health and soundness of the financial system independently or in cooperation with other authorities and that the effect of the macroprudential supervision on the behavior of financial institutions and markets is uncertain, relying on discretion could be counter-productive. There is also the danger that the supervisory authority loses its credibility and influence on financial market participants if they cry wolf too often.

Given these circumstances and risks together with the expediency of the rules, one can make a strong case for a rule-based, rather than a discretionary, macroprudential supervision. Goodhart (2004) is an advocate of linking not only provisioning but also the pricing of risks to the volume of the lending at banks. Borio (2002), however, argues that the rule-based supervision has its share of problems: it may not encourage financial institutions to improve their risk management, thereby exacerbating incentives to arbitrage it away; and it may not be consistent with promoting a better balance between market and policy-induced discipline.

2. A Macroeconomic Framework for Financial Stability: Need for Tripartite Policy Coordination

While Crockett (2000) and Borio (2003) were concentrating on developing a macroprudential framework for financial supervision and regulation designed to “limit the risk of episodes of financial distress” (p.2) as opposed to microprudential supervision aimed at protecting consumers, White (2004) proposed a broader framework for macroeconomic policy, which includes macroprudential supervision as its subset. Only such a broader framework, which encompasses the use of macroprudential instruments of the financial supervisory institutions as well as the use of monetary and fiscal policy could organize an effective policy response to macroprudential concerns of mitigating financial systemic imbalance with their attendant heavy costs in terms of output and employment. White claims that such a broad policy regime can provide critical information needed for financial stability about the distribution of risks and various systemic vulnerabilities stemming from the transfer of one type of risk to another through the interplay among market participants. The framework may also have advantages as it could facilitate policy coordination and institutionalize an integrated role of the central bank, the supervisory agency and the fiscal authority in limiting the expected losses arising from system-wide financial excesses that could feed back on the real economy.

The possible spillovers of macroprudential policy leave little doubt that there is a need for policy coordination between the financial supervisory institutions and monetary and fiscal authorities. In this broader framework all policy authorities – the central bank, the supervisory institution, and the central government fiscal authority – are jointly responsible for steering the economy clear of financial disruptions. They are expected to work together in detecting signs of the emergence of financial imbalances and working out policy responses by selecting and setting the timing of implementation of policy tools at their disposal. In this policy framework, therefore, efficiency of policy coordination together with a clear division of labor among the three policy authorities would figure importantly in achieving the objective of financial stability.

Before the supervisory function was separated out of the central bank to be assigned to a new supervisory authority, the central banks were engaged in some type of macroprudential supervision. Now that many central banks do not have the authority of supervising individual financial institutions, the responsibilities for financial stability have to be shared and the division of labor must be clearly agreed on among the three institutions in terms of policy tools they can use. In this regard, it may be advisable to create a tripartite committee consisting of all three policy authorities for monitoring and analyzing various financial stability indicators and the results of stress tests conducted for the financial system as a whole and making decisions on the activation of policy response to an impending financial crisis.

In a global economy, which has witnessed increasingly large and volatile capital movements between countries and regions as a result of deeper international integration, individual countries are finding it increasingly difficult to construct a shield against adverse external shock emanating from speculation in international financial markets. Resolving the problems related to the cross-border transmission of financial distress would call for expanding the scope of and consolidating policy cooperation between countries at the regional level. The thirteen countries belonging to ASEAN+3 have instituted a forum for policy dialogue. Although it has a relatively short history, this forum has contributed to exchanging information and identifying potential sources of financial disruptions in the region. At present, the forum for the policy dialogue does not include supervisory institutions from the region. Now that the importance of prudential controls as a means of stabilizing financial markets has gained acceptance, it may be desirable to expand the ASEAN+3 forum to include the region’s supervisory authorities as members.

V. Concluding Remarks

The macroprudential orientation of financial supervision and regulation is not necessarily a new idea. In fact, most central banks with supervisory oversight have been and will continue to be engaged in some type of macroprudential supervision. In their supervisory activities, they would rely on some of the microprudential controls as a means of complementing monetary policy as they may in dampening pro-cyclicality in the asset and risk management at banks and other financial institutions.

Two relatively recent developments have garnered growing attention on macroprudential orientation of financial supervision both in domestic and international policy communities. One has been the realization that the best defense against financial instability begins with strengthening the foundations of the domestic financial system. This awareness has led to the advocacy of institutionalizing macroprudential supervision.

The other has been the creation of an independent supervisory institution in a growing number of countries. These supervisory institutions are still bound by tradition of giving priority to ensuring safety of individual financial institutions to protect consumers-depositors and other financial investors. At the same time, many central banks have chosen inflation targeting as the framework for their conduct of monetary policy. To be sure, central banks have the mandate to maintain overall financial stability as well. Nevertheless, the transfer of supervisory oversight and the focus of the central bank on inflation targeting appear to have created a vacuum of macroprudential supervision as a constituent part of an overall macroeconomic policy framework for financial stability. This is a highly undesirable and unsustainable state of policy management and will have to be rectified. This paper recommends the construction of an overall framework for macroprudential policy to be managed jointly by monetary, fiscal, and supervisory authorities.

As a newly established institution, the independent supervisory agency may not have had the time to develop either the culture or the expertise needed to incorporate macroprudential controls in its supervisory operations. This internal constraint has been compounded by the additional burden of conducting macroprudential controls in the absence of a reliable operational framework for macroprudential policy that the authority can make use of in evaluating the emerging financial distress and charting appropriate policy responses. What is, therefore, needed at this stage of the debate on macroprudential policy is further research on the quantification and better assessment of systemic financial risk and the scope and effectiveness of prudential controls at the supervisory agencies.

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CHAPTER 3

Thoughts on Modeling Macro-Financial Crisis as Bankruptcy

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In this presentation, I would like to share some thoughts in progress. The core idea is that macro-financial crisis can be viewed as bankruptcy in the macro scale. Bankruptcy occurs when existing contractual relations become unsustainable. Thus resolution of crisis requires restructuring contracts. At the macro level, this is a political process. Practical implications of normative solutions in the bargaining and bankruptcy literature need to be investigated. Institutions that are built to insure financial stability such as central banking, deposit insurance and financial regulations can be looked at from the new point of view. In particular, discussions on financial reform should be guided by certain principles that are consistent with macro bankruptcy resolution.

Subject Classification: JEL G01, C71, C78

Key Words: financial crisis, bankruptcy, bargaining

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I. INTRODUCTION

The global financial crisis that started in the US in 2007 gave an opportunity to economists to re-examine the way they think about financial crisis. In the neo-classical tradition, financial crisis is not a pleasant topic to deal with. It does not quite square with the notion of equilibrium, rational expectations, not to mention *laissez-faire*.

Many analyses have been put forward to explain the occurrence of crises and many proposals have been put forward to prevent or reduce crises. For recent discussions, see, for example, Acharya and Richardson. eds. (2009) and Brunnermeier, Crocket, Goodhart, Helwig, Persaud and Shin (2009). The solutions proposed are based on the proposers' understanding of the crises. And there may not be a unique way of understanding the crises. But in order to propose good solutions, one needs to have good understanding of the nature of financial crises. Thus the framework in which we look at the problem is important.

One such framework is provided by the literature on *financial runs*. The existing literature on bank runs treats financial crisis as something that need not happen but happens because of what people think. See, for example, Bryant (1980) and Diamond and Dybvig (1983). See also papers on market runs such as Bernardo and Welch (2002).

In this essay, I will attempt to bring out and make clear an alternative frame-work, which perhaps many people have had in the background of their minds in analyzing financial crises. I submit that a useful framework is to look at it from the macro-bankruptcy point of view. *Macro bankruptcy* occurs when a substantial part of the economy is in a state of *insolvency*, which threatens to cause, in the absence of any resolution, the whole economy to degenerate into an unacceptable level of operation. One difference between micro bankruptcy and macro bankruptcy lies in the treatment of moral hazard problem. The case for moral hazard loses its strong appeal as we enter a macro bankruptcy situation. The reason is that in a macro bankruptcy situation, one cannot punish the whole economy. In contrast, one can punish individual players (persons or institutions) for their errors and excesses in micro bankruptcy situations. As the model in the next section will show, the macro bankruptcy problem is a systemic problem.

Distinguishing between liquidity problem and bankruptcy problem is important. The view that there are two equilibria, one in which there is a run on the system and another in which the economy will function normally, can be applied when there is a liquidity problem but not when there is bankruptcy. In the bankruptcy view, a crisis is not a situation that occurs because people panic without reason. The bankruptcy viewpoint emphasizes the underlying causes, presumably macroeconomic imbalances. In this view,

a crisis occurs when a gap develops between reality and past expectations, embodied in existing contracts, making it necessary to rewrite them.

This statement has many facets. First, it has relevance for the definition of financial crisis. There have been empirical definitions of financial crises. See, for instance, Bordo, Eichengreen, Kingebiel and Martinez-Peria (2001). One can provide theoretical rational for some of these definitions. Also, theoretical considerations can give further guidance in identifying financial crises.

Second, albeit related to the first point, financial crises are often identified with the surge of debts beyond sustainable levels. The bankruptcy view clearly associates debts with crises.

Third, it sheds light on the functions of some financial institutions. Deposit insurance, for instance, has been interpreted primarily as a device to prevent bank runs. But it can be also interpreted as a device for loss sharing, for the insurance fund could be used as bailout money. The *capital adequacy regulation* can be also viewed from this perspective. Also, the

lender-of-the-last-resort function of central banks can be understood as a device for providing liquidity, often with tax-payers' money, in the face of macro bankruptcy.

Fourth, it has implications for the relationship between monetary policy and financial crisis. For instance, it has been often observed that high inflation followed by a restrictive monetary policy can lead to crisis. This can be easily interpreted from the bankruptcy point of view, for the real value of debts increases and therefore leads to higher probability of bankruptcy.

II. LIQUIDITY PROBLEM AND INSOLVENCY PROBLEM

Consider a simple model of an economy with two sectors ($i = 1, 2$) and a foreign sector ($i = 0$). In each period, sector i ($i = 1, 2$) purchases one unit of input from sector $i - 1$, produces one unit of product by adding one unit of value-added, and supplies the product to sector $i + 1$. (We identify sector 3 with sector 0, that is, the foreign sector.) Thus in each period, production in sector 2 occurs after production in sector 1.

In return, sector i ($i = 1, 2, 3$) pays i dollars to sector $i - 1$ for the input at the time of delivery. Thus in each period, sector i ($i = 1, 2$) first pays i dollars to sector $i - 1$ for the input and then receives $i + 1$ dollars from sector $i + 1$. Out of this revenue of $i + 1$ dollars, sector i sets aside i dollars to pay for input in the following period. Then what is left, which we may call the net revenue, is 1 dollar.

Sector 1 has an outstanding debt in the amount of D dollars, which is serviced at the contracted interest rate of r^* so that interest payment in each period is $Dr^* (\leq 1)$ dollars. What is left from the net revenue after debt service is consumed. Thus consumption in sector 1 is $1 - Dr^*$ dollars. To simplify the analysis, we assume that consumption is completely passive. In particular, if there were no money left, consumption is zero. Sector 2 has no outstanding debt. Thus sector 2's consumption is 1.

The economy is initially in a kind of steady state, everything repeating itself. Suppose in some period, which we will call period 0, production fails in sector 1. Sector 1 cannot supply its product to sector 2 and thus cannot generate income.

Furthermore, without input, sector 2 cannot produce in period 0 either. Thus there will be no production at all in the economy in period 0. There may be damage to production capacity. Denote the replacement cost for the damaged production capacity by $\Delta (\geq 0)$.

Without revenue in period 0, sector 1 needs Dr^* dollars of cash to service the debt for period 0. It also needs additional $\Delta + 1$ dollars of cash, before period 1 begins, to replace the damaged production capacity and to purchase input from sector 0 in period 1. Thus sector 1 needs a total of $Dr^* + \Delta + 1$ dollars in cash to continue operation and it will be in default if it cannot pay Dr^* dollars.

1. Liquidity Problem

Unless sector 1 comes up with the money needed, production will stop completely in the economy from period 0 on, for sector 2 cannot produce without input from sector 1. The consolidated financial sector, which consists of the central bank and financial institutions, could immediately lend the money to sector 1 and production would restart from period 1. Then at the end of each period $t = 1, 2, \dots$, sector 1 would have a revenue of 2 dollars. But out of this, $1 + Dr^*$ dollars need to be set aside to service old debt and to pay for input in the following period for sector 1 to stay as a going concern. Thus the *income* that can be used to service any *new* debt would be $1 - Dr^*$ dollars in each period.

If the interest rate at which the consolidated financial sector provides *new* money is $r (\geq 0)$, the present value of this income stream starting from period 1 is $(1 - Dr^*)/r$ dollars. Thus sector 1 can eventually pay back its debt of $Dr^* + \Delta + 1$ dollars as long as $(1 - Dr^*)/r > Dr^* + \Delta + 1$. (Seeing it in another way, interest can be paid out of the income of $1 - Dr^*$ dollars in every period if $r(Dr^* + \Delta + 1) < 1 - Dr^*$. Here sector 1 has a liquidity problem that can be resolved by borrowing from the consolidated financial sector.

If $r = (1 - Dr^*)/(Dr^* + \Delta + 1)$, sector 1 needs to borrow money perpetually. It can pay interest but cannot pay back the principal. Put $\hat{r} \equiv (1 - Dr^*)/(Dr^* + \Delta + 1)$.

2. Insolvency Problem

If $r > \hat{r}$, the potential income cannot service the debt. Putting it in another way, the present value of sector 1's future income stream is less than the amount it needs to borrow, that is, $(1 - Dr^*)/r < Dr^* + \Delta + 1$. If sector 1 borrows money it needs, its debt will only grow without bound. The debt is not sustainable because sector 1's income cannot even cover interest payments. Sector 1 has to go out of business. It is *bankrupt* or *insolvent*. But letting sector 1 go out of business is not a viable option from the standpoint of the economy as a whole. Thus there is a compelling reason why sector 1 needs to be *bailed out*. When $r \leq \hat{r}$, it was sufficient for the consolidated financial sector to lend money to sector 1. But now with $r > \hat{r}$, the consolidated financial sector alone cannot resolve the problem. One has to resort to the taxing power of the government. In other words,

sector 2 has to share the burden of bailing out sector 1.

The present value of the future income stream of the whole economy is $(2 - Dr^*)/r$ dollars. Thus as long as $(2 - Dr^*)/r > Dr^* + \Delta + 1$, that is, $r < (2 - Dr^*)/(Dr^* + \Delta + 1) \equiv \tilde{r}$, it would be in the interest of sector 2 to contribute toward bailing out sector 1. The government can tax sector 2 in the amount of

$(Dr^* + \Delta + 1) - (1 - Dr^*)/r$, which can be paid over time in installments of (τ_1, τ_2, \dots) , where $\sum_{t=1}^{\infty} \tau_t / (1+r)^t = (Dr^* + \Delta + 1) - (1 - Dr^*)/r$.

3. Bailout Schemes

In the above, when $\hat{r} < r < \tilde{r}$, a bailout scheme was considered where sector 1 bears the maximum burden that it could shoulder and sector 2 bears the rest of the burden. That is, the total burden of bailout, which is $Dr^* + \Delta + 1$, is split between the two sectors as

$$\begin{aligned} Dr^* + \Delta + 1 &= b_1 + b_2, \text{ where} \\ b_1 &= (1 - Dr^*)/r = (\hat{r}/r)(Dr^* + \Delta + 1) \text{ and} \\ b_2 &= (Dr^* + \Delta + 1) - b_1 = (1 - \hat{r}/r)(Dr^* + \Delta + 1). \end{aligned}$$

That is, the burden is split between the two sectors in the ratio $(\hat{r}/r, 1 - \hat{r}/r)$. This scheme for burden sharing may be justified on the grounds that the problem occurred in sector 1. But one may also argue that since the production process is complementary in that neither sector can function without the other, the two sectors should equally share the burden. A compromising solution could be that

the two sectors share the burden but not equally.

The issue may not be resolved solely by theoretical deliberations, for it is a problem of *political economy*. In a democratic society, a solution will be ultimately reached based on the balance of political power.

Once we realize that whether sector 1 has to bear the maximum burden when insolvent is debatable, we can also see that whether sector 1 has to bear whole burden when it faces a liquidity problem is also debatable. In other words, even in the case where $r < \hat{r}$, any split of the burden between the two sectors $(b_1, b_2) \geq 0$, where $b_1 + b_2 = Dr^* + \Delta + 1$, is possible, with perhaps a strong presumption that $b_1 > b_2$.

4. Bargaining Problem

We may look at the problem from the standpoint of a formal bargaining problem¹. An n -person bargaining problem consists of n players who can split a pie of size $\pi (> 0)$ if they agree on how to split the pie, but will end up with a payoff vector of $(d_1, \dots, d_n) (\geq 0)$, which is called a break-down point or disagreement point, if they cannot agree. If they do agree, their payoffs can be represented by a payoff vector (x_1, \dots, x_n) such that $x_1 + \dots + x_n = \pi$ and $x_i \geq d_i$ for $i = 1, \dots, n$.

¹ See Nash (1950) for a seminal work on bargaining.

The current problem can be thought of as a bargaining problem with three players ($n = 3$): sector 1, sector 2, and the consolidated financial sector (player 3). They can split a pie of size $2/r - (\Delta + 1)$, which is the present value of the future income of the economy minus the cost of replacing production capacity and operating cash for sector 1. If they do not agree, their payoffs are $(d_1, d_2, d_3) = (0, 0, 0)$.

The Consolidated Financial Sector

We can think of a symmetric solution where the three parties split the pie equally. This, however, would not be a reasonable solution. Even though the three players are in the same boat in that they cannot split the pie without a unanimous agreement, there are social norms that put the three players in different positions.

First of all, the problem is in essence a loss-sharing problem. Thus there should be a social norm that a party should not profit from the situation while others are sharing losses. If we apply this principle here,

the consolidated financial sector should not receive more than the amount of "old money":

$$x_3 \leq Dr^* + Dr^*/r.$$

In practice, this principle is not always adhered to, for some financial institutions actually attempt to take advantage weak parties in crisis situations.

When the amount of old money exceeds the total pie to be split, that is, $Dr^* + Dr^*/r > 2/r - (\Delta + 1)$, then it is necessary to restructure the debt. In this case, any split $(x_1, x_2, x_3) \geq 0$ such that $x_1 + x_2 + x_3 = 2/r - (\Delta + 1)$ seems possible. But the consideration of moral hazard problem would perhaps dictate

$$x_3 \geq x_2 \geq x_1.$$

This is a genuine bankruptcy situation, where the value of an indebted party is less than the sum of existing claims. The literature on bankruptcy problem investigates how the *liquidation value* or the *going-concern value* should be shared among the claimants. One may think about the implication of applying various *bankruptcy solutions* proposed in the literature. For these solutions, see, for instance, Aumann and Maschler (1985) and Young (1987). In this essay, we will not go into this issue any further, for our model does not have sufficient structure to deal with liquidation.

Tax Payer Money

Let us now consider the case where the amount of old money is smaller than the total pie to be split, that is, $Dr^* + Dr^*/r < 2/r - (\Delta + 1)$. Even though debt restructuring is still possible, there seems to be no further guiding principles, except perhaps *the sanctity of contracts* in a capitalistic society. Thus, for a benchmark case, we will only consider solutions without debt restructuring. In effect, we assume that $x_3 = Dr^* + Dr^*/r$. This reduces the problem to a *two-person bargaining problem* where

$$\pi = (2 - Dr^*)/r - (Dr^* + \Delta + 1) > 0 \text{ and } (d_1, d_2) = (0, 0).$$

Any split $(s_1, s_2) \geq 0$, where $s_1 + s_2 = \pi$, is feasible. One standard bargaining solution that has been given the most attention in the bargaining literature has been the Nash Bargaining Solution (NBS). If we apply the NBS here, one has $s_1 = s_2 = \pi/2$. This means that the burden should be split equally, regardless of whether sector 1 has a liquidity problem or insolvency problem.

Is there no difference then between the liquidity case and insolvency case? Consider the liquidity case, where $(1 - Dr^*)/r > Dr^* + \Delta + 1$. Even though sector 2 cannot do anything if sector 1 does not agree, it knows that sector 1 can unilaterally, with the cooperation of the consolidated financial sector, solve the problem. Its threat of not producing without tax payer money is not credible. It is in the interest of sector 1 to solve the problem rather than insist on government rescue. Thus, *in the absence of any political solution*, the break-down point becomes

$$(d_1, d_2) = ((1 - Dr^*)/r - Dr^* + \Delta + 1, 1/r)$$

If both players realize this, there is no room bargaining between the two players and the solution is

$$(x_1, x_2) = (d_1, d_2)$$

III. CONCLUDING REMARKS

I emphasize that this is a work in progress. The model presented in this essay is just one component of a new approach for macro-finance modeling. There are many problems that still need to be addressed with rigorous theoretical modeling. One essential component lacking in the model of the current essay is asset markets. Our goal is to understand financial crisis in a macro scale. The financial sector deals with saving/investing and lending/borrowing. The financial market is a market for asset trading. An array of asset prices are determined in the financial market. Thus a good financial-macro model should capture the interaction between real economic activities and asset markets. The model presented in this essay is lacking in that it cannot, for example, properly address excesses in the financial market as a cause of financial crisis.² But I hope it constitutes a useful building block toward a good macro-finance model.

² See Borio and Lowe (2002) for empirical findings on the role of credit expansion and asset prices in explaining financial crises.

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CHAPTER 4

Issues on Reform of the International Financial Architecture: Korea's perspective

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Abstract

Based upon Korea's experience, this paper discusses issues related to reforming the international financial architecture. Foreign reserves, macro-prudential regulation, global financial safety nets and currency internationalization build main framework for reforming IFA. While accumulation of foreign reserves is the most important means of self-protection against deleveraging, without accompanying any macro prudential regulation this will cause significant costs and risk exacerbating the capital inflows problem. Properly designed and implemented macro prudential regulation should mitigate the risk of short term external borrowing. To that extent it can substitute for the hoarding of foreign reserves. However, macro-prudential regulations that are vaguely defined, poorly designed or incorrectly implemented might prevent domestic financial system from functioning properly and bring only short term relief at the cost of longer term benefits from currency internationalization. Global financial safety nets can be useful substitutes for foreign reserves, even though they may be less than perfect.

JEL Classification: F30, F32, F33, F34

Keywords: International financial architecture, capital inflows problem, pro-cyclicality, currency and maturity mismatch, foreign reserves, prudential regulation

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I. Introduction

Financial globalization makes peripheral countries, especially small open economies with deep international financial linkages, vulnerable to credit shocks originating from the center countries. Regardless of their economic fundamentals many emerging market countries (EMCs) have been severely hit by the global financial crisis. In fact, one may even say that financial globalization has led to collateral damage, instead of the collateral benefits promised earlier (Kose et al., 2006). Korea is a good example.

The global financial crisis has shown that self protection from volatile capital flows at the individual country level is either too costly or even impossible.¹ Since the East Asian (EA) crisis, foreign reserves have been given priority. However, they are not only inefficient but do not help global rebalancing, either.

Furthermore, at the current stage of financial globalization, regulatory arbitrage can make prudential rules and regulations ineffective in managing reckless capital flows. Therefore, it is necessary to rebuild an international financial architecture (IFA) that is compatible and harmonious with financial globalization.

The purpose of this paper is to review specifics related to reform of the IFA. Foreign reserves, macro-prudential regulation, global financial safety nets and currency internationalization build main framework for reforming IFA. A successful reform is much easier said than done. A successful reform should provide a safeguard against reckless capital flows and at the same time should allow EMCs to enjoy benefits from globalization.

On ambitious proposals for IFA reform, I leave it to the existing literature (for example, Eichengreen, 2009, 2010; Kawai, 2010; Baker, 2009; Dobson, 2009 among others). The discussion in this paper is based on Korea's experience. However, it may well represent the views of EMCs in general because during the last decade many EMCs have had certain characteristics in common: massive accumulations of foreign reserves, deep financial linkages, and suffering from volatile international capital flows.

The paper is organized as follows: Section II explains the implications of Korea's international financial linkages after the EA crisis. Section III discusses challenges related to volatile capital flows, and Section IV discusses four issues related to IFA reform. Section V closes with concluding remarks.

II. International financial linkages and increasing vulnerability

Since the EA crisis, the Korean government has pursued capital account liberalization aggressively. Most recently, Schindler(2009) who constructed de jure financial integration index of 91 countries from 1995 to 2005 has ranked Korea the 44th. Among Asian countries Korea is the 3rd most widely open country next to Hong Kong and Japan and even overtakes the U.S. which is ranked 47th.²

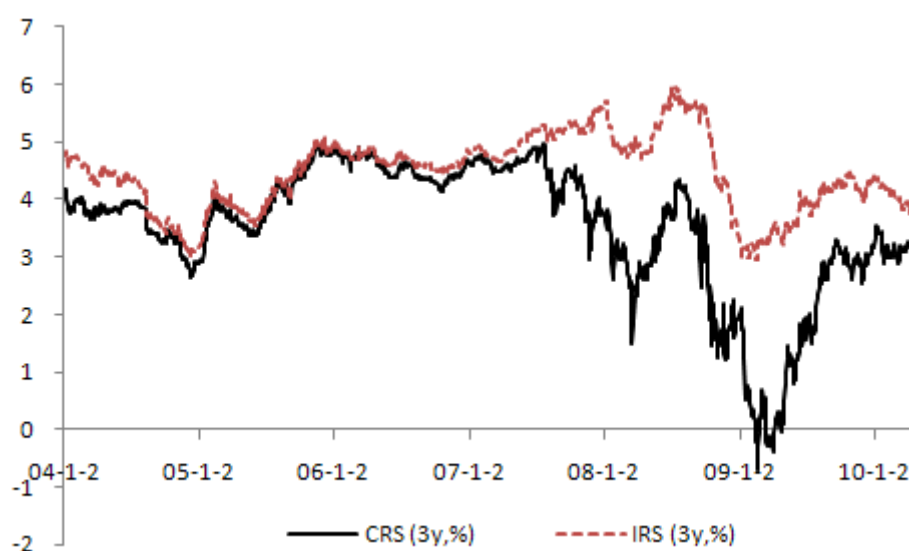
[Figure 1] plots the daily three year swap interest rates (IRS) and cross currency swap interest rates (CRS). The difference between IRS and CRS is called the swap basis. It is the exchange risk free rate of return when 1 USD is funded at LIBOR and invested in the KRW market. Although the swap basis has increased significantly since onset of the global credit crisis, both rates are highly correlated. In fact, the markets for TBs, swaps and foreign

¹ Valgreen (2007) has already noted this.

² In fact, capital inflows are more mobile (33rd) than outflows (48th).

exchange rates are closely interconnected, and deep financial linkages have been established.³

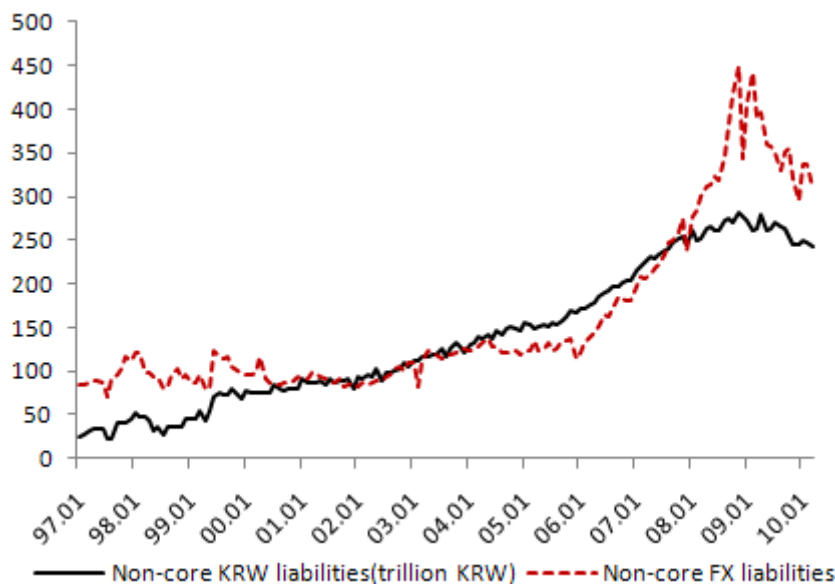
Figure 1. Korea's Financial Market Linkages



Source: Bank of Korea

The direct implication of the deep financial linkages is a sharp rise in non-core foreign currency liabilities. Non-core liabilities, *i.e.*, interbank liabilities not reflected in the monetary aggregates, are vulnerable to credit shocks. Deleveraging started immediately after the Lehman Brothers collapse, and non-core foreign currency liabilities shrank drastically. Furthermore, deleveraging had spillover effects on the domestic wholesale credit market. This phenomenon, a so-called double drain, was unprecedented (<Figure 2>).

³ Derivatives are important vehicles involved in capital flows in Korea (Global Financial Stability Report, Annex 3.3, IMF, 2007).

Figure 2. Non-Core Liabilities of the Korean Banking System⁴

Source: Bank of Korea

III. Capital inflows problem

Capital inflows often lead to real exchange rate appreciation: inflationary pressures on asset markets and the whole economy, deterioration in the current account, and a boom in bank lending.⁵ Furthermore, they are pro-cyclical. In fact, pro-cyclicality is the most important aspect of the capital inflows problem.⁶

<Table 1> measures the pro-cyclicality of various components of net capital inflows. In Korea, bank debt is mostly pro-cyclical. Pro-cyclicality is aperiodic. Strong pro-cyclicality showed up during pre-crisis period of 1995-97 and of 2006-08 while barely observed during 2000-05. This pattern of pro-cyclicality is the nature of capital flows to EMCs (Kaminsky et al., 2004). Net capital inflows increase in good times and fall in bad times.

Looking at the banking sector's integrated balance sheet during 1995.3-2009.3, the growth rates of foreign debts and assets illustrate a one-to-one correspondence, which also implies strong pro-cyclicality (<Figure 3>).⁷

⁴ Non-Core KRW Liabilities = CDs (interbank) + Borrowings from financial institutions + Repos (financial institutions) + Call money + bills sold and credit card receivables sold + Bonds payable in KRW; Non-Core Liabilities in Foreign currency = Total Liabilities in Foreign currency - Deposits in foreign currency

⁵ Calvo et al. (1994) addressed this issue and coined the term 'capital inflows problem.'

⁶ For other literature, see and their references.

⁷ The same result is obtained when looking at year-to-year instead of monthly growth rates.

Table 1. Pro-cyclicality of Capital Flows: Korea

		1995-97	2000-08	2000-05	2006-08
Pro-cyclicality ¹⁾	Net Capital Inflows	0.64	0.47	0.12	0.94
	FDI	-0.53	0.04	0.13	-0.31
	Equities	0.40	0.18	0.18	0.03
	Bonds	0.18	0.24	-0.13	0.70
	Others	0.71	0.33	0.06	0.87
	(Bank)	(0.64)	(0.41)	(0.00)	(0.92)

1) Coefficient of correlation with quarterly year-to-year real GDP growth rate (%)

Source: Kim (2009)

Figure 3. Pro-cyclicality of Banking Sector Foreign Currency Borrowing



Source: Kim (2009)

Using the flow of foreign currency funds table, the capital inflows problem in Korea may be best demonstrated ([Table 2, 3]). In 2007, the banking sector borrowed 56.3 billion dollars, while a total of 102 billion dollars flowed in. However, of 102 billion dollar inflow, only 15.1 billion dollars were absorbed as foreign reserves (FR) by the monetary authority and 16 billion dollars held as external assets by the government and the banking sector. The rest was recycled.

Capital inflows are intermediated. Even under flexible exchange rates, capital inflows via derivatives such as swaps accompany an increase in domestic credit (<Figure 7>). It is not a coincidence that non-core foreign currency and won liabilities move in the same direction (<Figure 2>). In fact, it is won intermediation that contributes to the pro-cyclicality.

After the Lehman collapse, the Korean economy faced a rapid downturn cycle generated by massive capital inflows followed by sudden stop and reversal. In 2008, 41.3 billion dollars flew out and deleveraging put heavy pressure on the banking sector ([Table 3]). It couldn't roll over its debt and had to pay back 23.5 billion dollars. The monetary authority had to sell over 56 billion dollars of reserves.

Table 2. Uses and Sources of FX Liquidity (2007)

Uses (billion USD)		Sources	
External Assets		External Liabilities	
General government	3.0	General government	21.5
Banks	13.2	Banks	56.3
Domestic banks	10.3	Domestic banks	26.8
Foreign bank branches	2.9	Foreign bank branches	29.5
Other	-0.0	Other	33.0
MA	15.1	MA	12.3
Overseas equity investment	52.6	Foreign equity investment	-28.9
Overseas FDI	15.6	Foreign FDI	1.8
Financial derivatives	-5.4	Other	0.2
Other investment	2.4	CA	5.9
Other capital account	7.8		
Errors and omissions	-2.1		
Total	102.0	Total	102.0

MA: monetary authority

Source: ECOS, Bank of Korea

Table 3. Uses and Sources of FX Liquidity (2008)

Uses (billion USD)		Sources	
External Assets		External Liabilities	
General government	-10.6	General government	-10.6
Banks	6.3	Banks	-23.5
Domestic banks	7.4	Domestic banks	-12.0
Foreign bank branches	-1.1	Foreign bank branches	-11.5
Other	-6.5	Other	19.5
MA	-56.4	MA	9.4
Overseas equity investment	-7.1	Foreign equity investment	-33.5
Overseas FDI	18.9	Foreign FDI	3.3
Financial derivatives	14.8	Other	-0.2
Other investment	-0.1	CA	-5.8
Other capital account	-1.1		
Errors and omissions	0.6		
Total	-41.3	Total	-41.3

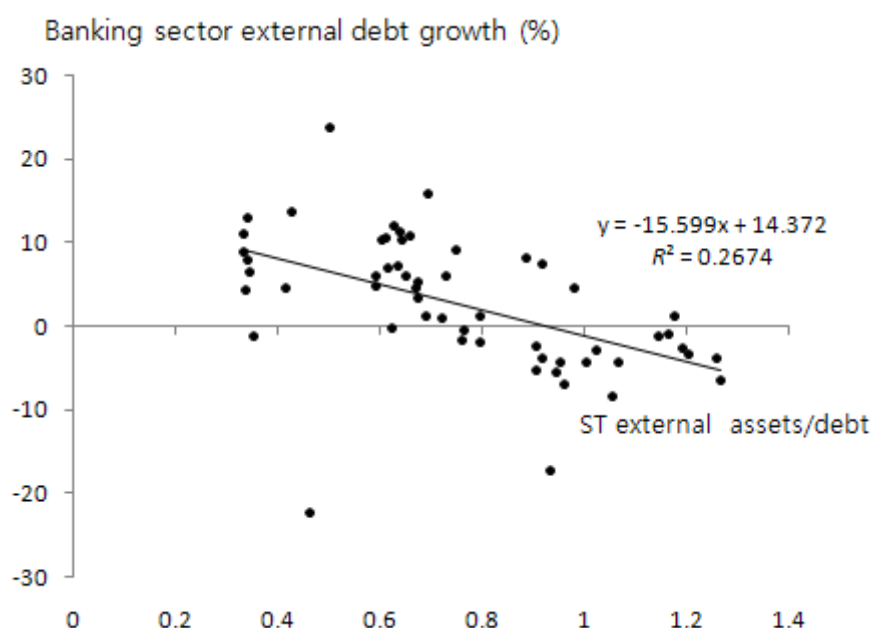
Source: ECOS, Bank of Korea

In EMCs having non-convertible currencies, capital inflows accompany both currency and maturity mismatches and often end up causing twin crises (Kaminsky and Reinhart, 1999). <Figure 4> shows the negative association between external debt growth and

maturity mismatch of the Korean banking sector, confirming what the capital inflows problem implies for EMCs.⁸

Ironically, currency mismatches are much more serious in developed countries. Following Goldstein and Turner (2004), their aggregate effective currency mismatch (AECM) index is computed for various countries ([Table 4]). A negative (positive) number indicates a debtor (creditor) country, and numbers in absolute terms denote the degrees of mismatch. As of 2007, all EMCs in the table were creditors thanks to their massive FR accumulations since the East Asian crisis. However, based upon the international investment position, covering broader types of assets and liabilities such as equities and direct investment, many EMCs had net liabilities.⁹

Figure 4. External debt growth and maturity mismatch (1994 IV-2008 IV)



Source: Kim and Chey (2010)

The Negative AECM indices of advanced countries also need explanation. First, in contrast to EMCs most advanced countries have net assets in terms of their international investment positions, even though they may be debtor countries. Many positive numbers of EMCs reflect nothing but 'debt intolerance,' the issue of which was raised by Reinhart et al., (2003). Second, currency internationalization allows the hedging of currency mismatches. For example, with foreign liabilities largely in the domestic currency and foreign assets denominated in foreign currencies, Australia has a net long position in foreign currencies (Battellino and Plumb, 2009). Here, the implication of exchange rate movements is different, in that depreciation of Australian dollar actually reduces the value of Australia's net foreign liabilities. This counter-cyclicality should stabilizing force on the Australian economy.

⁸ The two outliers are from vulnerable periods: 2008 IV and 1997 IV.

⁹ For example, by the end of 2009 Korea had net liabilities worth 150 billion dollars.

Table 4. Aggregate Effective Currency Mismatch Index

	90-99	2000	2001	2002	2003	2004	2005	2006	2007
USA	-2.2	-12.6	-23.7	-31.1	-35.4	-33.8	-29.8	-30.9	-33.2
Britain	-23.6	-32.7	-44.3	-65.4	-88.0	-101.3	-90.2	-95.9	-124.3
Germany	-2.0	-18.0	-7.8	-11.8	-14.3	-14.6	-6.5	-3.6	5.4
Japan	0.7	3.4	6.0	6.9	5.6	6.2	8.4	8.7	10.0
Australia	-31.0	-48.7	-56.4	-64.4	-102.0	-117.9	-101.8	-120.6	-115.5
Canada	-17.9	-12.3	-11.9	-14.3	-15.3	-13.6	-11.9	-9.1	-12.1
Korea	0.3	0.9	1.0	0.9	1.0	0.9	4.0	3.9	3.8
Malaysia	-21.4	-14.7	-11.8	-10.0	-3.9	-0.6	-0.7	0.8	1.5
China	0.9	0.8	0.8	0.6	0.5	0.5	0.6	0.5	0.6
Indonesia	0.9	1.0	0.9	0.8	1.0	1.0	1.3	1.7	2.1
Taiwan	-0.2	2.0	2.2	2.2	2.1	2.5	5.4	8.4	13.0
Mexico	-1.5	0.2	1.1	1.5	1.1	0.7	1.2	0.1	0.2
Brazil	-8.6	-18.0	-17.2	-30.0	-21.5	-11.5	-4.4	-0.7	3.3

Source: Suh and Kim (2010)

IV. Issues on IFA reform

This section brings up specific issues on IFA reform. FR, macro-prudential regulation, global financial safety nets and currency internationalization are core requisites for building main framework for IFA reform. Issues related to them are interrelated. In order to build well-balanced, sustainable IFA each requisite should be in accord with other requisites.

1. Foreign Reserves and External Borrowing

There has been debate about whether the foreign reserve holdings of EMCs following the East Asian crisis were excessive.¹⁰ The global financial crisis, has confirmed, however, that FR are a core tool for self insurance against deleveraging.¹¹

The size of the FR still matters, however. Rodrik (2006) evaluated the costs and benefits of hoarding FR and concluded that EMCs have over-invested in the costly strategy of reserve accumulation and under-invested in capital account management policies to reduce their short-term foreign liabilities.

His criticism may be best addressed by considering Korea's external debts and assets by sector in [Table 5]. Judging from its foreign debt and asset structure as a whole, the Korean economy should not suffer a foreign liquidity shortage. However, the risks of currency and maturity mismatch were concentrated in the banking sector. As a result, even sitting on the world 6th largest volume of foreign reserves (270 billion dollars) Korea suffered from vulnerability in term of foreign liquidity at the onset of the global financial crisis.¹²

¹⁰ See Aizenman and Lee (2007), Jeanne (2007), Obstfeld et al. (2008) among others.

¹¹ Some economists report that there is no evidence that countries with more reserves had better crises although short term liabilities matter (Blanchard et al., 2010).

¹² In response to the global credit crisis, the Korean government guaranteed domestic banks' overseas funding in October 2008. The Bank of Korea set up a competitive auction swap facility to ease the access to foreign liquidity, and established a temporary bilateral swap arrangement with the Federal Reserve.

Table 5. External Debts and Assets by Sector

(end of period, billion USD)

	Total	ST	LT	G	MA	BK	ST	LT	DBK	FBB	Other
Debts											
2005	187.9	65.9	122.0	8.5	7.1	83.4	51.3	32.2	58.4	25.0	88.9
2007	383.2	160.2	222.9	31.7	21.9	192.9	134.0	58.9	109.0	83.9	136.7
2008	377.9	149.9	228.1	21.1	31.2	169.4	110.4	59.0	97.0	72.4	156.2
2009	401.9	150.0	252.0	27.8	39.6	180.9	115.2	65.7	103.7	77.2	153.6
Assets											
2005	317.1	262.0	55.0	13.2	213.4	53.0	39.0	14.0	42.6	10.5	37.3
2007	420.6	333.1	87.5	19.9	267.5	76.4	45.5	30.9	63.6	12.7	56.8
2008	347.9	280.2	67.7	9.3	205.6	82.7	52.0	30.7	71.1	11.6	50.3
2009	417.1	345.0	72.2	9.3	275.1	77.1	43.7	33.3	65.3	11.8	55.7

ST: short term; LT: long term; G: general government; MA: monetary authority;

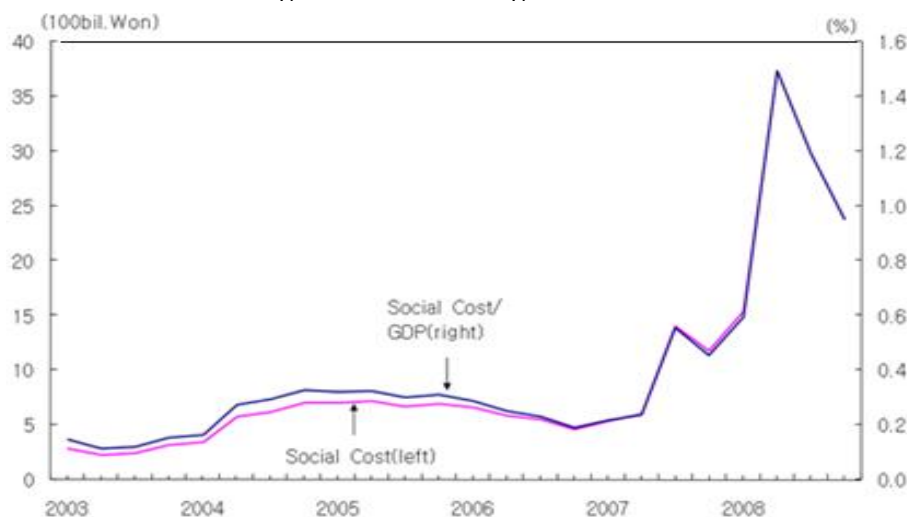
BK: banks; DBK: domestic banks; FBB: foreign bank branches

Source: ECOS, Bank of Korea

The link between hoarding of FR and short term external borrowing needs to be elaborated. For example, the Guidotti-Greenspan rule suggests that short term external borrowings should be absorbed as FR. But such a rule may encourage the private sector to extend short term borrowing all the way up to maximizing return on borrowing rather than balancing risk and return, and therefore exacerbate the capital inflows problem. Consequently, the risk associated with short term borrowing may be socialized while the return is privatized.

<Figure 5> shows the social costs of hoarding FR, defined as the yield on FR subtracted from the cost of private external borrowing (Rodrik, 2006). At the peak it was 1.5% of GDP. It is clear that socially optimal level of borrowing is not the same as privately optimal one.

Figure 5. Social Costs of Foreign Reserve Hoarding



Source: Bank of Korea

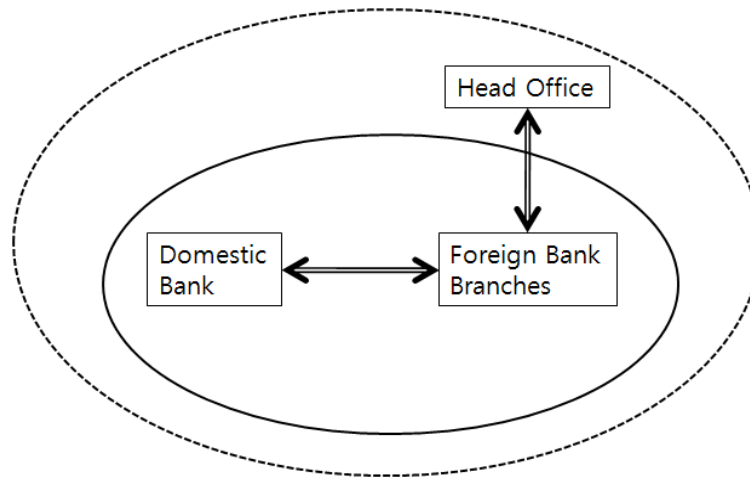
2. Macro-prudential regulation

In EMC whose currencies are not fully internationalized, the economies as a whole are unable to hedge the risk of currency and maturity mismatches, although consumers, firms and banks engage in hedging activities. Therefore, the central bank having FR plays the role of insurer of last resort for the banking sector. The banking sector, the insured, should naturally pay an appropriate premium to the central bank, the insurer. Without the paying of such a premium, social and private optimality of external borrowing would not be the same.

Alternatively, one could argue that private external borrowing creates a negative externality on domestic asset prices, or more broadly real exchange rates (Jeanne and Korinek, 2010b; Aizenman, 2010). Instead of a risk premium, a Pigouvian tax that targets borrowing activities that cause spillover effects can cure the negative externality, and therefore mitigate the capital inflows problem.

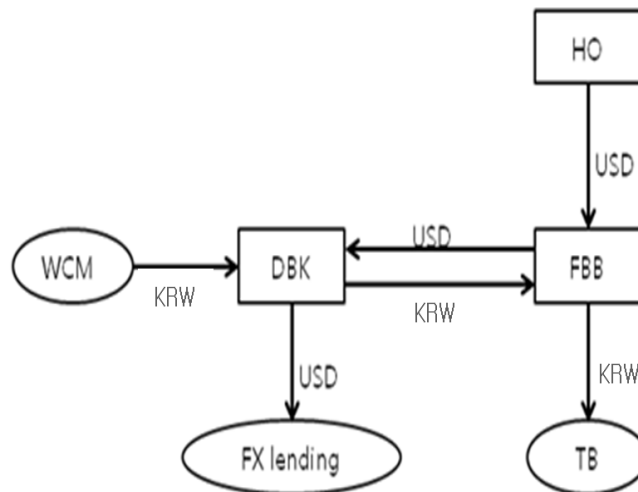
However, application of either a risk premium or a Pigouvian tax is easier talked about than done. It may be easily evaded. It may also yield unintended consequences. For example, Shin and Shin (2010) have proposed a levy on NCLs of the banking sector. Such a levy should definitely discourage short term external borrowing. Here, identifying the systemically important financial institutions (SIFIs) matters. In Korea, the foreign bank branches (FBBs) are important agents supplying foreign liquidity and could be SIFIs. But it could ultimately in fact be their head offices that are the SIFIs.

Figure 6. Systemically Important Financial Institutions



Whether all capital inflows of a certain type (for example, short term foreign currency funding) are treated equally depends upon how an SIFI is identified. <Figure 7> illustrates a foreign exchange swap (FES) between a domestic bank (DBK) and a foreign bank branch with such FESs known to be the most common pattern of foreign liquidity funding by domestic banks. Borrowing from its head office, the FBB supplies dollars to the DBK through an FES. The DBK engages in foreign currency lending. In return DBK funding on KRW from the wholesale credit market supplies KRW to the FBB and the FBB invests this in TBs. Through FES, both parties effectively borrow short term funds and intermediate them in longer operations. Therefore, bank levies should be imposed on the FBB and the DBK.

Figure 7. Foreign Exchange Swap 1

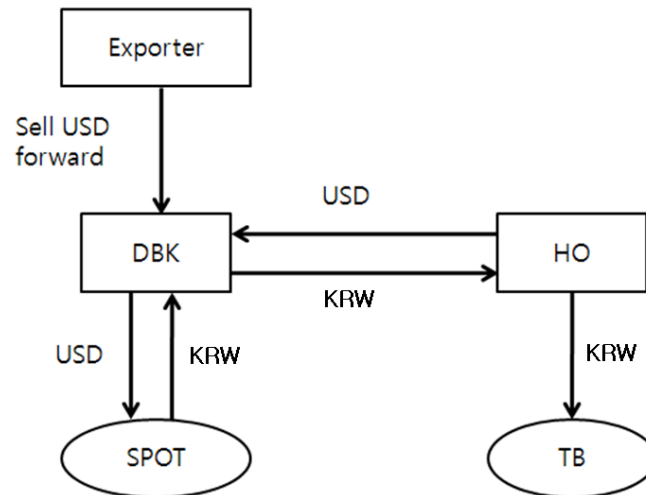


WCM: wholesale credit market; HO: head office

However, when instead of an FBB its head office engages directly in an FES, the head office is not subject to a bank levy as long as the FBB is an SIFI. A DBK isn't either when, after entering into a forward contract with an exporter, it squares its position by selling dollars in the spot market (<Figure 8>). Throughout these transactions none of them create NCLs. But by keeping renewing FES until the contract is carried out the DBK successfully transforms the maturity. Consequently, the DBK hedges currency mismatch at the risk of maturity mismatch. These examples demonstrate that unless the bank levy is imposed internationally, regulatory arbitrage can always be exploited.

Arguably, one could identify the DBK as an SIFI. As a matter of fact, it is the DBK that is able to fund KRW at the lowest cost. Without the DBK, capital inflows aimed at exploiting maturity transformation cannot help but decrease. In <Figure 8> a levy will be imposed on the DBK's foreign liquidity funding through FES. Rising cost of the maturity transformation forces the DBK to reduce foreign liquidity funding and, therefore, less exposed to the risk of maturity mismatch.

Figure 8. Foreign Exchange Swap 2

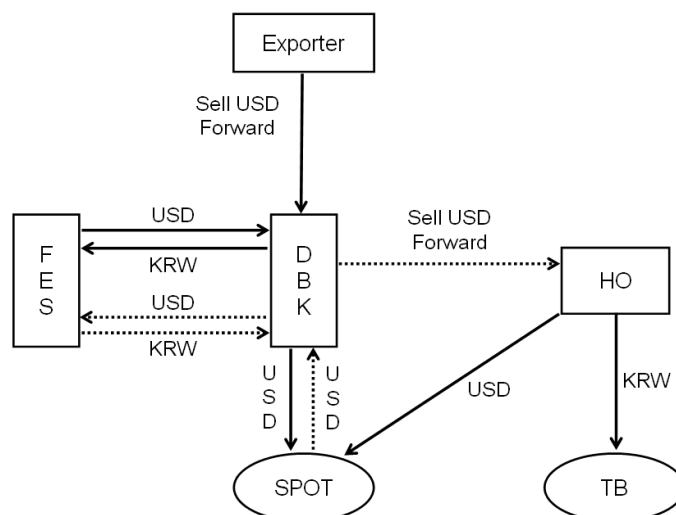


Furthermore, such levy is not be easily evaded. For example, instead of FES in <Figure 8>, the head office may engage in functionally equivalent transactions by selling dollars forward to the DBK and at the same time selling dollars in the FX spot market (<Figure 9>).¹³ Here, in order to hedge the additional currency mismatch created by the forward contract, the DBK buys dollars spot and engages in an FES as shown in dotted lines.¹⁴ If the FES counterparty is another domestic bank, then the bank which is the counterparty of the DBK (not shown in <Figure 9>) is subject to a levy. If the maturities of the two forward contracts coincide, the DBK is not subject to the levy, which is exactly what the levy aims for.

¹³ From a synthetic forward which is functionally equivalent to forward contract transactions such that buy (sell) USD forward = pay (receive) USD FES + buy (sell) USD spot, the transaction composed by buy (sell) USD forward + sell (buy) USD spot is functionally equivalent to pay (receive) USD FES.

¹⁴ In general the maturity of FES is shorter than a forward contract

Figure 9. Foreign Exchange Swap 3



3. Global Financial Safety Nets

Unlike the domestic financial market, the international financial market is less integrated. This is because the lack of a supranational legal authority and of cross border contract enforceability creates an additional risk: sovereign risk. In general, the binding constraint of international debt repayment is willingness rather than ability to pay, which makes international debt contract incomplete (Eaton and Gersovitz, 1981). Relying on short term external borrowing, the debtors benefit by cheap funding costs (only at the risk of unwarranted crises). It may also be the case that excessive short term debt is the outcome of incomplete international debt contracts.

A more complete international debt contract is possible to arrange if bad luck is distinguishable from bad policy. In such a case, debt restructuring contingent on bad luck with good policy can make both creditors and debtors better off. Indeed, the following table, showing the years of default (or rescheduling) and of suffering from banking crises in six continents over the last two centuries demonstrates that sovereign risk differs from continent to continent, and from country to country ([Table 6]).

Table 6. Debt and Banking Crises: 1800 or independence to 2008

Continent (countries)	Average years in default or rescheduling	Average years in banking crisis
Africa (13)	24.0	12.2
Asia (12)	6.4	11.2
Europe (19)	14.4	6.4
Latin America (18)	34.8	4.3
North America (2)	0.0	10.8
Oceania (2)	0.0	4.9

Sources: Authors' calculations from Table 10.1 and 10.2 (Kaminsky and Reinhart, 2010)

According to Jeanne (2009), the verifiability of policy quality should be enhanced by appropriate collective action at the international level, by the creation of a new legal regime or new specialized institutions mandated to accumulate the required expertise (such as the IMF). Going further, Jeanne et al. (2008) explored IMF conditionality to the country's crisis prevention efforts or ex ante conditionality, or prearranged lending. He concludes that considering that IMF lending to EMCs has been repaid in full, and that ex ante conditionality can mitigate systemic contagion, ex ante conditionality should be a useful policy tool.

However, at the individual country level, one dollar of the flexible credit line (FCL) established in March 2009 which is ex ante conditionality for member countries with sound fundamentals is worth less than one dollar of their own reserves (Jeanne, 2010a). This is because sound fundamentals must be verified. That is, there is a potential risk of Type II errors, denying lending to countries with good policies.

4. Currency Internationalization

In spite of her deep linkage Korean won is not yet convertible in the international currency market, which has put Korean economy into too much vulnerability. On the one hand, the private sector has an easy access to leverage via many debt instruments and derivatives. On the other hand, the inconvertibility of Korean won makes 'debt intolerance' the binding constraint on the Korean economy as a whole. Naturally, the Korean economy faces even more serious capital inflows problem, which incurs a huge cost of preserving macroeconomic stability. The social cost of foreign reserve in <Figure 5> is simply one example. While the monetary authority amasses foreign reserves, the effectiveness of the prudential controls dealing with capital flows is in general short lived (Miguel and Reinhart, 2006). A strong enforcement capacity as in Chile is needed to identify loopholes and prevent circumvention (Ostry et al., 2010).

Currency internationalization (CI) is the final destination of foreign exchange liberalization. CI can enable the sharing of important benefits. Like in Australia, a country as a whole can hedge the risk of currency mismatch. Naturally, there is no need to accumulate a huge volume of FR as self-protection.

At the firm level, CI can provide opportunity for offshore funding. Through offshore funding, firms have better risk management, exploit price arbitrage, and have access to diversified funding. Research suggests that the choice of currency by non-financial companies is motivated by cost minimization, hedging, and by the desires to establish a broader investor base and to overcome regulatory barriers (Siegfried et al, 2007).

Specifically, Munro and Wooldridge (2009) find that swap-covered foreign currency borrowing can provide Asia-Pacific issuers with access to larger, more liquid, lower grade and longer term markets, as long as issuance by non-residents in the domestic currency (such as Arirang, Kangaroo, Samurai) meets investor demand for high grade local currency assets.

As can be seen in [Table 7], countries with more open financial systems such as Australia, Hong Kong, Japan, New Zealand and Singapore have substantial nonresident issuance of local currency. They enjoy many benefits of raising foreign currency funding offshore and swapping the proceeds into domestic currency instead of issuing local currency bonds directly.

Table 7. Global Market for Bonds Denominated in Asia - Pacific Currencies
(Outstanding, end of 2007, % of GDP)

	Onshore		Offshore	
	Resident	Nonresident	Resident	Nonresident
Australian dollar	76	8.5	9	9.4
Chinese renminbi	52	0.0	0	0.1
Hong Kong dollar	25	2.1	6	32.6
Indonesian rupiah	20	0.0	0	0.3
Indian rupee	42	0.0	0	0.0
Japanese yen	202	1.6	2	10.1
Korean won	113	0.0	0	0.1
Malaysian ringgit	96	0.3	0	0.5
New Zealand dollar	18	3.5	1	39.8
Philippine peso	38	0.1	0	0.1
Singapore dollar	61	2.3	6	9.5
Thai baht	57	0.3	0	0.1

Source: Black and Munro (2009)

Of course, the benefits of CI do not come without costs. Offshore markets may serve as means to evade controls in the domestic markets and to exploit mismanaged macro and financial policies. Furthermore, weak infrastructure, poor legal systems and, above all, volatile capital flows can lead to abuses of CI and even deepen financial imbalances further. Therefore, while prudential regulations should not be substituted for sound macro and financial policies they should not hamper financial developments, either. They are preconditions for successful CI.

V. Final Remarks

Foreign reserves, macro-prudential regulation, global financial safety nets and currency internationalization are keywords related to reform on the international financial architecture. They are inter-related. Properly designed and implemented macro-prudential regulation should mitigate the risk of short term external borrowing. To that extent, the economy can be less dependent upon an insurer of last resort role of the monetary authority in providing foreign liquidity funding. Such macro-prudential regulation should be clearly defined, well designed and correctly implemented. Otherwise, it could de facto prevent the domestic financial system from functioning properly and also bring about only short term relief at the cost of the longer term benefits that will be realized through currency internationalization. Accumulation of foreign reserves is important self protection against deleveraging. But it causes significant costs and without accompanying macro prudential regulation it risks exacerbating the capital inflows problem. Global financial safety nets can be useful substitutes for foreign reserves, even though they may be less than perfect.

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CHAPTER 5

국제통화제도의 개혁과 G20 International Monetary System Reform and the G20

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본 논문은 2010 KDI Journal of Economic Policy Conference “Global Financial and Monetary Order for Sustainable Development”에서 발표한 논문을 수정, 보완한 것임. 저자는 본 논문에 대해 유익한 코멘트를 주신 신관호 교수와 자료수집에 도움을 준 송지원 조교에게 감사를 드림. 본 논문에 남아 있는 오류는 모두 저자의 책임임을 밝혀둠.

I. 서론

지난 2 년간 세계는 약 80 년 만에 가장 심각한 금융, 경제 위기를 맞게 되었다. 미국 주택시장의 거품붕괴와 **subprime mortgage** 금융부실로 초래된 세계적 금융, 경제위기로부터 각국 경제가 서서히 안정을 되찾아가고 있긴 하지만 아직도 위기가 해결되거나 위기로부터 완전히 벗어났다고 할 수 없다. 위기 직후 취해진 각국의 전대미문의 팽창적 재정정책, 통화정책 기조가 마냥 지속될 수 없는 상황에서 미국과 유럽경제는 다시 회복세가 주춤해지고 침체에 빠질 조짐들을 보이고 있다. 1990 년대 이후 미국과 유럽의 선진 각국에서 서서히 일기 시작한 자산가격 붐은 결국 이들 국가의 가계저축률을 크게 떨어뜨리고 소비 붐에 의해 경제의 호황을 지탱하였고 이는 다시 자산가격 붐에 연료를 제공함으로써 약 20 년 가까운 경제호황이 지속되었다. 산이 높으면 골이 깊듯이 이들 국가는 지금 정상적인 가계 저축률을 회복하고¹ 지나치게 확대되었던 민간부문의 부채수준을 조정해야 하는 과제를 안고 있다. 위기로 인한 경제의 지나친 위축, 혹은 공황으로의 진입을 막기 위해 초 팽창적 거시정책을 써 왔으나 그 또한 분명한 한계를 가지고 있다. 과거에도 금융위기는 시차를 두고 재정위기로 연결된 경우가 많았다(Reinhart and Rogoff 2009). 유럽의 재정건전성에 대한 시장의 불신이 다시 금융시장을 흔들고 실물시장을 위축시키고 있다. 경제에 공짜 점심은 없다고 하였듯이 위기가 요구하는 경제의 구조조정과 제도의 변화를 이루지 않고 진정으로 위기를 벗어날 수는 없는 것이다.

왜 세계는 지금 이 시점에서 한 세대, 혹은 한 세기에나 맞게 될 정도의 심각한 경제, 금융위기를 맞게 되었는가? 이는 물론 여러 복합적 요인의 결과로 보아야 하겠으나 보다 근본적으로는 오늘날 세계경제가 가지고 있는 제도(*institutions*)와 시장현실(*market reality*)간의 괴리의 확대에서 기인했다고 보아야 할 것 같다. 다시 말해 이러한 간극이 점점 크게 벌어져 왔음에도 불구하고 세계가 그 동안 이에 대해 적절히 대응하지 않았기 때문이다. 결국, 우리가 지금 맞고 있는 경제위기의 근본적인 원인을 한마디로 요약한다면 그 것은 시장과 제도의 괴리에서 나오는 ‘제도의 실패’(*institutional failure*)라고 할 수 있다.

위기는 근본적으로 제도와 시장현실의 불일치에서 비롯되는 것이다. 혹은 기존의 제도가 시장에서 발전한 새로운 움직임을 적절히 조정, 관리해 주는데 실패했기 때문에 비롯되는 것이다. 이러한 불일치가 시장의 쏠림 형태와 거품으로 축적되어 어느 날 붕괴처럼 터져 나오게 되는 것이 위기이다. 따라서 위기는 바로 과도한 쏠림 현상에서 기인하는 자산가격의 거품, 환율을 비롯한 상대가격의 왜곡의 조정을 요구하고 그리고 이를 적절히 제어해주지 못한 부적절한 제도의 개혁을 요구하는 시장의 절실한 외침이기도 하다.

그렇다면 오늘날 세계경제는 어떤 제도적 문제점들을 안고 있는가? 여러 부문에서 찾을 수 있을 것이다. 그러나 보다 직접적이며 근본적으로는 현재의 국제통화제도(*international monetary system*) 및 국제금융제도(*international financial system*)의 한계성 혹은 부적절성에서 찾을 수 있을 것 같다. 그리고 더 크게 보아서는 세계경제 지

¹ 1965-1985 년 미국 평균 가계 저축률은 약 9% 였으나 1990 년대 이후 이 것이 지속적으로 하락하여 2000 년대 중반에는 거의 제로 수준까지 떨어졌다.

배구조(global economic governance)의 실패에서 찾을 수 있다. 오늘날과 같이 각국 경제의 상호의존성이 절대적으로 높아진 상황에서 주요국들의 거시경제정책 조정과 정책협력을 관할할 수 있는 실효성 있는 국제제도도, 기구도 존재하고 있지 않다. 오늘날 세계금융시장은 마치 하나의 단일 시장처럼 통합되었다. 지난 약 30-40 년 동안, 특히 1990 년대 이후 각국의 자본시장 개방, 금융상품 혁신이 가속화됨으로써 국제자본 이동, 세계금융시장의 모습은 그 이전과 판이하게 달라졌다. 제 2 차 세계대전 후 출범하여 전후 국제통화체제로 정착한 브레튼우즈(Bretton Woods System) 체제하에서는 국가간 자본이동은 경상수지 거래를 원활하게 지원하기 위한 공적 대차거래와 상업, 또는 은행차관이 주류를 이루었고 자본거래는 엄격히 통제되었다. 그러나 거의 모든 선진국과 신흥 경제국에서 자본거래에 대한 규제가 철폐된 오늘날에는 경상수지 거래를 뒷받침하기 위한 자본이동 보다 국제 자산간 수익률 차이와 자본이득을 얻기 위한 자본의 이동이 수 백배를 넘고 있다. 그리고 이러한 자본이동은 각국의 경제환경의 조그만 변화에도 민감하게 대응하여 분초를 다투며 국경을 넘나들고 있다. 이렇게 세계금융시장은 마치 하나의 시장처럼 통합된 반면 이러한 국가간 자본이동을 규율하고 거래당사자들과 금융기관의 건전성을 일관되게 감독할 세계금융감독원도, 또한 시장의 한 부분에서 유동성 위기가 발생했을 때 최종대부자(lender of last resort)의 역할을 할 세계중앙은행도 존재하지 않는다.

브레튼우즈 체제하에서 국제통화질서를 유지하기 위해 설립된 국제통화기금(International Monetary Fund)은 오늘날 세계적 유동성위기에 적절히 대응하기에는 턱없이 부족한 재원을 가지고 있으며, 또 이에 대해 적시에, 적절히 대응할 수 있는 기능이 부족할 뿐 아니라 국제적 신뢰도 실추되어 있다. 이 기관의 의사결정구조, 투표권은 또한 지난 약 20 년간 일어난 세계경제의 역학구도의 변화를 제대로 반영하지 못하고 있다. 특히 미국이나 유럽 주요국, 그리고 중국과 같은 주요 흑자국들에 대해서는 별다른 영향력이나 제재수단을 가지고 있지 못한 반면 경상수지 적자와 외환부족에 시달리는 작은 개도국들에게는 거의 절대적인 영향력을 행사하며 지나칠 정도의 경제조정과 긴축을 강요해왔다. 그 결과 IMF 는 이들 국가로부터 심각한 불신을 받고 있으며 이로부터 자금지원을 받는 것을 가능한 한 기피케 하고 있다. 따라서 외환 금융위기의 위험으로부터 스스로를 보호하기 위해(self-insurance) 이들 국가들이 각자 점점 더 많은 외환보유고를 쌓아 두고자 하는 유인(incentives)이 고착화되어 가고 있다. 국가간 금융거래와 감독의 국제규준을 정하기 위해 활동해온 국제결제은행(Bank for International Settlement)도 세계금융시장에 충분한 구속력을 행사하지 못하고 있으며, IMF 와 세계은행이 공동 실시해 온 FSAP(Financial Sector Assessment Program)이나 선진국 재무부와 중앙은행들의 협의체로 이루어져온 FSB(Financial Stability Board)²도 모두 제한적인 기능을 행사해왔을 뿐이다.

전후 고정환율제도에 기반한 브레튼우즈 체제가 1971 년 무너지고 주요 선진국들은 자유변동환율제도(free floating system)를 채택하기 시작했다. 그러나 여전히 많은 나라들은 자국의 환율 안정과 국제수지 방어를 위해 외환시장에 개입하는 환율정책(managed floating system)을 추진해 왔다. 아시아 외환위기 이후 특히 신흥 경제국들은 외환위기 가능성으로부터 자국경제를 보호하고 수출경쟁력을 유지하기 위해 환율

² FSB 는 주요 국제금융시장(international financial market)을 가진 나라들의 협의기구인 FSF(Financial Stability Forum)으로부터 2009 년 모든 G20 국가들을 포함하여 확대 개편된 기구임.

의 저 평가를 유도하고 외환보유고를 확충하기 시작하였다. 중국은 고성장과 고용창출을 위해 수출에 의존하는 정책의 일환으로 환율을 달러화에 거의 고정시킴으로써 자국환율의 저 평가를 지속하고 이를 유지하기 위해 막대한 외환보유고를 쌓아오고 있다. 따라서 현재의 국제통화제도는 어떤 국제적 규칙과 규범(rule and order)에 의해 작동하는 것이 아니고 자유변동환율제도, 관리변동환율제도, 준 고정환율제도 등이 뒤섞여있는 ‘혼합제도(hybrid system)’ 혹은 ‘무제도(non-system)’ 하에 있다고 볼 수 있다.

세계경제의 불안정성과 위기의 이면에는 단순히 국제자본시장 환경의 변화나 취약한 환율제도뿐 아니라 중국과 같은 거대 신흥공업국의 빠른 부상에 의한 국제정치적 역학 구도, 세계경제의 구조 변화가 있었다. 지난 약 20 년은 세계 정치, 경제의 큰 변혁기였다. 지난 20 년 동안, 보다 짧게는 지난 약 10 년 동안, 중국과 인도경제의 부상은 세계무역에 대한 비중으로 보나 세계 총생산에 대한 비중으로 보나, 19 세기 후반과 20 세기 초반 미국이 영국을 대체할 때의 부상 속도보다 훨씬 빠르다. 1870-1913 년 사이의 미국경제의 연 평균 성장률은 약 3% 대로 추산된다. 반면 지난 20 년간 (1988-2008) 중국경제의 평균 성장률은 약 10% 가까이로 추산되고 있다. 1870-1913 년 사이 미국은 상당히 폐쇄된 경제로서 수입의 국내총생산에 대한 비율이 대략 4-7% 사이로 안정되어 있었으나 오늘날 중국은 훨씬 개방된 경제로서 무역이 국내총생산액에서 차지하는 비중은 60%를 넘고 있다. 이러한 나라의 급속한 부상이 세계경제에 야기하는 문제는 결코 만만할 리 없다. 세계사는 항상 새로운 세력이 부상할 때 소용돌이와 격동에 휘말리게 되었음을 보여주고 있으며 그 것은 오늘날의 역사에 있어서도 예외는 아닐 것이다.

구 소련과 동유럽 사회주의체제가 붕괴하면서 지난 20 년 동안 4 억 이상에 달하는 인구를 가진 이들 국가가 시장경제 체제로 편입되게 되었다. 역시 1990 년대 이후 인도가 과거 사회주의적 계획경제체제로부터 서서히 탈피하여 수입장벽을 낮추며 경제개혁을 시작하고, 그리고 중국의 개방과 시장자유화에 가속도가 붙기 시작한 1990 년대 이후 약 25 억의 인구가 시장경제체제로의 통합이 본격화되었다. 결국 세계 인구의 약 절반 가량이 지난 20 년 동안 시장경제체제에 편입되게 된 것이다. 훗날 세계사를 정리하는 사람들에게 이는 놀랄만한 세계의 변화를 초래한 것으로 기록되게 될 것이라 생각한다. 세계경제가 이러한 대변혁을 겪게 되면서, 과거에 작동했던 제도가 더 이상 제대로 작동하지 못하게 되고 새로운 제도와 세계지배구조의 출현이 요구되는 것은 너무나 당연한 일이다.

최근 세계가 겪고 있는 금융, 경제위기도 바로 이러한 변화에 상응하는 세계경제 제도의 변화를 촉구하는 강력한 신호라고 할 수 있다. 1997 년 한국의 외환, 금융위기는 당시 한국경제가 가지고 있었던 제도³와 빠르게 변화된 시장환경의 차이에서 나오는 괴리에서 기인했고 이러한 위기는 기업과 금융부문의 주요 제도 개혁과 자산/부채 구조의 대폭적인 조정으로 극복될 수 있었듯이 현재 세계가 겪고 있는 금융, 경제위기도 결국은 국제통화제도, 국제금융시스템의 개혁과 이러한 제도가 촉진하는 시장의 구조조정으로 대응해야 장기적인 세계경제의 안정과 번영을 기대할 수 있으리라 생각한다.

³ 여기서 말하는 제도는 North(1990)가 정의하는 광의의 ‘institutions’를 의미한다.

현재의 국제통화제도는 지난 약 20 년간 진행되어온 세계경제 상황 변화에 잘 맞는 제도라고 할 수는 없다. 많은 한계와 취약점을 가지고 있어 이 것이 세계경제의 불균형을 지속시키고 금융시장의 취약성, 불확실성을 심화시키는 요인이 되고 있다. 그러나 이를 어떻게 개편해야 할 것인지에 대해서는 국가간, 학자간에 많은 이견이 존재하고 있다. 결국 과거에도 그러했듯이 국제통화제도의 개편은 단순히 경제적 합리성, 효율성 측면에서가 아닌 국제정치의 역학구도, 타협, 시장의 선호 등에 의해 점진적인 변화를 이루어가게 될 것으로 보인다. 이는 또한 향후 주요 국가간 거시경제 정책의 협의, 공조가 얼마나 원활하게 이루어지고 세계경제의 제도 개편을 적절히 이루어낼 수 있는 세계경제지배구조(global economic governance system)가 어떻게 정착되어 가느냐에 크게 달려있다고 볼 수 있다. 그러나 동시에 보다 안정적인 국제통화제도의 마련을 위해 지금 국제사회는 상호 협력을 통해 공동의 노력을 경주할 필요가 있다고 생각한다.

본 논문은 이러한 배경에서 국제통화제도의 개편과 세계경제지배구조에 대해서 논하고자 한다. 제 1 장에서는 국제통화제도의 정의 및 간단한 역사, 그리고 현재의 문제점에 대해서 논하고자 한다. 제 2 장에서는 국제통화제도의 개편 방향에 대해 최근에 논의되고 제기된 의견들을 정리해보고 이러한 개편 방향이 어떻게 현실화될 수 있을 것인가에 대해 전망해 보고자 한다. 제 3 장에서는 국제통화제도의 개편이 단순히 경제적 합리성, 효율성 및 안정성을 추구하는 측면을 넘어 국제정치의 현실, 세계경제의 지배구조와 직결되어 있는 만큼 최근 세계경제 문제에 대한 최고협의체(premier forum)로 새로이 부상한 G20 정상회의의 향후 역할과 그리고 전망에 대해서 논해보고자 한다. 마지막 장에서는 이상의 논의를 토대로 간단한 결론을 도출하고자 한다.

1. 국제통화제도—무엇이 문제인가?

국제통화제도는 사람에 따라, 경우에 따라 조금씩 달리 정의되고 있으나 대개 국제경제와 국제금융시장에 영향을 주는 공적인 정책과 행위를 지배하고 규율하는 일련의 규준(rules), 관습(conventions), 그리고 이를 뒷받침하는 기관과 제도(institutions)로서 구성되고 있으며 이에에는 환율제도, 외환시장 개입정책 및 방식, 외환보유고의 규모와 구성, 공적인 금융지원의 장치 등을 포괄하고 있다⁴ (IMF 2010 a, Subacchi and Driffill 2010, Truman 2010, Carney 2009, Y Lago et al 2010). 일반적으로 국제통화제도(international monetary system)는 국제금융제도(international financial system)와 구별되며, 후자는 오늘날 공적 부문이 아닌 민간부문에 의해 주도되고 있으며 이는 국제통화제도를 포괄하고 있다고 볼 수 있다

국제통화제도는 지난 약 두 세기 동안 세계경제에서의 역학구도 변화에 따라 변천해 왔다. 19 세기 고전적 금본위제도(classical gold standard)로서의 국제통화제도는 대영제국의 절대적인 경제적 우위로 정착되었으며 그 것의 붕괴과정은 양차대전을 거치면서 global power로서의 영국의 쇠퇴과정에서 일어나게 되었다. 마찬가지로 세계 제 2 차 대전 이후 출범한 브레튼우즈 체제는 미국경제가 절대강자로서 부상함에 따

⁴ "International monetary system is the set of rules, conditions, and institutions that govern and condition official actions and policies affecting the international economy and financial system: exchange rate regimes, intervention policies, the size and composition of reserve holdings, mechanisms of official financial support, etc."
 (Truman 2010)

라 탄생, 지탱되었고 또한 미 달러화에 대한 국제적 신뢰에 바탕을 두고 있었다. 그러나 국제통화질서의 변화는 국력의 상대적 부침에 따라 바로 일어나는 것이 아니고 일정한 시차를 두고 진행되어 왔다. 영국의 파운드가 주된 국제통화로서의 위치를 잃기 시작한 것은 1차 대전 이후였으며 이러한 전환과정은 1925년 영국이 금본위제도의 회복 (Resumption Act of 1925)과 더불어 전전의 평가가치로 환원하는 과정에서의 영국 경제침체 가속화와 또한 미국이 국제통화질서에서 보다 주도적인 역할을 책임지기를 주저하는 과정을 거치게 되었다 (Eichengreen and Sussman 2000). 2차 대전 이후에도 영국의 파운드화는 과거식민지 국가뿐만 아니라 각국들에 의해 주요 보유외환으로서 통용되어 미 달러화로 보유외환(international reserve currency)으로서의 주도권이 확실히 넘어간 1970년대까지 주요 국제통화의 역할을 수행해 왔다 (Schenk 2009). 이는 물론 파운드화의 지위격하로 영국경제에 급격한 충격을 주는 것을 피하기 위한 영국 정부의 조심스러운 통화, 금융정책과 또한 미국과 당시 주요국들의 협력이 있었기에 가능했던 일이다 (Schenk 2009).

국제통화제도의 변천은 또한 국제경제의 운용에 대한 경험과 지식의 발전에 따라 영향을 받아왔다. 20세기에 들어서서 케인즈를 대표로 하여 금본위제도의 한계에 대한 분석과 19세기 자유방임주의 경제정책에 대한 비판과 정부의 경제운영능력에 대한 신뢰가 결국 전후 고정환율제도를 낳게 한 반면 1960년대 이후 시카고대학을 중심으로 한 고정환율제도와 자본규제, 그리고 이를 위한 정부의 시장개입에 대한 비판이 1970년대 이후 자유변동환율제도로의 전환에 지적 기반을 제공하기도 하였다.

과거의 예를 보면 국제통화제도는 신흥국의 부상과 국제경제체제로의 편입 등 세계경제에 일어나는 구조변화에 적응하기 위해 끊임없는 변화를 모색해왔다. 그러나 늘 전환기에는 국제통화질서를 주도하는 나라의 국내 정책이 당시 국제통화제도가 요구하는 조정과 건전성 유지에 실패했다는 공통점을 가지고 있다 (Carney, 2009). 그 결과, 경상수지 불균형의 조정은 지연되었고, 국제금융시장의 취약성은 높아졌으며, 급기야 조정이 일어나게 되었을 때에는 위기의 형태로 다가와 대공황과 같이 재난스러운 결과를 가져오게 되었다.

세계경제와 국제통화질서는 지금 다시 큰 전환기를 맞고 있다. 양차대전 사이의 금융위기, 대공황, 각국의 경쟁적 환율절하와 보호무역주의의 경험은 새로운 금융규제 입법(Glass-Steagall Act 등의 분리 등)과 새로운 국제통화질서(Bretton Woods System)를 초래하였듯이 미국의 subprime mortgage 부실로 초래된 세계금융위기는 또 다시 새로운 금융규제 입법, 국제통화질서를 요구하고 있다. 세계경제의 중심국인 미국은 최근 1930년대 이후 가장 급진적인 새로운 금융규제 입법안(Dodd-Frank Bill)을 의회에서 통과시키고 금년 7월 20일 오바마 대통령이 이에 서명함으로써 이러한 요구에 대응해오고 있다. 그러나 국제통화질서의 개편에 대해서는 아직까지 지극히 소극적이거나 오히려 거부감을 보이고 있다.

1) 국제통화제도의 변천

금본위제도(1870-1914)

근대 국제통화제도의 출발은 1870년대에 당시 주요국들이 bimetallic system 으로부터 금본위제도(gold standard system)로 전환하면서 시작했다고 볼 수 있다. 금본위

제도하에서 주요국 통화는 금과 일정한 환율로 자유롭게 태환이 보장되었으며 국내 경제불균형의 조정은 주로 국내 임금과 물가의 금과의 상대적 가치 변화로 이루어졌다. 경상수지 불균형도 국가간 금의 이동으로 인해 통화공급의 변화, 각국의 상대적인 물가수준 및 수출경쟁력 변화로 이어져 자동적으로 조정되는 장치가 이 금본위제도에는 어느 정도 내재되어 있었다. 즉 경상수지 흑자는 금의 유입과 화폐량의 증가로 인플레이를 유발하고 이는 자국통화의 실질적 환율절상으로 이어져 수출경쟁력 저하와 경상수지의 악화로 반전하게 되며 그 결과 금의 유출이 발생하게 되는 것이다. 경상수지 적자의 경우는 그 반대의 조정과정이 일어나게 된다. 금본위제도하에서는 국가의 개입이나 이를 주관하기 위한 어떤 기구(institutions)의 특별한 보조역할 없이도 국제통화질서가 시장의 기능에 의해 작동되었다. 당시 미국을 포함해 대부분의 나라에서는 중앙은행이라는 것도 없었다. 물론 이 시기에도 금의 공급이 불규칙하여(haphazard supply of gold) 세계경제발전에 상응하는 국제통화(금)의 공급이 부족하게 될 때는 디플레이의 효과, 그리고 새로운 금광의 발견에 의한 금의 공급이 과다할 때는 인플레이의 효과를 낳는 부작용이 있었다. 그리고 러시아와 오스트렐리아와 같이 새로운 금광의 발견으로 금 공급을 주도하는 나라들이 특권을 누리기도 하였다.

그러나 이 제도는 1 차 대전의 발발과 더불어 각국이 군비조달을 위해 금 보유량에 제한 받지 않고 화폐를 찍어내어야 하는 필요성에 의해 잠시 폐기되었다. 1 차 대전 이후 다시 금본위제도로 복귀하게 되었으나 전후 인플레이 수습에 실패하고, 국가에 따라서는 (영국과 같이) 전쟁 전의 환율로 다시 복귀함으로써 디플레이와 경기침체가 따르게 되었고 결국 대공황을 겪게 됨으로써 1930 년대에 금본위제도는 완전히 무너지게 되었다 (Krugman and Obstfeld 2008, Schenk 2009). 이 후 각국은 경쟁적 평가절하, 보호무역주의로 치닫게 됨으로써 국제교역은 위축되고 세계는 제 2 차 대전으로 향하게 되었다.

브레튼우즈 체제(1945-1971)

양차 대전 사이의 경험을 바탕으로 영국과 미국이 새로운 국제통화제도에 대한 안을 내었고 주로 양국의 협상에 의해 새로운 국제통화제도에 대한 모색이 1940 년대에 시작되었으며 그 결과 탄생한 것이 브레튼우즈 체제이다. 이 브레튼우즈 체제는 미국의 달러화와 금과의 태환이 보장되고 (금 1 온스당 35 달러) 여타국가들의 통화는 달러화에 평가를 고정시키는 일종의 금환본위제도(gold exchange system)였다. 그리고 국제통화기금(International Monetary Fund)을 설립하여 고정환율제도하에서 경상수지 적자와 이로 인한 외환부족을 해결하기 위해 대기성차관(stand-by arrangement)제도를 도입하고 대외수지의 불균형의 조정을 위해 거시정책 조정과 환율조정을 주관하게 함으로써 국제통화질서를 관할하게 하였다. 이 체제는 금본위제도에 비해 훨씬 국가의 규제와 기관(institutions)의 역할에 기반하고 있었으며 미국을 제외하고 어느 나라에서나 강력한 외환규제와 자본통제 정책에 기반을 두고 있었다. 국제수지 불균형은 IMF를 통한 환율조정과 거시경제정책 변화를 통해 조정되었다.

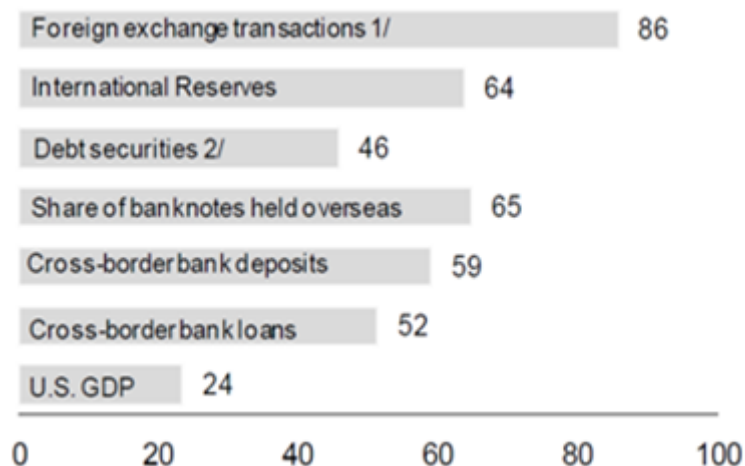
그러나 이 제도 역시 한계를 지니고 있었다. 미국달러가 기축통화로 사용되게 됨에 따라 국제통화공급이 미국의 경상수지나 자본수지에 의존하게 되었으며 이는 1950 년대 까지는 국제통화의 과소공급, 1960 년 이후에는 미국의 재정팽창과 경상수지 적자 확대로 과대공급으로 나타나 달러화의 신뢰가 흔들리게 되었다(Triffin Dilemma). 결국 각국의 달러보유량이 미국의 금보유량을 넘어서게 되면서 1971 년 미국은 달러화의 금태환 정지를 선언하고 브레튼우즈 체제는 붕괴하게 되었다. 이러한 주요 이유 중의 하나는 이 브레튼우즈 체제하에서도 흑자국들은 흑자축소를 꺼리며 이의 조정을

피하려 했으며 이를 강제할 마땅한 국제적인 압력이나 수단이 없었다는 것이다. 그리고 기축통화를 공급하는 국가의 거시경제정책의 건전성이 흔들리면서 경상수지가 악화되고 기축통화 가치의 안정성에 대한 신뢰가 무너지면서 결국 기존의 국제통화질서가 무너지게 된 것은 오늘날의 상황과 비슷하다.

현재의 국제통화질서

브레튼우즈 체제 붕괴 이후 주요 선진국들은 자유변동환율제도를 채택하기 시작했다. 그러나 여전히 많은 나라들은 자국의 환율안정과 국제수지방어를 위해 외환시장에 개입하는 환율정책(managed floating system)을 추진해 왔다. 주요 선진국들이 자국 통화의 환율수준을 유지하기 위해 외환시장 개입에서 거의 완전히 손을 뗀 것은 일본을 마지막으로 2000 년대에 들어서이다. 지금은 달러, 유로화, 파운드화, 그리고 엔화는 시장에서 거의 완전히 자유롭게 환율이 결정되고 있다. 반면 아시아 외환위기 이후 신흥 경제국들은 외환위기 가능성으로부터 자국을 보호하기 위해 환율의 저 평가를 유도하고 외환보유고를 확충하는 움직임이 강화되었다. 중국은 고성장과 빠른 고용창출을 위해 수출에 의존하는 정책의 일환으로 환율을 달러화에 거의 고정시켜 줌으로써 자국 환율의 저 평가를 지속하고 이를 유지하기 위해 막대한 외환보유고를 쌓아오고 있다. 따라서 현재의 국제통화제도는 자유변동환율제도, 관리변동환율제도, 준 고정환율제도 등이 뒤섞여있는 혼합제도(hybrid system) 혹은 무제도(non-system)에 가깝다. 미국 달러화의 기축통화로서의 역할은 없어졌지만 달러화는 여전히 국제준비통화(reserve currency)와 준비자산(reserve asset)으로서 절대적인 또 중요한 역할을 하고 있다. 달러화는 현재 전체 세계 외환보유고의 60% 이상 (신흥 경제국과 개도국의 경우 이 비율은 더욱 높음)을 차지하고 있으며 국제교역상품의 가격인용, 그리고 국제 자본시장에서의 기채에 있어서도 달러화 표시는 압도적인 비중을 차지하고 있다. 우리나라의 경우 전체 교역에서 미국과의 교역이 차지하는 비중이 20% 정도인데 비해 달러화 표시 무역거래가 전체교역의 약 85%를 차지하고 있다.

Figure 1. 달러화의 비중



Sources: IMF(2010).

1/ 이 경우 거래는 두 통화를 거치게 되므로 전체 비중은 200% 임.

2/ 자국 외에서 발생한 외화표시 채권

금본위제도와 브레튼우즈 체제하에서는 국제통화제도가 국제금융시장의 운용을 주도하였다. 개인이나 민간기관이 미 달러화 자산을 일정한도 이상 보유할 경우 이를 통화당국에 금과 교환하거나 자국화폐로 교환하게 되었으며 그 결과 해당국의 통화량 공급은 영향을 받게 되었다. 오늘날에는 개인이나 민간기관이 스스로 판단하여 미화 자산을 필요로 하는 이상으로 보유할 경우에 이를 시장에 내다 팔게 되고 그 결과 환율과 이자율이 조정되게 된다. 오늘날 외화자산은 과거의 국제통화제도에서와 달리 주로 민간부문에 의해 소유되고 있다. 달러화 자산의 경우, 공적부문에 의한 달러화 보유는 전체 해외보유의 약 15% 정도에 지나지 않는 것으로 추산되고 있다. 모든 국제통화표시 외화자산의 경우 민간부문의 보유는 공적 외환보유고로 소유되고 있는 규모의 약 6 배가 되는 것으로 추산된다. 정확한 추산은 불가능하지만 가령 1970 년의 경우 이 비율은 2 배 혹은 그 이하였던 것으로 추산되고 있다 (Truman 2010).

2) 현 국제통화제도의 문제점

최근 세계금융위기를 촉발한 주요 요인 중 하나로 세계경제불균형(global imbalance)-- 보다 정확히는 세계 주요국들, 특히 중국과 미국 간의 경상수지 불균형--문제를 들고 있다. 그리고 이 주요국들의 경상수지 불균형이 지속되고 심화되고 있는 배경에는 다시 오늘날 국제통화제도가 가지고 있는 여러 취약점이 주요 요인으로 지적되고 있다. 그러면 오늘날 국제통화제도는 어떤 문제점들을 가지고 있는가?

여기서 잠시 2008 년 9 월 리먼 브라더스 사태 이후 우리나라의 경험을 통해 국제통화제도의 문제점과 개편방향을 생각해 보자. 당시 우리나라의 은행들은 많은 단기 외채를 안고 있었기 때문에 결국 해외은행과 금융기관들의 deleverage 과정에서 심각한 유동성 위기를 직면하게 되었다. 단기외채 연장률이 평상시에 비해 크게 떨어지고 전세계 금융시장에서 달러 유동성이 급격히 위축되어가는 상황에서 만약 정부(중앙은행)의 지원이 없었다면 채무불이행의 위기에 놓이게 되었을 지도 모른다. 당시 우리나라 은행들이 이 같은 상황에 당면하게 된 것은 은행의 자산이 부실화되었기 때문은 아니었다. 다시 말해 당시 은행들이 당면한 위기는 부실에서 오는 지급불능의 위기(solvency crisis)는 아니었고 유동성 위기(liquidity crisis)임이 분명했다. 왜 이런 위기를 맞게 되었는가? 가까운 원인을 말한다면 2006 년 이후 단기외채의 급증으로 인한 외환계정의 maturity mismatch 그리고 currency mismatch 문제들을 들 수 있다. 그러나 보다 근본적인 이유는 이미 개방화된 국내 자본시장에서 은행들이 고객들의 서비스 수요를 충족하려 하다 보니 생긴 결과였다. 당시 원화 환율절상에 대한 기대가 시장에서 압도적이 되어버린 상황에서 수출이 급증한 선박회사들의 장래 수출대금에 대한 선물환 매도수요가 급증하였고 은행들이 이에 응하다 보니 그에 대한 환리스크를 중화할 필요가 있었으며, 또한 2006 년 이후 환율절상 압력을 줄이기 위해 국내거주자들의 해외주식 투자에 대한 자유화가 확대되어 해외주식투자가 증가하는 상황에서 이들 투자대금의 선물환 매도를 받아주기 위해서도 단기외채를 늘리게 된 것이다. 여기에다 선물환 환율이 내려감에 따라 당시 주어진 선물환율과 내외금리차로 인한 재정거래의 이익기회가 크게 열려 있어 외국계 은행들의 본지점간 차입을 통해 이들의 외화 단기차입이 급증하게 되었다.

은행들이 일시적인 유동성 위기에 처했을 때 중앙은행은 발권력을 동원해 은행들을 지원하여 유동성 위기를 넘기고 금융시장의 안정을 회복하도록 하는 것이 중앙은

행의 주요 역할 중의 하나다. 이번 미국의 subprime 모기지로 촉발된 금융위기는 유동성 위기라기 보다 오히려 많은 은행들의 solvency 위기라 할 수 있다. 그럼에도 불구하고 미국 중앙은행(Federal Reserve Board)은 전대미문의 통화공급확대를 통해 시장을 안정시키려 하였다. 반면 한국의 은행들이 달러화 유동성 위기를 맞게 되었을 때 한국의 중앙은행(한국은행)의 발권력은 전혀 무력할 수 밖에 없었고 오직 보유한 외환만이 도움을 줄 수 있는 형편이었다. 정부는 한편으로 외환보유고를 사용하여 단기외채를 상환해야 하는 국내 민간은행을 지원하고 다른 한편으로는 1000 억불에 달하는 단기외채에 대한 지급보증으로 지난 번 유동성위기를 헤쳐나가게 되었다. 만약 우리나라의 당시 외환보유고가 2000 억불을 넘지 않았다면 그러한 지급보증의 신뢰성은 없었을 것이며 우리는 또 다른 외환위기를 맞았을 가능성이 크다. 당시 정부의 1000 억불에 달하는 단기외채 지급보증에도 불구하고 단기자금의 유출은 지속되었고 외환시장은 계속 불안하였다.

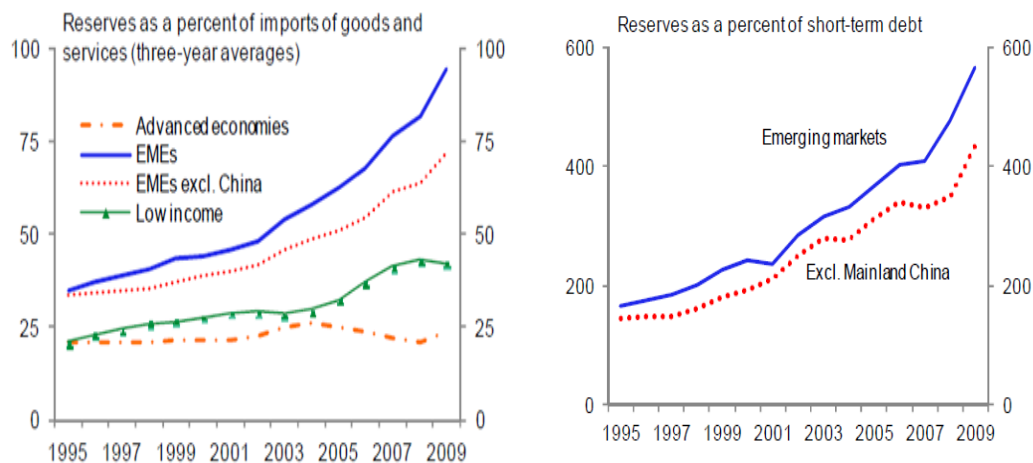
다시 말해 우리나라와 같이 국내통화가 국제결제통화로 사용되지 않는 국가에서는 오늘날 중앙은행의 최종대부자 기능은 오로지 국내통화의 유동성 위기에만 발휘될 수 있다. 그러나 오늘날과 같이 상품교역과 자본이동이 개방된 경제에서, 금융시장에 국경이 거의 사라지고 세계금융시장이 마치 하나의 시장처럼 통합된 환경에서 국내은행들의 영업구조가 해외은행들의 영업구조와 크게 다를 수는 없다. 특히 우리나라는 경제규모에 비해 상대적으로 글로벌 대기업들이 많은 상황이며 이들의 금융수요를 충족하다 보면 은행들의 영업구조가 국제화 될 수 밖에 없고 외화자산과 부채에 대한 노출(exposure)이 클 수 밖에 없다. 이 것이 세계화의 산물이며 세계금융시장통합의 결과이다. 반면 아직도 국제통화를 발행하는 중앙은행의 역할과 기능은 주권 국가의 한계에 갇혀있다. 그 것은 그들의 설립취지와 역할이 새겨진 국내 법에 따라 운용될 수 밖에 없기 때문이다. 한국의 은행이나 미국의 은행이나 다 같이 달러화 거래를 할 수 밖에 없고 대차대조표의 구성에 있어 달러화 표시 자산과 부채의 비율은 높아질 수 밖에 없는데 반해 미국의 FRB 는 한국 은행들의 유동성 위기에는 최종대부자의 역할을 하지 않고, 또 할 수도 없다. 오로지 중앙은행간의 스왑협정을 통해 일시적인 간접적인 지원을 할 수 있다. 실제로 미국 FRB 와 한국은행의 300 억불 Swap 협정이 이루어지고 나서야 지난번 유동성위기는 안정되기 시작하였다. 그리고 이제 그 Swap 협정의 유효기간은 만료되었다. 반면 한국과 같이 국제통화를 발행하지 않는 나라의 중앙은행은 자국의 은행들이 당면하고 있는 유동성위기에 무력하다. 그리고 세계화와 세계경제의 통합이 진전되고 자본 유출입의 변동성이 확대될수록 이들 나라는 외환위기의 가능성에 더 크게 노출되고 위기를 맞게 되었을 경우 치뤄야 할 경제적 비용은 더 크게 되었다. 이를 Ricardo Hausmann 과 같은 경제학자는 바로 오늘날의 국제통화 질서 하에서 비 결제통화를 가지고 있는 나라들의 ‘원죄(original sin)’라고 부르고 있다. 브레튼우즈 체제하에서 IMF 의 설립 취지는 이 기관이 일종의 국제중앙은행의 역할을 하도록 하는 것이었다. 그러나 뒤에서 논하듯이 현재의 국제금융시장 상황에서 IMF 는 그러한 기능을 거의 수행하지 못하고 있다.

이상과 같은 한국의 경험은 현재 자국통화를 국제통화로 가지지 못한 대부분의 신흥경제국들이 겪고 있는 문제이다. 현재 학계와 IMF 등 국제기구에서 지적하고 있

는 국제통화제도의 문제점들을 종합해 보면 크게 다음과 같이 요약할 수 있을 것 같다.⁵

첫째, 많은 국가들이 자유변동환율제를 채택하고 있지만 세계 전체로 볼 때 외환보유고에 대한 수요는 오히려 더 커지고 있다는 것이다. 원래 자유변동환율제도는 외환시장의 수요와 공급에 의해 환율이 자유롭게 움직이게 하는 제도로서 정부의 시장개입을 필요로 하지 않고 따라서 외환보유고를 많이 쌓아놓을 필요가 없는 제도이다. 그러나 자국통화가 국제결제통화로 사용되지 않는 신흥개도국에서는 자본의 유출입이 불안정해진 상황에서 외환위기의 위험을 줄이기 위해, 또한 자국의 수출경쟁력을 유지하기 위해 외환시장에 개입하여 높은 외환보유고를 쌓는 것이 일반화되고 있다. 특히 아시아 외환위기를 거치면서 이러한 경향은 더욱 심화되었다 <그림 2 참조>.

Figure 2. 외환보유고의 추이 (1995-2009)



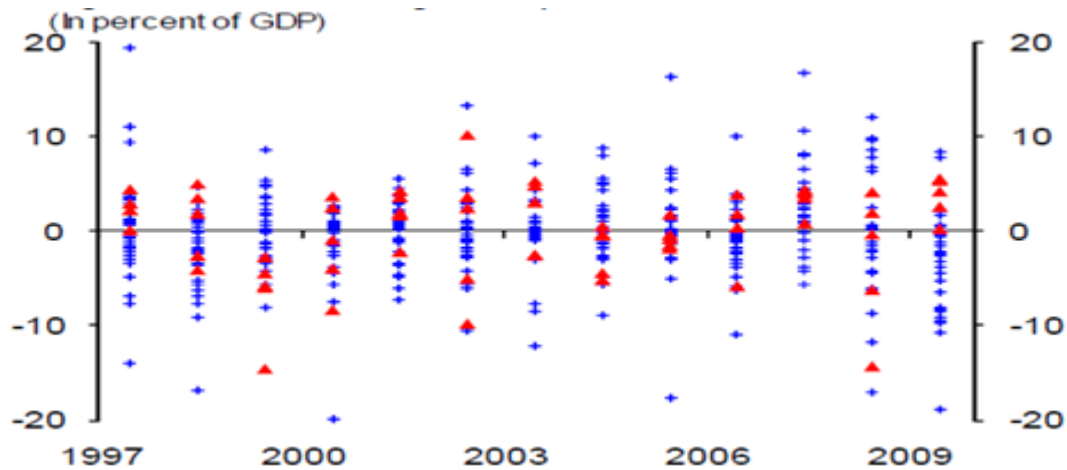
Sources: IFS and WEO, IMF

2002-2007 년, 불과 5 년 동안에 신흥 경제국들로 흘러 들어간 순 민간자본 (net private capital flows to emerging market)은 900 억불에서 6000 억불로 늘어났다. 뿐만 아니라 이러한 유입의 증가는 일관되기 보다 유입홍수(floods)와 급작스러운 반전(sudden stops)과 같이 불안정하게 진행되어 왔다. <그림 3>에서 보는 바와 같이 지난 18 년 중 일곱 해에 걸쳐 신흥 경제국들은 선진국들의 금리정책 변화, 자국의 경제 펀드멘털의 변화, 국제금융시장의 불확실성 증대 등의 요인에 따라 국내총생산의 3%가 넘는 순 자본유입을 경험했다 (IMF 2010 b). 이러한 대량의 자본유입은 국내 자산가격의 버블, 자원 배분의 왜곡, 그리고 국내 금융기관과 기업들의 외화 자산, 부채의 확대에 이어졌으며 자국통화의 절상 압력을 가져와 거시경제운용에 커다란 제약 요인으로 작용하였다. 그 결과 신흥 경제국들은 유입 시 외환시장에 개입하여 자국통화의 과도한 절상을 막고 급작스러운 유출시기에 대비하여 막대한 외환보유고를 쌓아두려 하는 내재적 유인구조를 현 국제통화제도는 가지고 있다. 만약 이러한 추세로 나간

⁵ 물론 이러한 문제들은 반드시 오늘날에만 봉착하고 있는 것은 아니다. 앞서도 지적했듯이 40 년 전 브레튼우즈 체제 (역시 달러화를 기축통화로 한 체제)가 붕괴된 것도 비슷한 상황에서 기인했던 것이다.

다면 향후 세계의 외환보유고 수요는 (가령 2035 년의 경우) 현재 미국의 국내총생산 대비 약 40-50% 수준에서 약 700% 수준으로 증가할 것으로 추산되고 있다. <그림 4>

Figure 3. 신흥 경제국들의 자본유입의 변동성 (1997-2009)



Sources: WEO 1/36 emerging market countries. Capital flow defined as negative of current account plus change in reserves. Red triangles indicate oil exports. In 7 cases (not shown), absolute value of capital flow was greater than 20 percent of GDP.

Figure 4. 향후 외환보유고 증가추세

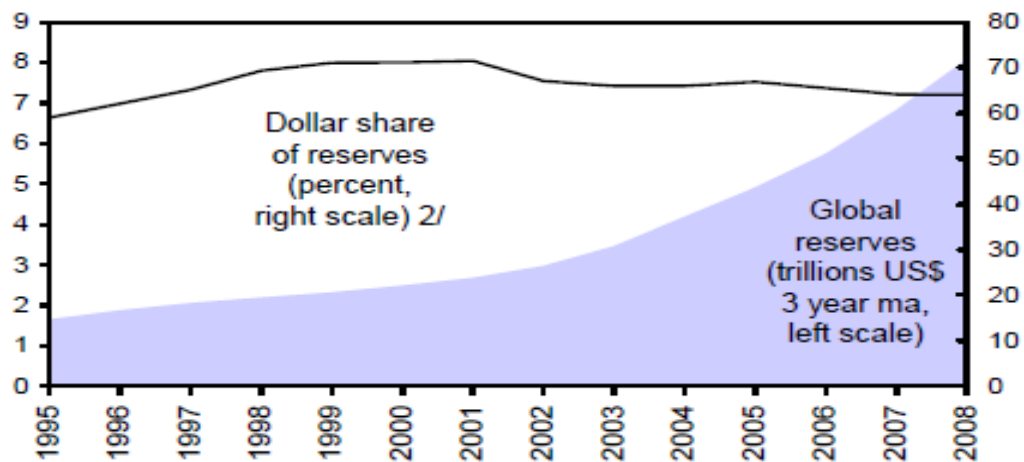


Sources: IFS, WEO, UN "World Population Prospects: the 2008 Revision", staff calculations, IMF(2010).

둘째, 이러한 점증하는 외환보유고에 대한 수요는 주로 달러화 자산, 그 것도 미국의 국공채 수요에 집중되고 있으며 미국의 입장에서 보면 적정한 규모의 안전한 준

비자산(safe reserve asset)을 세계에 공급함과 동시에 자국의 대내균형(특히 재정균형)과 대외균형을 동시에 달성하는 데에 큰 어려움을 겪게 된다는 것이다. 달러자산의 공급이 과소하게 이루어지면 세계경제에 deflationary bias가 생기게 되고 너무 과도하게 이루어지면 해외에서 과도한 외환보유고 (미국의 입장에서 보면 과다 외채)가 쌓이게 되어 국제금융시장의 불안요인이 된다는 것이다. 이는 오래 전부터 지적되어온 Triffin dilemma로서 기축통화를 발행하는 국가가 국제통화를 원활히 공급하기 위해서는 지속적인 경상수지적자를 내어야 함과 동시에 거시경제와 금융시스템의 안정성을 유지하여 방지하여 자국통화가치에 대한 신뢰를 유지해야 한다는 것이다. 이 문제는 지금처럼 종이화폐(fiat currency)를 사용하는 관리통화제도하에서는 언제나 내재되어 있는 것이나 오늘날 미국경제의 상황이 악화됨으로써 다시 부각되게 된 것이다.

Figure 5. 세계 외환보유고의 통화구성



Sources: AREAER, BIS, COFER, Goldberg and Tille (2008)

셋째, 국제통화제도가 한나라의 통화에 지나치게 의존함으로써 대외준비자산을 발행하는 국가에게 자국의 거시경제정책을 운영하는 데에 있어 지나친 특권(exorbitant privilege)을 부여하게 된다는 것이다. 이는 자국통화가 국제통화로 사용되는 데에서 누리게 되는 seignorage 효과뿐 아니라 국제금융시장에서 늘 최저의 금리로 자금을 조달할 수 있다는 데에서 나오는 거시경제운용상의 특권을 포함하는 것이다. 미국의 경우 경상수지적자와 같이 대외불균형이 지속되더라도 이를 시정할 필요를 크게 느끼지 않게 되고 지속적으로 방만한 재정, 금융정책을 유지할 수 있다는 것이다. 그 결과 세계경제불균형은 지속되고 자산거품이 확대되며 미국의 저금리는 전 세계 저금리 정책의 확산과 금융시장에서의 고수익 추구('search for yield')를 위한 risk taking을 부추기게 되었다는 것이다. 반면 자국통화가 국제통화로 사용되지 않는 나라가 경상수지 적자에 당면할 경우에는 이의 축소를 위해 국내 경제정책 조정에 대한 압력을 훨씬 강하게 받게 된다. 이를 적절히 수용해 내지 못할 경우 외환위기의 가능성에 봉착하고 엄청난 경제적 비용을 치루게 된다. 또한 이를 피하기 위해 높은 외환보유고를 유지하는 경우 이에 수반하는 비용을 치루게 된다. IMF(2010)에 의하면

신흥개도국들이 외환보유고 축적으로 치루는 비용은 2009 년의 경우 이들 국가의 연간 국민총생산액(GDP)의 약 1.3%에 이르는 것으로 추산되고 있다.⁶

넷째, 앞서 지적한 사항과도 관련되는 것이지만 한 국가의 통화를 국제중심통화로 사용한다는 것은 전 세계가 그 특정국가가 자국의 통화가치를 안정적으로 유지하는 능력에 의존하게 된다는 것이며 이 것 자체가 국제금융시스템의 불확실성을 높이는 요인이 되고 있다는 것이다. 만약 미국이 건전한 재정정책을 쓰고, 중앙은행의 독립성을 확보하여 안정적인 통화가치를 유지하고, 그리고 든든한 금융감독체제와 감독규준을 설정하여 자국 금융시장의 안정성을 지속적으로 담보해 나가는 한 큰 문제가 없을 수 있다. 그러나 이러한 능력에 대한 신뢰가 무너지는 순간 국제금융시장은 혼란에 빠져들 수 있는 것이다. 만약 여러 나라의 통화가 동시에 국제통화로 사용될 경우 그 나라들의 거시정책, 금융감독의 건전성, 그리고 통화의 안정성에 따라 점점 보다 중요한 국제통화로 선호되고 사용되어 거시경제정책의 규율(discipline)에 대한 경쟁체제가 형성될 수 있으므로 보다 안정적인 통화제도를 갖게 될 수도 있을 것이다. 혹은 국제통화기금(IMF)과 금융안정협의회(Financial Stability Board)와 같은 국제기구에 중심통화를 발행하는 국가의 거시경제정책, 재정정책, 통화정책, 그리고 금융감독정책에 대해 강력한 감독기능(surveillance)을 주어 이를 규율할 수 있다면 보다 안정적인 국제통화제도를 가질 수 있을 것이다. 그러나 현재로서는 국제통화기금은 미국의 거시정책이나, 금융감독정책에 대해 거의 아무런 구속력이나 영향력을 가지고 있지 않다. 또한 달러화와 함께 국제통화로 부상할 수 있는 가장 주요 후보인 유로화의 경우 최근 유럽의 재정위기, 유로존 지탱의 불확실성 등으로 당분간 국제통화의 건전한 경쟁시대를 낙관하기 어렵게 되었다.

다섯째, 특히 신흥경제국들과 개도국들을 중심으로 한 막대한 공적 외화자산의 보유는 세계의 자본이동을 이들로부터 통화중심국(미국)으로 흐르게 하는 왜곡현상을 낳고 있다는 것이다. 원래 자본은 자본의 생산성이 낮은 선진국으로부터 자본의 생산성이 높은 개도국이나 신흥 경제국으로 흘러 들어 가는 것이 바람직하나 후자의 외환보유고의 축적은 미국이나 유로화 국가의 재정증권이나 공공채권에 대한 투자로 일어나고 있어 이와 반대되는 국제자본이동을 가져오고 있는 것이다. 이는 전 세계의 잠재 성장률을 낮추는 결과를 낳고 있다는 것이다.

이상과 같은 문제점들은 새로이 발생한 문제들이라기 보다 1971 년 브레튼우즈 체제붕괴 이후 국제통화제도에 그 동안 오랫동안 내재되어 왔던 문제점들이기도 하다. 국제통화제도를 개편해야 한다는 주장도 비단 최근에 제기된 것이 아니라 오래 전부터 제기되어왔었다. 아시아 외환위기를 맞았을 때도 국제통화제도의 개편에 대한 주장들이 제기 되었다. 그러나 최근 세계금융위기를 맞게 됨에 따라 이러한 국제통화제도의 문제점들이 더욱 크게 부각되고 바로 이 때문에 지난 약 1-2 년간 국제통화제도를 개혁해야 한다는 국제적 논의가 다시 일어나고 있다. 작년 3 월 중국의 인민은행(The People's Bank of China) 총재인 Zhou Xiao Chun 이 현재의 국제통화제도는 불안정성뿐 아니라 불공정성을 가지고 있으며 이의 개혁이 필요하다고 주장하고 나선 것도(Zhou 2009) 바로 이러한 맥락에서 일어난 문제의 제기이다. 그리고 금년 4 월에는

⁶ 이는 이들 국가가 발행한 채권과 미국 Treasury 국채의 금리 차이(spread)가 3% 포인트 정도 된다는 가정하에 추산된 숫자이다.

스위스의 취리히에서 IMF와 스위스중앙은행(Swiss National Bank)의 공동주관으로 주요국 중앙은행총재들, 국제금융학자, 국제금융시장의 주요 인사들이 비공개하에 국제통화제도의 개편에 대해 심도있는 토의를 하게 된 것도 바로 이런 배경에서다.

2. 국제통화제도—어떻게 개편할 것인가?

현재의 국제통화제도가 오늘날의 세계경제와 국제금융시장 현실에 비추어 많은 한계와 문제점을 안고 있다는 것에 대해서는 거의 견해가 일치하나 이 제도를 어떻게 개편해나가야 할 것인가에 대해서는 많은 이견들이 있다. 근본적이며 이상적인 개편안은 오늘날의 국제정치 현실에서 실현성이 약하고 반면 현실적으로 가능한 개편안은 여전히 근본적인 문제점들을 해결할 수 없는 한계점들을 가지고 있다. 현재 당면하고 있는 국제통화제도의 문제점들을 볼 때 개편 방향의 핵심은: (1) 수요 측면에서는 과대한 외환보유고를 축적하려는 인센티브를 어떻게 줄일 수 있을 것인가 하는 것이며; (2) 공급 측면에서는 현재 미국 달러화에 주로 의존하고 있는 제도로부터 보다 다양한 국제통화(reserve currency) 혹은 대체적 외화준비자산(SDR을 포함하여)으로 전환해 나가거나 혹은 보다 근본적인 개혁 방안으로서 새로운 세계통화(global reserve currency)를 창출하는 것이며; 그리고 (3) 이러한 변화를 뒷받침 하기 위해 필요한 기구적(institutional) 개편, 특히 IMF이 개혁을 추진하는 것이다.

1) 수요적 측면—외화보유고 축적에 대한 수요의 축소

이론적으로 볼 때 고정환율제도에서 변동환율제도로 이행하게 되면 높은 수준의 외환보유고를 축적할 필요가 없다. 그러나 앞서도 언급한 바와 같이 전세계적으로 볼 때 외환보유고의 축적은 크게 늘어나고 있다. 그 것은 많은 신흥 경제국들이 순수한 변동환율제를 채택해 오지 않았기 때문이다. 외환보유고의 축적 이유는 단순히 급작스러운 자본흐름의 반전에서 기인하는 외환위기에 대비하기 위한 자기 보험기능(self-insurance)으로서 뿐만 아니라, 중국과 같이 수출주도형 경제성장을 추구하는 나라는 환율을 가능하면 저평가하여 수출경쟁력을 유지하려 하고 높은 성장잠재력에 따른 지속적인 자본유입에 의한 절상압력이 가중될 때 외환시장에 개입하여 그 결과 외환보유고가 계속 늘어나게 된다. 그러나 또한 많은 신흥 경제국들은 외환위기를 피하기 위해서는 거시경제의 건전성과 경상수지의 균형, 수출경쟁력을 유지해야 한다는 것을 과거 위기를 통해 체험하였고 이러한 정책을 추진하는 과정에서 외환보유고가 지속적으로 축적되고 있는 것이다. 물론 이러한 두 요인은 서로 연관되어 있기도 하다. 신흥개도국으로 자금이 유입되는 것은 이들 국가의 성장률이 높고 장래 투자수익률이 높기도 하지만 선진국들이 오랫동안 저금리 기조를 유지하여 carry trade가 증가한 때문이기도 하며 이는 다시 신흥 경제국들의 외환보유고 증가가 미국, 유럽의 재정증권, 공적 채권과 같은 안전자산의 수요를 늘리게 되어 이들 국가들이 재정적자와 주택시장 대출을 낮은 비용으로 조달할 수 있기 때문이기도 하다. 따라서 위기에 대비한 보험기능으로서의 외환보유고 축적 유인을 줄여준다고 해서 신흥 경제국들의 외환보유고 수요가 절대적으로 준다고 기대하기는 쉽지 않다.

그러나 이러한 유인구조가 오늘날 국제금융 현실에서 존재하는 것도 분명한 사실이다. 일부 추산에 따르면 보험동기에 의한 외환보유고의 축적은 현재 전체 세계 외환보유고의 약 2/3, 혹은 4 조 내지 4.5 달러에 이르며, 지난 10년간 전체 외환보유고

증가액의 약 절반을 차지한다고 한다 (Obstfeld, Shambaugh and Taylor 2009). 그러나 이러한 자기 보험(self-insurance)을 위한 외환보유고의 축적은 상당한 비용을 수반할 뿐만 아니라 전 세계적 관점에서 보았을 때 분명히 비효율적인 방법이다. 따라서 이에 대한 개선이 필요하다. 이와 관련해 크게 보아 두 가지 대안들을 생각해 볼 수 있다. 첫째는 제 3 자 보험의 모색이며 둘째는 유동성위기 시 의존할 수 있는 ‘국제적 지원 창구’(최종대부자와 비슷한)의 확대를 모색하는 것이다. 전자의 경우 이론적으로는 가능하나 현실적으로 시장의 실패(market failure)로 인해 이의 출현을 기대하기 어렵다. 후자의 경우 ASEAN plus 3 에서와 같이 지역의 외환보유고를 이용해 스왑라인을 확대하거나 혹은 지역적 혹은 글로벌 차원에서 외환보유고를 pool 하여 긴급 시 이를 사용할 수 있도록 하는 것이다. 그러나 현실적으로 이러한 장치의 마련은 크게 미흡한 수준이다.

이상과 같은 상황하에서는 결국 IMF 에 의한 유동성 대출기능을 확대하고 대출 프로그램의 내용을 개선하여 위기 시에 개도국이나 신흥경제국들이 보다 쉽고, 주저함 없이 의존할 수 있게 하는 것이 가장 현실적인 대안으로 토의되고 있다. 다시 말해 IMF 의 대출기능을 강화하여 세계금융안전망 (Global Financial Safety Net)을 강화하는 것이다. 이를 위해서는 우선 IMF 의 재원이 확충되어야 하는 바 2009 년 G20 정상회의에서 이미 IMF 의 재원을 지금의 3 배로 늘하기로 합의한 바 있다. 현재 IMF 대출 프로그램의 개선도 일부 이루어졌다. 지난 세계금융위기 시 IMF 는 위기 시 긴급지원이 가능하도록 FCL(Flexible Credit Line)을 새로이 설치함과 동시에 HAPA(High-access Precautionary Arrangements)를 보강하게 되었다. FCL 의 경우, 자국의 거시경제 건전성에 문제가 없으면서 일정한 사전적 조건을 충족한 경우 외부요인에 의해 유동성 위기를 겪는 나라들에게 제공되게 되어 있는데 폴란드, 멕시코, 콜롬비아 등이 2009 년 이 FCL 의 도움을 받았다. 반면 다른 나라들은 (우리나라를 포함하여) IMF 의 권유에도 불구하고 이의 차입을 기피하였다. 이는 여전히 IMF 로부터의 차입이 가져오는 ‘낙인효과(Stigma Effect)’를 두려워했기 때문이다. 또한 FCL 은 차입 국가들의 자격에 대해 일정한 조건을 사전에 정함으로써 이에서 제외되는 비 자격국가들의 신용도는 시장에서 오히려 불이익을 받게 되어 이 것이 자기보험 (self-insurance)을 위한 외환보유고의 대안으로서의 기능을 제대로 해오지 못하고 있다는 비판도 받고 있다.

우리나라는 금년도 G20 의 의장국으로서, 또한 1997 년 외환위기와 2008 년에 유동성위기를 경험한 신흥 경제국 입장에서 Global Financial Safety Net(GFSN)의 설립이 절실하다는 입장에서 IMF 와 협의 하에 이에 대한 몇 가지 대안을 준비 중이다. 현재의 FCL 보다 훨씬 대규모의 대출이 가능하고 대출자격에 대한 보다 객관적인 사전적 자격기준을 마련해 IMF 로부터의 차입에서 오는 낙인효과를 줄이고 나아가서 현재 6 개월로 제한되어 있는 FCL 의 만기를 늘이는 방안; FCL 의 사전적 자격요건을 충족시키지 못하더라도 유동성위기에 처한 개도국들이 일정한 사후적 정책조건하에 FCL 과 유사한 긴급대출에 접근이 가능할 수 있도록 하는 새로운 대출라인인 PCL(Precautionary Credit Line)의 설치 등에 대해 협의를 진행 중인 것으로 알고 있다. 또한 이번 위기 시 FRB 와 한국은행의 스왑협정이 위기를 진정시키는 데에 가장 유효한 역할을 했던 경험에 비추어 미국과 유럽, 영국, 일본 등 국제결제통화를 발행하는 나라들이 IMF 를 통해 간접적으로 세계금융시장에서 중요한 위치를 가지고 있는 (systemically important) 신흥 경제국들에게 스왑라인과 비슷한 자동 대출을 동시에

일괄적으로 제공할 수 있는 장치(Multilateral Credit Line)를 설정하는 방안들에 대해서도 회원국들과 협의중인 것으로 알고 있다.

이러한 새로운 대출제도를 만드는 데에 있어 가장 기본적인 문제는 ‘대출 자원’의 마련과 위기 시 거의 자동적으로 제공되는 이들 대출제도가 개별국가들의 거시경제운용에 가져오게 될 ‘도덕적 해이’ 문제를 어떻게 해결할 것인가 하는 것이다. 이에 대한 주요국들의 입장이 달라 이번 G20 서울 정상회의를 통해 어느 정도 수준의 합의가 이루어질지는 아직 미지수이다.

2) 공급적 측면 — 달러화 위주의 국제통화질서에서 탈피

이상에서 논의했듯이 글로벌 금융안전망의 강화를 통해 외환보유고 수요의 축소를 도모하고 이를 통해 세계경제 불균형의 확대를 시정하려는 노력도 필요하지만 현재 달러화에 주로 의존하고 있는 외화준비자산(Reserve Assets)을 다양화하여, 혹은 새로운 세계통화를 창출함으로써 보다 안정적이고 공정한 국제통화질서를 구축해야 한다는 의견들을 공급적 측면에서의 국제통화제도의 개선에 대한 제언으로 볼 수 있다. 이와 관련해서는 크게 세가지 방안이 제시되고 있다. 첫째는 지금의 ‘달러화 중심체제’에서 ‘복수 통화(multiple reserve currency) 체제’로 나아가자는 것이며, 둘째는 현재의 주요 국제통화를 pool 한 SDR 에 기반한 국제통화제도로 이행해 가자는 것이며, 셋째는 Keynes 가 과거 제안했듯이 Bancor 와 같은 세계통화를 창출하자는 것이다. 물론 이들은 각각 장단점을 가지고 있다.

복수통화제도 (Multiple currency system)

이는 세계경제 구조가 다극화(multipolar) 시대로 나아가고 이듯이 국제통화제도도 multi currency system 으로 가야 한다는 의견이다. 현재 국민총생산량, 국내 금융시장 및 교역 규모 등에서 미국과 비슷한 유로화는 달러화와 비슷한 국제통화로서의 역할을 할 잠재력을 가지고 있다. 중국의 인민폐도 지금은 아니지만 향후 중국 정부가 외환규제를 자유화하고 중국의 금융, 자본시장이 지금보다 더 국제화되고, 또 중국의 거시경제정책이 장기적 신뢰성을 쌓아간다면 그러한 잠재력을 가질 수 있을 것이다. 어떤 통화가 국제통화로 자리잡기 위해서는 그 통화가 사용되는 나라의 경제규모가 커야 할 뿐 아니라 그 나라의 외환, 금융시장이 개방, 자유화되고 잘 발달되어 있어야 하며, 또 거시경제정책과 금융감독 정책의 건전성에 대한 오랜 신뢰성이 확보되어 그 통화의 장기적 가치가 안정되어 있어야 한다. 그리고 그 통화가 국제외환시장에서 민간부문의 거래에 많이 사용되기 시작해야 한다.

그러나 과거 국제통화질서의 발전을 통해 볼 때 여러 통화가 동시에 국제통화로 사용되기는 했지만 늘 한 통화가 압도적으로 많이 사용되는 우월적 통화(dominant currency)로서의 지위를 확보하는 경향이 있었다. 이 것은 단지 그 나라의 경제적 지위가 세계경제에서 차지하는 비중이 압도적이어서만이 아니라 소위 ‘network effect’라고 하는, 국제교역이나 자본거래에 있어 늘 보다 널리 사용되는 통화로 가격 인용과 자산 보유를 단일화 하려는 시장의 경향이 있기 때문이다. 역사적 경험을 보더라도 19 세기 초반 금화와 은화가 동시에 국제통화로 통용되다가(bimetallic system), 결국 금이 우월적 통화의 지위를 갖게 되었으며(Global Standard System), 2 차 대전 이후 미국의 달러화와 영국의 파운드화가 동시에 통용되다가 결국 달러화가 주 국제통화로의

지위를 확보하게 되었다. 그러나 만약 동시에 복수의 통화가 비슷한 수준의 가치의 안전성에 대한 신뢰를 주고 적절한 공급량을 유지할 수 있다면 복수의 통화가 경쟁적으로 국제통화의 지위를 확보할 수도 있다. 물론 새로이 출현하는 통화가 일정한 수준의 ‘network effect’에 도달할 수 있기까지는 쉽지 않은 과정이 있을 수 있고 장기간의 시간을 요할 수도 있다.

복수통화제도하에서는 또한 국제통화를 발행하는 국가들에게 경쟁적으로 상당한 거시경제정책의 규율을 요구하게 될 것이라는 장점이 있다. 만약 한 통화 가치의 안전성에 의문을 갖게 되면 금방 다른 통화로 준비자산을 옮기게 될 것이며 이는 자국 경제에 상당한 부담으로 작용하게 될 것이기 때문이다.⁷ 또 복수의 국제통화제도하에서는 여태까지 미국이 누려왔던 과도한 특권(exorbitant privilege)도 국제통화를 발행하는 몇 나라에 분산되게 될 것이다. 그러나 어떤 통화든지 적절한 network effect 를 가질 수 있는 지점까지 도달하고, 또한 달러화의 우월적 지위로부터 서서히 복수통화로 옮겨가는 과정을 세계가 어떻게 관리해 나갈 것인가 하는 것은 매우 어려운 과제가 아닐 수 없다. 복수통화가 출현하는 과정에서 유력 통화간의 환율의 움직임이 불안정해 질 수 있으며 이는 세계금융시장과 세계경제에 커다란 불확실성을 야기할 수도 있다. 따라서 이러한 과정에서 주요국들간의 성공적인 정책협약과 조율이 무엇보다 중요한 관건이 될 것이라 보여진다.

SDR 에 기반한 제도 (SDR-based System)

1969 년 IMF 에 의해 창출, 배분되었다가 그 동안 거의 잊혀오다시피한 특별인출권(Special Drawing Right)이 세계금융위기로 달러화의 국제통화로서의 신뢰성이 위협받자 새로운 국제통화로서의 가능성으로 부상하고 있다. SDR 은 그 자체로서 국제통화가 아니고 통화바스켓(currency basket)⁸에 구성되어 있는 통화들에 대한 일종의 구상권(claim)이다. 실제로 최근에 BRIC 국가들의 중앙은행들로부터 수요가 발생해 IMF 가 이를 공급했고 현재 전세계 외화준비자산의 약 4%를 차지하고 있다 (IMF 2010). SDR 은 주요 통화들의 바스켓으로 구성됨으로써 한 국가의 외화준비자산이 어느 한 통화에 절대적으로 의존하는 경우와 비교해 그 가치가 훨씬 안정적이라는 장점이 있다. 또한 Triffin Dilemma 를 부분적으로 극복할 수 있는 장치가 있다. 그러나 SDR 이 대외준비자산으로서의 역할이 강화되기 위해서는 유동성이 지금보다 훨씬 높아져야 한다. 그러기 위해서는 IMF 가 이의 발행을 늘리고 유동성을 높이기 위한 노력을 강화해야 할 뿐 아니라 민간부문에서도 이의 사용이 늘어나야 한다. 각국 정부가 국채를 SDR 표시로 발행하고, 민간채무자들도 SDR 표시 채권을 발행하고, 그리고 일부 국가들이 환율을 SDR 로 인용하는 등의 일련의 움직임이 일어나게 되면 SDR 의 국제준비자산(Reserve Assets)으로서의 역할이 강화되게 될 것이다.

SDR 은 실제로 복수통화제도(multiple reserve currency system)가 가지는 이점도 그대로 가지고 있다. 준비자산의 수요 입장에서 보면 이를 보유할 경우 바로 바스켓 구성 통화들로 외화보유고를 자동적으로 분산(diversify)하는 효과를 가지게 되는 것이

⁷ 최근 유럽의 재정위기로 유로화가 절하되기 전까지만 해도 중국은 세계금융위기 이후 외환보유고에서 조금씩 달러화의 비중을 줄이고 유로화의 비중을 늘어왔었다.

⁸ 원래는 출범시에는 16 개 통화로 구성되어 있었으나 현재는 달러, 유로, 엔, 파운드화 등 4 개 통화로 구성되어 있음

다. 따라서 준비자산으로서의 가치가 훨씬 안정적이다(물론 이를 구성하는 통화들의 상대적인 안정성에 달려있기는 하지만). 또한 공급자의 입장에서 볼 때 SDR 에 포함되어 있는 통화의 비중은 고정된 수치로 정해지기 때문에 (예를 들어 1 SDR 당 미 달러화 44 cents 포함 등), 각 통화의 상대적인 비중은 이들 통화간의 환율이 변동하는 데에 따라 변하게 되어있다. 따라서 어떤 한 나라가 부실한 통화관리로 인플레이가 발생할 경우 환율이 절하되어 바스켓내에서의 비중이 자동적으로 내려가게 되므로 바스켓에 포함되는 통화를 발행하는 국가들에 거시경제정책의 규율(discipline)을 부과하는 효과가 있다. SDR 의 사용은 또한 지금까지 어느 한 국가가 국제통화발행으로부터 얻는 ‘과다특권(exorbitant privilege)’을 바스켓에 포함되어 있는 통화를 발행하는 국가들로 자동적으로 분산할 수 있으며 또한 복수통화제도하에서 시장에서 어떤 통화가 network effect 를 가지게 될 때까지 걸리는 시간에 비해 훨씬 더 빠르게 분산될 수 있는 이점을 가지고 있다. 나아가서 IMF 가 개도국이나 신흥경제국을 대상으로 SDR 발행을 늘리게 되면 이들 국가가 외환보유고 확대를 통해 국제통화를 발행하는 선진국들에게 직접적으로 자본을 수출하게 되는 일도 줄어들게 될 것이다 (Clark and Polak 2004).

실제로 중국이 달러화 위주로 되어 있는 현재의 외환보유고를 달러화의 비중을 낮추도록 재구성하려 할 경우 달러화 가치의 급격한 하락 등을 수반할 수 있어 외환보유고의 큰 손실을 가져올 수 있음에 비해 달러화 준비자산을 SDR 로 대체할 경우 중국의 외화자산 가치를 훨씬 안정적으로 유지하며 달러화의 비중을 줄일 수 있는 방법이 될 수 있다. 지난 해에 Zhou 중국인민은행 총재가 국제통화제도의 SDR 시스템으로의 전환을 제안한 것도(Zhou 2009) 이러한 배경에서 출발한 것으로 보인다. 다른 한편으로 보면 SDR 에 기반한 국제통화제도로 전환해나간다고 해도 실제로 세계경제불균형의 문제를 해결하는 데에는 큰 도움이 되지 않을 것이라는 견해도 있다(Carney 2009). 실제로 만약 중국이 SDR 위주의 시스템으로 자국의 외환보유고의 가치를 안정적으로 유지할 수 있게 되면 외환보유고를 줄이려는 인센티브가 오히려 없어질 수 있다.

어쨌건 실질적으로 SDR 에 기반한 국제통화제도로 전환해 가기 위해서는 국제적인 합의와 주요국들간의 정책공조가 뒷받침되어야 한다. 특히 IMF 를 실질적으로 지배하고 있는 미국이 달러화를 대체하는 국제준비자산으로서의 SDR 의 역할이 확대되도록 받아들이고 이로의 전환에 적극적으로 협조해 주어야 가능해 질 수 있다. 그러나 이는 지금의 달러 중심의 국제통화제도가 결정적으로 붕괴의 위험에 처하게 될 때까지는 기대하기 어려운 일이 아닐까 생각된다. 또한 국제준비자산으로서의 달러화 공급의 감축속도 보다 SDR 에 대한 수요의 증가속도가 빠를 경우 미국의 금리가 올라가게 되며 여타 국가들의 금리와 차이가 커져 국제금융시장에 혼란을 불러올 수도 있기 때문에 주요국가들간의 치밀한 국제공조가 이루어지지 않으면 SDR 위주의 국제통화제도로의 전환과정이 쉽지 않을 것이라 예측된다. 따라서 SDR 을 복수 국제통화의 하나로서 다른 통화들과 함께 사용되게 하고 이의 사용이 점차 확대되도록 하는 것이 보다 현실적인 대안이 될 수 있을 것이다.

세계통화(Global Reserve Currency)의 창출

국제통화제도의 가장 급진적인 개혁 방안은 새로운 세계통화를 창출하여 실제 국제거래에 사용되게 하고 이 통화에 대해 각국 통화의 환율이 정해지도록 하는 것이다.

이 통화는 그 가치의 안정성이 보장되도록 지금의 IMF와는 다른 기능과 지배구조를 가진, 새로이 설립된 국제기구에 의해 창출, 발행되도록 해야 할 것이며 이 기구는 어느 특정 국가의 경제 문제로부터 독립되어 있어야 할 것이다. 그리고 이 기구의 자산과 부채구조가 모든 회원국들에 의해 뒷받침되어 있어 안전자산(safe asset)으로서의 세계통화를 새로이 창출하는 것이 바로 이 제안의 골격이다.

만약 이 통화가 널리 사용되게 되면 개별국가의 통화가 새로이 국제통화로 부상하기 위해 필요한 ‘network effect’ 문제를 신속히 해결할 수 있고 또 어느 한 특정 국가에 의해 향유되는 ‘과다특권’은 모든 회원국으로 분산되어 국제통화제도의 공정성을 기할 수 있게 된다. 또한 이에 기반한 국제통화질서는 세계경제의 불균형 문제를 보다 원활히 조정해낼 수 있을 것으로 예상된다. 만약 지금과 같이 각국이 다양한 환율제도를 채택하더라도 이 ‘세계통화’에 환율을 고정시키는 경상수지 흑자국의 경우 (현재 중국의 경우처럼) 이 통화에 대해 자유변동환율제도를 채택하는 적자국의 통화(가령 달러화)가 절하됨으로써 적자국에 비해 자국통화가 자동적으로 절상되게 됨으로써 국제수지 불균형이 보다 원활히 조정될 수 있는 것이다. 또한 이 통화를 발행하는 국제기구는 실질적으로 세계금융시장에서 최종대부자(lender of last resort)의 기능을 발휘할 수 있어 신흥개도국들의 자기보험을 위한 과다 외환보유고 수요를 줄일 수 있는 것이다.

따라서 새로이 창출된 ‘세계통화’에 의한 국제통화제도는 세계경제 불균형(global imbalance)의 조정을 원활히 하는 측면에서나, 국제통화제도의 안전성 및 공정성을 제고하는 측면에서 가장 바람직한 대안이 될 수 있다는 것이다. 이 보다 더욱 급진적인 개혁은 현재의 유로화와 같이 세계중앙은행을 설립하여 여기서 발행되는 통화가 국제통화일 뿐 아니라 각국의 국내통화로도 유통되게 하는 것이다.

그러나 이러한 개편안이 현실화되기 위해서는 각국의 경제주권이 크게 희생되어야 하고 따라서 이 제도가 가지는 커다란 장점에도 불구하고 국제정치 현실상 실현될 가능성은 극히 낮다는 것이 한계이다.

3) 기구적 측면에서의 개편 (Institutional Reform)

국제통화제도에 있어서의 기구적 측면에서의 개편은 주로 IMF의 역할과 기능에 대한 개편으로 집약되고 있다. 브레튼우즈 체제하에서 IMF의 설립 취지는 이 기관이 일종의 국제중앙은행의 역할을 하도록 하는 것이었다. 경상수지적자의 지속으로 외환부족 사태를 겪는 국가들에 경상수지적자를 해소할 수 있도록 긴축적 거시경제정책을 도입하고 (필요한 경우) 환율을 절하하는 정책을 채택하는 조건으로 대기성차관을 제공하여 외화유동성 위기를 넘기도록 하는 역할을 하게 하였다. 당시의 외환위기는 주로 경상수지 적자에 의한 위기였고 대부분의 국가들에 있어 자본거래는 엄격히 통제되어 있었다. 그리고 IMF의 재원도 당시의 세계경제규모나 대외거래 규모에 비해 상대적으로 넉넉한 편이었다. 그러나 1990년대 이후 각국의 자본시장 개방과 세계금융시장 통합으로 국가들이 겪는 외환위기는 주로 급격한 자본수지의 반전에 의한 위기가 많아졌고 IMF의 재원은 세계경제규모나 대외거래 규모에 비해 상대적으로 훨씬 왜소하게 되었다. 2008년 당시 IMF의 재원은 우리나라가 가지고 있었던 외환보유고와 비슷한 약 2500억 달러에 불과하였다. 당시 중국의 외환보유고가 약 2조 달러에

달하고 있었으며 일본도 약 1 조불 가까운 외환보유고를 가진데 비하면 IMF 의 재원 규모는 상대적으로 크게 위축된 것이었다.

또한 IMF 는 앞서도 지적했듯이 외환부족 사태를 겪는 개도국들에는 절대적 영향력을 행사해 왔던 반면 세계경제운용에 절대적인 영향을 미치는 미국이나 여타 선진국들의 경제정책에 대해서는 거의 아무런 영향력을 행사하지 못해 세계경제에 대한 **watchdog** 으로서 이미 국제적 신뢰성이 약화되어 있다. 이런 현실에도 불구하고 IMF 에 자금을 요청하는 나라는 지극히 심각한 유동성위기에 봉착했다는 의미이며 그 위기를 넘기기 위해 고통스러운 조정 프로그램을 받아들여야 할 정도로 경제의 펀드멘털과 정책운영이 부실했다는, 소위 낙인효과 '**stigma effect**'를 가지게 되기 때문에 우리나라도 2008 년 심각한 유동성 위기를 겪으면서도 IMF 에 자금지원 요청을 한사코 거부했었다. 따라서 현재의 IMF 는 설립 당시의 취지와 달리 세계경제의 불균형을 해소하고 국제금융시장의 안정을 도모하는 데에 있어 거의 무력한 기관으로 되어버렸다. 최근의 세계금융위기처럼 위기가 주요 국가들로 빠른 속도로 퍼져나가는 경우 이들의 외화유동성을 동시에 지원하기 위해서는 재원도 턱없이 부족하게 되었다.

따라서 국제통화질서의 개편은 당연히 IMF 의 개편을 포함하는 것이 되어야 한다. IMF 의 개편방향은 첫째, IMF 의 재원을 확충해야 하고; 둘째, IMF 의 주요국에 대한 경제정책의 감시; 감독역할(**surveillance**)과 정책조정에 대한 압력기능을 강화해야 하며; 셋째, 신흥개도국들이 외화유동성 위기의 가능성에 봉착했을 시 이에 탄력적으로 대응할 수 있는 대출 프로그램(정책조건을 포함하여)의 개선; 그리고 넷째, IMF 의 지배구조를 개편하는 것이다.

첫째 조건의 경우에는 이미 G20 회의에서 현재의 재원을 3 배로 증가시켜 7500 억 달러로 증액하기로 하였다. 최근 IMF 는 새로운 금융안전망 구축과 관련하여 대출재원으로 추가적으로 2500 억 달러를 증액해 줄 것을 G20 에 요구하고 있는 것으로 알려지고 있다.⁹ 둘째의 경우는 2009 년 런던 G20 정상회의에서 국제금융시장에 대한 감시기능과 조기경보체제를 강화할 것을 IMF 에 이미 요구했으며 이에 대한 구체적 조건 및 방안이 검토되고 있으나 아직 제도화된 단계는 아닌 것으로 보인다. 셋째의 경우에는 앞서 수요 측면에서 다루었듯이 금년도 G20 의장국인 우리나라의 대통령 직속 G20 준비위원회와 협의를 진행 중이며 몇 가지 새로운 대출 프로그램의 윤곽이 최근 **Financial Times** 지 등 해외 언론에도 보도된 바 있다. 구체적인 협의는 아직도 진행 중인 것으로 알고 있으며 이번 서울정상회의에서 소기의 성과가 있기를 기대한다. 넷째의 경우, 지배구조의 변화는 무엇보다 지분율의 재구성과 이사회의 재구성을 추진해 나가는 것이다. 지난 해 런던 G20 정상회의에서 현재 경제규모나 교역규모에 비해 과다하게 지분을 소유하고 있는 나라들(주로 유럽국가들)로부터 전체 5%의 지분을 떼어 내어 경제나 교역규모에 비해 과소하게 지분을 소유하고 있는 나라들(주로 중국, 한국을 포함한 신흥 경제국)에 재배분할 것으로 합의한 바 있다. 이의 구체적인 방법에 대해서는 11 월 서울 정상회의 전까지 대체적인 윤곽이 결정될 예정이나 아직도 여전히 난항을 겪고 있는 것으로 보인다. 재원 증가(**quota increase**)보다 지분율 조정(**quota distribution**)이 훨씬 어려운 것이다. 모두 합쳐서 100%가 되는 지분율에서

⁹ Financial Times, "IMF seeks \$250 billion boost in loan resources to prevent new crises," by Christian Oliver and Alan Beattie, 2010. 7. 18 일자

어느 한 나라의 지분증가는 다른 나라의 감소에 의해서만 가능한 제로섬 게임인데 어느나라도 선뜻 자국의 지분율 감소를 받아들여려 하지 않기 때문이다.

필자의 견해로는 IMF 가 신뢰성을 회복하고 국제금융문제들에 대한 실질적 조정 역할을 하기 위해서는 지금의 신흥경제국의 경제규모에 의한 비중보다 훨씬 더 많은 지분율을 배분하는 방안을 모색해야 한다. 가령 지금 계획되어 있는 바와 같이 신흥국들에게 5%의 지분을 이전한다고 해서 IMF 의 실질적인 지배구조는 크게 달라지지 않을 것이기 때문이다. 또한 지배구조의 개편은 단순히 지분율의 재구성뿐 아니라 현재 IMF 의 경영진, 고위직의 재구성을 포함해야 한다. 주로 미국과 유럽출신들로 구성되어 있는 고위직의 구성을 세계경제 구조의 변화를 반영한 구성으로 이루어 내야 IMF 의 운영절차, 정책 조건의 공정성을 개선할 수 있을 것이며 또한 이로부터 연유하는 신뢰성도 강화할 수 있을 것이다. 그러나 이는 장기적인 시간을 요구하는 분야로 보인다.

4) 향후 전망

앞서도 말한 바와 같이 현재의 국제통화제도가 여러 한계점을 노출하고 있다는 데에 대해서는 별다른 이견이 없으나 이를 어떻게 고쳐나가야 할 것인가, 혹은 고쳐나갈 필요가 반드시 있는가에 대한 의견은 국가에 따라, 학자에 따라 의견이 다르다. 우선 현재의 제도에 가장 우려를 가지고 제도의 개편에 대해 적극적으로 의견을 개진해온 나라는 중국이다. 중국은 현재 약 2 조 5 천억 달러에 달하는 세계 최대의 외환보유고를 축적하고 있으며 그 규모는 중국의 연간 국민소득의 절반을 넘는 수준이다. 미국에서 금융위기가 발발한 이후 장래 미국 달러화의 가치가 현재의 수준에서 유지되기 어려울 것이라는 관측이 지배함에 따라 중국은 현재 달러화 위주로 구성되어 있는 외환보유고의 장래 가치 손실에 대해 불안감을 가질 수 밖에 없다. 그러나 중국이 독자적으로 외환보유고의 통화구성에서 달러화 비중을 낮추려 할 경우 그 것 자체가 달러화 가치의 하락을 촉발하게 되어 이 또한 자국의 이익을 위한 길이 아니다. 중국은 세계경제 불균형의 한 축으로서 자국에 가해지는 환율절상과 국내소비 증가를 위한 구조개혁의 압력에 당면하여 최근 국제통화제도 개편이라는 화두를 국제사회에 던지고 있다.

또한 한국, 동아시아, 중남미 국가들을 비롯해 자국의 통화가 국제통화로서의 기능을 전혀 갖지 못한 신흥 경제국들은 현 국제통화제도에서 늘 외환위기의 위험에 노출되어 있게 되므로 높은 외환보유고를 비축할 수 밖에 없는 실정이며 이에 대한 만만치 않은 비용을 지불하고 있다. 또한 아무리 많은 외환보유고를 쌓아놓고 있더라도, 그리고 신중한 경제정책의 운용을 하더라도 이번 세계금융위기처럼 국제통화의 중심국에서 위기가 발생할 경우 커다란 타격을 받지 않을 수 없는 처지에 있어 현재의 국제통화제도의 개편에 많은 관심을 가지고 있다.

그럼에도 불구하고 가까운 장래에 국제통화제도에 주요한 개편이 이루어지리라고 기대하기는 쉽지 않을 것 같다. 국제통화제도는 단순히 경제적 효율성과 공정성에 따라 결정되는 것이 아니고 국제사회의 정치적, 경제적 역학구도에 의해 결정된다. 그리고 한번 제도가 정해지고 또한 국제통화로 사용되는 통화가 시장에서 우월적 지위를 확보하게 되면 그 것이 지속되는 관성을 가지게 된다. 무엇보다 미국이 현재의 국제

통화제도로부터의 큰 변화를 원치 않고 있으며 또한 시장이 달러화를 국제결제수단, 무역표시 통화로 계속 사용하는 데에서의 편리함을 쉽게 포기하려 하지 않을 것이기 때문에 당장 어떤 변화를 도모하기 어렵다는 것이 많은 경제학자들의 견해이다. 마치 국제법으로 정하거나 누가 강요하지 않아도 영어를 국제 공용어로 세계 시민들이 사용하고 있는 것처럼 브레튼우즈 체제가 붕괴한 이후 현재의 달러화도 국제조약이나 정부간 합의에 의해서가 아니라 관행에 의해 시장이 이를 선호되고 있기 때문에 주된 국제통화(dominant currency)로 통용되고 있으며 이미 network effect 를 확보한 달러화를 대체할 통화가 당분간은 나타나지 않을 것이란 것이다. 특히 이는 주로 미국 출신의 학자들을 중심으로 주장되는 견해이기도 하다 (Truman 2010, Cooper 2008).

Truman(2010)은 지금의 국제통화제도가 적절치 않으며 세계경제의 불균형, 금융위기의 한 요인이 되었다라는 견해 자체에 반대하고 있다. 그의 견해에 의하면 현재의 제도는 금본위제도, 양차대전 기간 동안의 변동환율제, 전후의 브레튼우즈 제도의 결함들을 보완하면서 발전해 온 제도로서 이 제도하에서 많은 나라들의 경제적 번영과 발전이 이루어졌다는 것이다. 물론 이 제도가 완벽한 것은 아니지만 이를 전면적으로 바꾸자는 것은 인터넷을 통해 테러리스트들이 포섭되기 때문에 인터넷을 없애자는 주장과 같다는 것이다. 과거의 제도로 돌아가거나, 아니면 불균형의 자동적 조정이 가능한 새로운 제도를 만드는 것은 현재 이를 뒷받침할 환경과 조건이 되어있지 않기 때문에 불가능하다는 것이다. 또한 금본위제도가 비교적 성공적이었던 것은 시장에 대한 정부개입을 최소화해야 한다는 당시의 경제철학이 주류를 이루고 있었기 때문이었고, 변동환율제가 세계무역과 국가경제번영을 해친다는 양차대전간의 경험의 브레튼우즈의 출현을 가능하게 하였으며 그리고 이는 전후의 시장에 대한 정부의 개입이 일반화되었던 당시 경제철학이 지지해 주었기 때문에 가능했다는 것이다. 오늘날과 같이 자본시장이 개방되고 자본의 유출입이 자유화된 상황에서는 더 이상 과거와 같은 제도의 도입은 불가능하고 적절치도 않다는 것이 그의 주장이었다. 또한 최근의 세계금융위기가 과거 수십 년간 일어난 금융위기보다 크게 다른 것이 없으며, 만약 심각성에 있어 다르다고 하더라도 그 것은 ‘국제통화제도’의 문제에서 기인하기 보다 ‘국제금융시스템’의 문제에서 기인했다고 보아야 한다는 것이다. 따라서 국제통화제도의 개편보다는 국제금융시스템의 규제를 개혁해야 한다는 의견이다.

반면 캐나다 중앙은행 총재인 Carney(2009)는 이번 세계금융위기는 과거의 국제통화제도를 붕괴시킨 것과 똑같은 문제에 대해 적절히 대응하지 못했기 때문에 발생했다고 주장한다. 금본위제도, 브레튼우즈 제도, 그리고 현재의 제도로부터의 공통된 교훈은 국제통화제도에서의 핵심적인 문제는 ‘준비자산의 선택(choice of reserve assets)’ 문제라기 보다 바로 ‘조정 장치(adjustment mechanism)’의 결여 문제라는 것이다. 따라서 외화준비자산을 지금의 달러화 위주에서 보다 다양화한다고 해서 현재의 세계경제 불균형이 크게 감소하지는 않을 것이며 국제금융시장과 세계경제의 불안정성은 지속될 것이라는 견해이다. 준비자산이 달러화로부터 다른 통화들로 다양화하게 되면 달러화의 수요가 줄게 됨에 따라 미국은 불균형을 시정할 압력을 받게 되지만 흑자국들은 여전히 별 다른 조정압력을 받지 않게 될 것이라는 것이다. 흑자국들이 조정을 기피하게 되면 결국 지금과 같은 불균형이 지속되게 되고 결국 이로 인해 시스템이 붕괴할 위험이 커지게 된다는 것이다. 불균형의 지속은 결국 국가간 갈등을 고조시키고 보호무역주의와 자본통제의 압력을 증가시켜, 세계경제발전에 부정적인

영향을 미칠 것이다. 따라서 그는 지금 더 중요한 것은 국제통화제도의 개편보다 국제간 정책공조를 통하여 세계경제불균형 문제를 풀어나가는 일이라고 주장한다.

반면, IMF 와 많은 국제경제학자들 (Benigno 2010, Bergsten 2009, Cooper 2008, Driffil 2010, Y Lago, et al. 2010, Kenen 2010, Rodrik 2006, Subacchi and Driffill 2010, UN 2009 등)은 현재의 국제통화제도의 개편 필요성에 대해 공감하고, 다만 국가간 이해가 엇갈리는 현실적 제약하에서 최대의 개편 폭을 찾아가야 한다는 입장이다.¹⁰ 다시 말해 정치적 가능성(political feasibility)과 가장 바람직한 개편방안(desirability of reform)의 사이에서 현실적이며 점진적인 개편 방안을 찾아가야 한다는 의견들을 내어놓고 있다. 이러한 과정에서 이들은 SDR 의 발행과 사용을 점차적으로 늘여가는 방안을 주로 제시하고 있다.

이상과 같은 논의들을 종합해 볼 때, 당분간 국제통화제도가 현재의 모습으로부터 크게 달라지기를 기대하기는 어려울 것으로 보인다. 결국은 주어진 정치, 경제 여건의 현실적 제약하에서 점진적인 제도의 개선을 이루어 나가는 것이 최선의 대안이 될 것으로 보인다. 그렇다면 크게 두 가지 측면에서 국제통화제도의 점진적인 개선을 기대해 볼 수 있을 것 같다. 첫째는 현재의 제도하에서 경상수지 불균형을 보다 적절히 조정할 수 있는 방안을 모색하는 것이고, 둘째는 미 달러화의 지배적 위치가 가지는 단점에서 벗어날 수 있도록 복수국제통화로 점진적으로 이동하는 길을 열어주는 것이라고 할 수 있다. 첫 번째 문제의 경우, 세계 주요국가들이 자국의 경제운용이 세계경제에 미치는 영향에 대해 공동의 책임의식을 가지고 환율, 거시경제정책을 협의해 나가면서 불균형을 조정해 나가는 정책협조의 노력을 강화해 나가야 하며, 또한 위기에 대비한 보험목적(self-insurance)에서 기인하는 신흥경제국들의 외환보유고에 대한 과다수요를(특히 신흥경제국을 중심으로한) 줄여주기 위해 적절한 사전 위기대응용 ‘국제적 유동성지원 장치’ 혹은 ‘국제금융안전망(Global Financial Safety Net)’을 확대함으로써 줄여주는 것이다. 두 번째 문제의 경우, 우선 일차적으로 SDR 의 배분을 점진적으로 늘이고 이 것이 점차 정부간 거래뿐 아니라 민간부문의 거래에서도 사용되도록 유도해 나가면서 이 SDR 의 통화바스켓에 포함되는 통화들로 국제통화의 역할이 다변화되도록 하는 것이다. 이러한 진전이 보다 확고하게 자리잡게 되면 이 보다 근본적인 국제통화제도의 개혁, 가령 새로운 세계통화의 창출 등에 대해서 논의할 수 있을 것이다.

그러나 이상과 같이 현재의 국제통화제도에서 거시경제정책 협력을 통해 세계경제불균형을 조정해 나가기 위해서는, 또한 현 제도의 점진적인 개편을 추구해나가기 위해서는 무엇보다 국제적인 합의와 공조, 그리고 이를 위한 주요국들의 협력이 없이는 불가능하다. 결국 세계 주요국들의 정부지도자들이 공동의 책임의식을 가지고 세계경제의 안정적 발전을 위해 정책협력과 필요한 제도의 개편을 추진할 의지를 가지고 또 이를 실효성 있게 추진할 수 있는 어떤 기구나 협의체를 가질 때 비로소 구체적인 진전을 기대할 수 있으리라 생각된다. 이런 관점에서 다음 장에서 새로운 세계경제 지배구조의 출현과 이의 전망에 대해 논해 보고자 한다.

¹⁰ UN Report 는 global reserve currency 로의 전환을 비중 있게 다루고 있다.

3. G20 정상회의와 세계경제지배구조(Global Economic Governance)

세계금융위기는 결국 그 동안 국제사회에서 논의되어 오던 새로운 세계경제협의체(global economic steering committee)를 출범시키게 되었다. 아시아 외환위기 이후 출범했던 G20 재무장관 회의를 G20 정상회의로 격상시켜 2008 년 워싱턴에서 첫 회의를 가졌고, 2009 년 Pittsburg 에서의 제 3 차 G20 정상회의는 이 협의체를 세계경제 문제를 다루는 ‘최고의 협의체’(premier forum for international economic cooperation)로 인정하고 이를 매년 정기적으로 개최하자는데 의견을 모았다¹¹. 그러나 G20 정상회의가 세계경제 문제에서 최고 협의체로 확실히 자리잡은 것은 아직 아니다. 세계경제위기를 맞으면서 각국들이 세계대공황을 피해야 한다는 공동의 이익 추구를 위해 적극적인 국제공조를 이루어 내었지만 위기가 서서히 극복되어감에 따라 벌써 각국은 국내 정치사정과 자국경제의 입장을 더욱 우선시하게 되어 G20 회의를 통한 합의와 의사결정이 점점 어려워지고 있다. 이는 한편으로 예견되었던 일이기도 하다.

금년 6 월 말의 Toronto G20 정상회의에서 이미 이러한 균열의 조짐이 나타나기 시작했다. 위기를 통해 급격하게 늘어난 재정적자와 정부 부채를 줄이기 위한 방안(fiscal consolidation)에서부터 ‘은행세(Bank Levy)’의 도입문제에 이르기까지 각국의 이견이 노출되었다. 지난 Toronto 정상회의는 정상간의 합의를 성과로 부각시키려 하기 보다 이견을 크게 부각시키지 않는 것을 성과로 나타내고자 한 인상을 주고 있다. 팽창적 재정정책이 당분간 더 필요하다고 보는 미국과 재정건전성의 빠른 회복이 더 필요하다고 보는 유럽국가들 특히 독일과의 이견을 ‘growth oriented fiscal consolidation’라는 모호한 표현으로 포장한 것이 바로 그런 예라 보여진다. 파이낸셜 타임즈(Financial Times)지의 논설위원인 Clive Crook 은 그의 최근 칼럼에서 “지난번 국제공조에 의한 각국의 팽창적인 정책은 G20 회의가 없었더라도 어차피 각국이 했을 일이었다. 그러나 세계경제가 다시 침체에 빠질 수 있는 위험이 큰 지금이야 말로 각국의 재정정책에 국제공조가 필요한 시점이나 Toronto G20 정상회의는 정작 아무런 합의를 도출하지 못했다”고 비판하고 있다.¹²

G7 과 마찬가지로 G20 도 출범할 때부터, 소위 적법성(legitimacy), 대표성(representativeness), 그리고 유효성(effectiveness)의 문제를 안고 있었다. UN 과 같이 어떤 국제조약(international treaty)에 의해 출범한 기구도 아니고 어떻게 보면 스스로 세계경제의 최고협의체(Premier Forum)이라고 선언함으로써 출발한 이 협의체가 어떤 국제법적 지위를 가지고 있는 것이 아니다. 대표성에 있어서도 왜 지금 여기에 포함 되어있는 19 개 국가로 이루어져야 하는 것에 대해서도 많은 이견의 소지를 안고 있다. 그리고 무엇보다 중요한 취약점은 참여자의 수가 많은 데에서 비롯되는 회의체로서의 비효율성이다. G20 는 G7 과 같이 소위 비슷한 생각을 가진(like-minded) 국가들간의 회의체가 아니다. 물론 대표성에 있어서는 G7 보다 훨씬 우월하지만 의사결정기구로서는 훨씬 더 많은 취약점을 가지고 있다. G20 에는 경제발전 정도가 크게 다른

¹¹ G20 회의의 경우 G7 회의의 경우와는 달리 매년 회의를 정례적으로 가지기로 정상들이 ‘합의했다(agreed)’라는 문구를 쓰는 대신 기대했다(expected)라는 표현을 쓰고 있다.” Leaders said that they expected to meet annually after 2010 in their statement (Section 50 of the Leaders’ Statement of the Pittsburg Summit in September 2010).” 그러나 실질적인 효과는 비슷하리라고 기대된다.

¹² Financial Times, “Fiscal disarray is the least of the G20’s sins,” by Clive Crook, 2010. 6. 27 일자

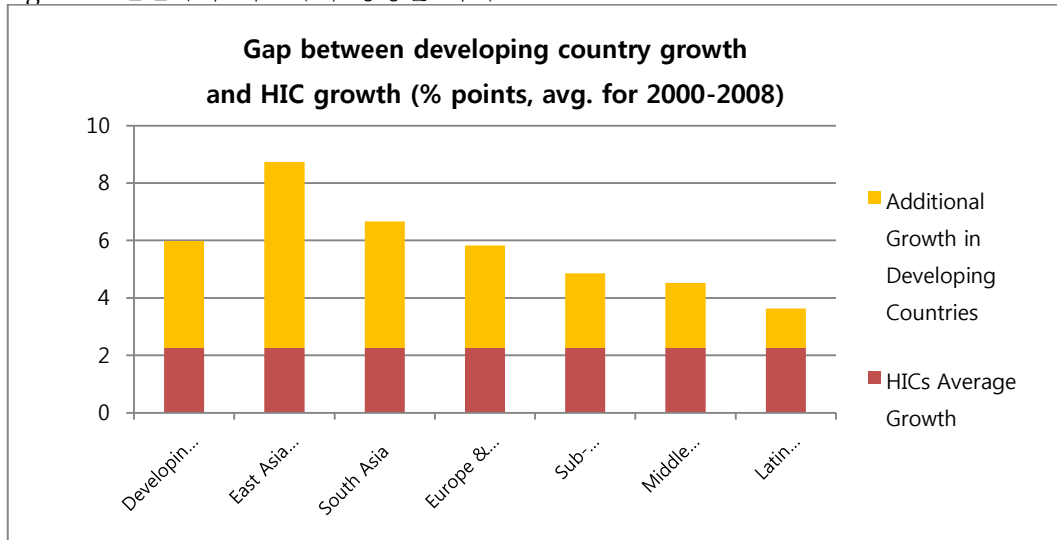
선진국과 신흥개도국이 함께 포함되어 있으며, 이슬람국가가 셋, 그리고 아시아, 중남미, 아프리카, 중동의 국가들이 모두 포함되어 정치적, 문화적 동질성을 찾아보기 어렵다.

오늘날 세계경제문제는 분명히 선진국과 신흥개도국들이 함께 풀어나가야만 하는 것이지만 세계경제문제의 요인과 처방, 그리고 그 것을 수행해나가는 데 있어서의 책임과 부담을 나누어 가지는 것에 대해서는 선진국들과 신흥개도국간에 많은 입장의 차이가 있는 것이 사실이다. 20 명 이상이 각자 다른 입장을 가지고 한 테이블에 앉아 있는 회의체에서 유효한 결정과 합의를 도출하는 것은 지난한 과제임에 틀림없다. 더구나 발전단계와 경제철학, 정치체제에 있어 크게 다른 나라들의 모임은 더욱 그렇다.¹³

그럼에도 불구하고 G20 정상회의는 결코 실패하거나 흐지부지 되어서는 안 되는 협의체이다. 앞서도 말했지만 지금 세계경제문제를 해결해나가기 위해 절실히 필요로 하는 것은 새로운 지배구조(governance structure)이다. 물론 아직은 국가(nation state)가 내부의 헌법과 이에 규정된 권력구조를 통해 그 국가구성원과 사회를 통치하는 가장 중요한 최고의 지배단위로 인정받고 있다. 그러나 오늘날 세계는 개별국가라는 단위의 지배에 의존하고 있기에는 너무나 상호의존적이고 통합되어 버렸다. 과거에는 국가 사이를 가로지르던 산맥, 강이 나라를 구분하게 되었으나 이제는 국경이 사람의 왕래나 재화와 자금의 흐름을 더 이상 제약하지 못한다. 이미 유럽은 개별국가의 주권을 상당 폭 포기하고 EU 라는 새로운 지배단위를 만들었으며 초 국가기구(supranational institute)인 EU 의 지배구조는 더욱 강화되며 발전하고 있다. 미국과 유럽이 세계를 지배하고 국제규준과 경제질서를 주관하던 시대는 지나가고 있다. 이미 세계 경제성장을 이끄는 주 엔진은 신흥개도국(특히 아시아의)들로 넘어왔으며<그림 6 참조> 경제력의 중심도 서구의 일방적 우위에서 다극화(Multi-polar)시대로 서서히 이행하고 있다<그림 7 참조>. 제 2 차 세계대전 직후에 설립된 지금의 국제기구, 국제통화질서는 더 이상 오늘날의 현실에 맞지 않다. 대표성에 있어서 더 많은 국가들을 포함하는 회의체가 있으면 좋고, 적법성에 있어 전세계 시민들의 보다 구체적인 인정이 있었으면 좋겠지만 의사결정의 효율성과 현실적으로 중요한 요인들을 고려할 때 G20 보다 나은 대안을 찾기 어렵다. 현재 G20 회원국들이 세계경제에서 차지하는 비중은 총생산액에 있어 90%, 총 교역량의 약 80%, 세계인구의 약 67%를 차지하고 있다 (Heinbecker 2010). 이미 네 번의 회의를 가졌고, 이를 통해 적지 않은 성과도 이루어 내었다. 어쨌든 이 G20 정상회의라는 협의체의 강화를 통해 지금 세계경제가 요구하는 ‘정책협약’ 및 ‘공조’, ‘제도의 개혁’에 대한 논의를 시작하고 의미 있는 합의를 도출해 나가야 한다.

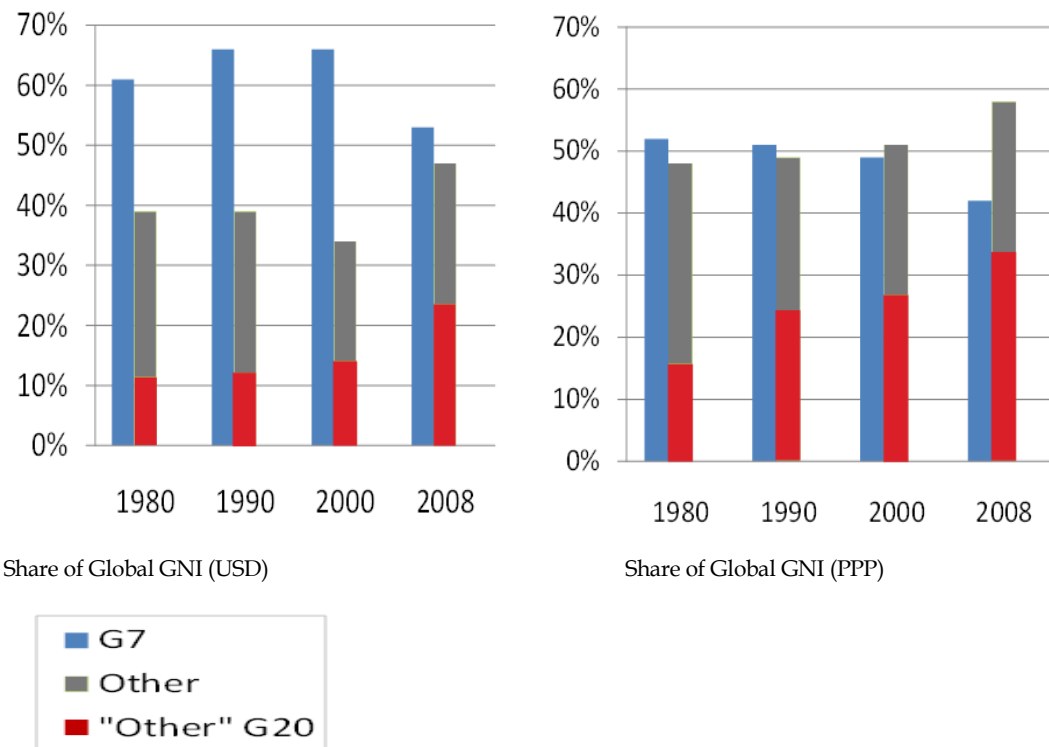
¹³ 미국은 오히려 G7 회의에서 보다 이 회의체에서 사안에 따라 아시아, 중남미 국가들과 혹은 유럽국가들과 담합할 수 있는 선택의 폭이 넓어져 미국의 입지는 더욱 강화될 수 있다는 견해가 있다 (Patrick 2010). 그러나 이 것이 반드시 세계경제지배구조라는 입장에서 볼 때 더욱 바람직한 것인지에 대해서는 아직 판단하기 어렵다.

Figure 6. 선진국과 개도국의 성장률 차이



Sources: Lin(2010), World Development Indicators, available at data.worldbank.org

Figure 7. Rebalancing of the Global Economic Landscape



Sources: Lin (2010)

그러기 위해서는 G20 정상회의의 기능을 보완하기 위한 많은 노력이 필요하다고 생각된다. 적법성과 대표성을 보강하기 위해서는 비회원국들의 관심과 이해관계를 적절히 이 회의체에서 반영할 수 있어야 한다. 개발의제, 기후, 환경의제들이 이 회의에서 적절히 다루어져야 할 뿐 아니라 신흥 개도국들의 관심사인 국제통화제도 개편 문제도 다루어져야 한다. 세계경제문제를 관할하는 기구는 ‘국제기구(international organization)’와 ‘정부간 협의체(government network)’로 나누어 볼 수 있는데 G20 회의는 사실상 후자에 속하나 실질적으로 회원국들이 세계경제에서 차지하는 비중을 볼 때 전자의 역할과 운용방향을 관할할 수 있을 것으로 보인다. G20 정상회의에서 합의하여 역할과 방향을 제시하면 국제경제기구들은 이를 구체적 기능의 조정과 상응하는 프로그램으로 실천해 나가는 방식으로 G20 회의와 국제기구간의 역할이 긴밀하게 정립 되어나가야 할 것이라고 생각한다. 다시 말해 G20 정상회의는 그림과 방향을 제시하고 국제기구는 구체적 정책과 프로그램을 만들어 나감으로써 실질적 세계경제의 지배구조가 강화되어 나가야 한다.

무엇보다 G20 정상회의가 유효한(effective) 협의체가 되기 위해서는 의사결정이 원활히 이루어 질 수 있는 방안과 장치를 세워나갈 필요가 있다. 효율적 협의체가 되기에는 참여자가 너무 많은 상황이기 때문에 위원회제도 같은 것을 활용할 필요가 있지 않나 생각된다. 또한 G20 정상회의에서 협의되고 합의된 사항들을 원활히 추진하고 이의 진행을 점검할 사무국(secretariat), 혹은 그와 유사한 기능을 행사할 수 있는 조직의 설립이 필요할 것으로 보인다. 정상들은 원래 그들이 모든 것을 결정한다는 것을 대중에게 보여주고 싶어하고 늘 세계언론의 조명을 받기를 원하는 사람들이라 사무국이 설립되면 이의 상시적 기능으로 인해 정상회의가 덜 주목 받게 되는 것을 원치 않을지 모른다. 그러나 G7의 경험을 보더라도 사무국의 결여는 궁극적으로 그 회의체의 실효성을 떨어뜨리는 것이어서 G20 정상회의가 그야말로 세계경제문제의 최고협의체로 자리잡기 위해서는 어떤 형태로든지 사무국의 설립이 필요하게 될 것이라 생각된다. G7의 경우 정상회의 성명 혹은 합의문 발표 이후 그 것의 진전상황을 챙기거나 합의문의 구속력을 점검하는 과정이 결여되어 이 회의의 실효성에 대한 비판이 끊임없이 제기되었었다. G20의 경우 지금까지는 trio countries(직전 의장국, 현 의장국, 차기 의장국)들과 IMF가 유사한 역할을 해오고 있다. 그러나 trio 국가들은 순환되기 때문에 기능의 일관성을 유지하기 어렵다는 한계를 알고 있고 IMF는 거시경제정책, 통화금융문제의 협력 문제에 있어서는 유효한 사무국 역할을 할 수 있겠으나 개발의제, 기후, 환경, 에너지 문제에까지 사무국 역할을 하기에는 원래의 기능과 전문성이 너무 제한되어 있는 한계가 있다. 마찬가지로 지금까지는 G20 정상회의에 주로 재무장관, 외무장관들이 수행해 왔으나 향후, 환경, 에너지, 복지, 개발 등의 의제를 다룰 때는 해당장관들이 모두 참가해야 할 것인지 재무장관이 이들 모두를 대신해 독자적으로 참가 할 것인지 등에 대한 문제도 간단치 않다.

어쨌거나 오늘날과 같이 통합되고 상호의존적인 세계경제구조 하에서는 세계경제의 주요문제를 협의하고, 이에 대응하는 지배구조로서 G20 정상회의의 보다 나은 대안을 현실적으로 찾기 어렵다고 보여진다. 따라서 G20 정상회의가 보다 유효한 지배구조로서 발전해나갈 수 있도록 여기에 참여하는 각국이 공동의 책임의식을 가지고 위원회의 구성, 사무국의 설치, 효율적 의사결정 방식 등에 대해 합의해 나가야 할 것으로 보이며, 이에 실패할 경우 G20는 APEC 정상회의와 같은 형식적 협의체로 전락할 가능성도 있다. 이렇게 될 경우 세계경제문제는 협력적이기 보다 대립적으로 풀려나

갈 가능성이 많으며 결국 미국과 중국, 그리고 서구와 아시아의 대립적, 경쟁적 관계로 세계경제의 불안정이 커질 수 있는 가능성을 안게 된다.

국제통화제도는 전세계 시민과 경제참여자들이 공동으로 소유하고 또한 동시에 이의 지배를 받는 지구촌의 공동의 자산이자 제일 중요한 제도(*institution*) 중의 하나이다. 오늘날의 지구촌 경제상황에 비추어 현재의 제도가 더 이상 적절하지 않다면 이에 대한 개편방향 역시 G20의 주요 아젠다로 다루어져야 할 것이라고 생각한다. 사르코지 프랑스 대통령은 이미 내년도 의장국으로서 프랑스 G20 정상회의에서 국제통화제도의 개편을 주요의제로 다루겠다고 공언한 바 있다. 1944년 브레튼우즈 모임에서 44개국의 대표가 모여 새로운 국제통화질서에 대해 토의하고 브레튼우즈 체제를 출범시켰지만, 당시 실제로는 미국과 영국의 재무성 대표들이 주도하여 이 체제를 출범시키게 되었다. 그 때와 비교해 지금 세계경제와 금융시장의 모습은 판이하게 달라졌다. 세계경제의 성장 추과 경제력, 교역구조는 다극화하고 있으며 아시아경제의 비중은 그 때와 비교하여 훨씬 커졌고 향후 그 비중은 더욱 빠르게 늘어날 것이다.

세계경제의 중심축은 향후 점차 다극화되어 갈 것이다. 국제통화제도도 결국 현재의 미국 주도의 제도에서 보다 균형되고 안정적인 제도로 개편되어 나가야 하며, 또한 세계자본시장이 통합되고 자본의 흐름이 급변하는 상황에서 신흥개도국들의 이익과 우려가 적절히 반영될 수 있는 제도로 나가야 한다. 파운드화 중심의 국제통화제도가 달러화 중심의 제도로 전환되어갈 때 영국과 미국 정부의 협력적 관계가 없었다면 영국경제가 훨씬 더 큰 어려움을 겪고 국제금융시장이 더욱 불안해졌을 것이다 (Schenk 2010). 마찬가지로 달러화의 비중과 중요성이 하락하게 되는 과정에서 미국과 유럽, 그리고 중국을 포함한 아시아국가들의 신중한 협력이 없게 된다면 미국경제는 향후 큰 어려움을 겪고 이로 인한 세계경제의 불확실성은 높아질 것이다. 또한 오늘날 국제통화제도의 개편은 단순히 정부가 주도하는 것이 아니고 시장 스스로 선택하는 측면도 크기 때문에 결국 이 제도의 개편은 점진적인 과정을 거치나가야 할 것이다. 그러나 주요국 정부들의 의지와 협력 없이는 결국 개편은 지연되고 세계경제의 불확실성은 지속되며 또 다른 위기의 가능성은 높아지게 될 것이다.

결국 이러한 관점에서 국제통화제도의 개선을 위해 중단기적으로 개선해 나가야 할 과제와 장기적으로 개선해 나갈 할 문제로 나누어 세계가 이에 대해 전략적인 접근을 할 필요가 있다고 생각된다. 필자의 견해로는 중단기적으로 접근해 나가야 할 문제는 첫째, IMF의 기능과 역할을 개편하는 것이다. IMF의 재원을 확충하고, 지배구조를 개편하며, 각국의 거시정책 및 세계금융시장에 대한 감독 및 감시 기능 강화, 그리고 *systemic risk*를 유발할 수 있는 신흥경제국들에 대한 대출제도를 개선하는 것이다. 둘째, SDR의 배분 및 사용의 확대와 이를 통해 현재 달러위주의 시스템에서 복수통화의 시스템으로의 점진적인 전환을 시도해 보는 것이다. 그리고 이러한 방향과 이를 위한 구체적 방안들을 G20에서 합의하여 IMF 및 여타 국제경제기구들을 이에 맞게 개편해 나가는 것이다. 또한 이러한 과정에서 세계경제가 안정적으로 성장해 나갈 수 있도록 G20를 통해 거시경제정책의 협의와 협력을 강화해 나가고 경상수지의 불균형문제를 조정해 나가는 것이다. 이를 위해서는 G20 회원국들간의 합의가 구속력을 가질 수 있도록 상호간의 감시(*peer pressure*)와 제도적인 압력을 행사할 수 있는 장치들을 설립해 나가야 할 것으로 보인다.

장기적으로는 국제통화제도의 보다 근본적인 개편을 준비해 나갈 필요가 있다고 생각된다. 금년도 서울정상회의에서 논의하는 글로벌 금융안전망의 구축은 그 자체로서 국제통화질서를 부분적으로 개선하는 효과는 있겠지만 근본적인 해결 방안은 결코 되지 못할 것이다. 장기적으로는 보다 근본적인 개혁의 그림을 G20 정상회의를 통해 그려보는 것이 좋을 것이라 생각된다. 마침 사르코지 프랑스 대통령이 내년도 G20 정상회의에서 국제통화제도의 개편을 주의제로 삼겠다고 공언한 바 있으므로 프랑스 정상회의를 계기로 이에 대한 구체적인 토의의 진전이 있기를 기대한다. G20 정상회의 산하에 국제통화제도 개혁에 대한 위원회를 만들어 이에 대한 안을 준비하는 것도 한 방법이 될 수 있을 것이다. 물론 여기에서 금방 새로운 합의안이 나오거나 향후 추진 계획이 나오기를 기대하기는 어렵겠지만 장기적인 시간을 두고 각국대표들 간, 그리고 국제경제학자들 간의 심도 있는 토의와 논쟁을 거처나가면서 새로운 제도를 준비해나가는 것이 장기적으로 보다 안정적이고 공정하며, 효율적인 제도를 만드는 길이 될 수 있다. 그리고 그 것이 G20 정상회의가 세계경제문제에 대한 최고협의체로서의 역할에도 부합된다고 생각된다.

4. 맺음말

새로운 세력이 부상할 때 세계는 늘 갈등과 격동에 휘말려 들곤 했다. 앞서도 지적했듯이 지난 약 20 년간 우리가 경험하고 있는 세계경제의 역학구도, 교역 및 금융 환경, 경제구조의 변화는 과거 역사상 어떤 세계경제구조 변화 시 보다 빠르게 일어나고 있다. 따라서 갈등의 소지와 세계경제의 불안정성, 그리고 미래에 대한 불확실성 또한 과거 어느 시대에 비해 크다고 할 수 있다. 그러나 동시에, 지금은 과거 어느 때에 비해 국가간 협의체라는 것이 잘 구성되어 있어 이러한 잠재적 갈등을 국가간 협의, 나아가서 국제적 공조로 풀어나갈 수 있는 길도 넓혀져 있다. 세계가 이러한 제도(institutions)를 성공적으로 활용하고 이러한 협의체를 더욱 실효성 있는 제도로 발전시켜 나갈 수 있도록 공동의 책임의식을 가지고 제도적 장치를 보강해 나간다면 향후 세계경제는 안정적인 환경에서 번영을 지속해 나갈 수 있을 것이다. 만약 그렇지 못할 경우 세계경제의 불안전성과 불확실성은 확대되고 또 다른 위기의 가능성은 깊어질 것이다.

지난 한세기 동안, 가까이는 지난 20-30 년 동안, 지구촌에서 많은 국가들의 국내 정치체제가 민주화되었고 또한 이미 민주화된 서구 선진국들에서는 민주화가 더욱 심화됨으로써 권력이 분산되고 국가의 실질적 경영에 다양한 세력들이 참여하게 되었다. 최고권력자에 의한 ‘통치’로부터 국가 구성원간의 ‘협치’라는 새로운 지배구조가 발전, 정착되어 가고 있다.¹⁴ 이제 지구촌에서도 슈퍼파워의 시대에서 다극화의 시대로 넘어가고 있으며 이는 결국 지구촌의 문제도 점차 ‘협치’에 의해 풀어갈 수 밖에 없는 시대로 들어가고 있다는 것을 시사한다.

이러한 협의체로서의 G20 정상회의의 출범은, 비록 그 것이 세계금융위기로 촉발되긴 했으나, 세계경제의 미래를 위해 긍정적이며 다행스러운 진전이다. G20 가 세계경제의 최고협의체로 확고히 자리잡고 유효한 지배기구(governance body)로서의 역할을 할 수 있을 지는 아직 미지수로 남아있으나 이에 대한 기대는 가질 수 있다고 생각된다. G7 정상회의가 매년 정기적으로 회합을 갖기로 합의하기까지는 13 년이 걸렸

¹⁴ Governance in the 21st Century, OECD, 2001 참조

다¹⁵. 반면 G20 정상들이 매년 회의를 정기적으로 갖기로 합의한 것은 이 회의체가 출범한지 불과 1 년 만에 이루어졌다. 그만큼 세계경제의 유효한 지배구조에 대한 필요성이 확고하다는 것을 반영한다고 볼 수 있다. G20 가 향후 유효한 협의체로 자리잡기 위해서는 회원국들뿐 아니라 이 회의에 참여하지 못한 개도국, 신흥 경제국들이 이 회의 결과에 대해 공감하고 그들의 지지도 얻을 수 있어야 하며, 지금 세계가 당면하고 있는 주요 경제문제들을 각국의 정치적 이유로 피하지 말고 이들에 대한 신뢰성 있는 해결방안을 제시할 수 있어야 한다.

지난 Toronto 정상회의에서는 실질적으로 중요한 의제들을 많이 다루지 못했고 과거 London, Pittsburg 정상회의에서 합의한 중요한 의제들은 시간표상 거의 모두 서울정상회의에서 결론을 내도록 되어있다. 이런 관점에서 볼 때 금년 11 월 열릴 예정인 G20 서울 정상회의는 중요한 의미를 가지며 반드시 의미 있는 결과를 도출할 수 있는 회의가 되도록 국제사회가 함께 노력해야 할 것이다. 지금과 같은 세계경제구조의 전환기에 무엇보다 필요한 것은 안정적이며 실효성 있는 지배기구의 구성과 이의 지속적인 역할이다. 우선 개도국에서 선진국의 문턱으로 발돋움한 한국이 이번 회의의 의장국으로서 이번 서울 정상회의에서 경제발전과 관련한 의제(development agenda)와 그리고 현재 국제통화제도의 문제점을 보완하기 위해 '세계금융안전망(global financial safety net)'의 확충방안을 주요 의제로 포함시키기 위해 주도적인 역할을 하고 이의 구체적 방안을 IMF 와 World Bank 와 긴밀히 협의해 온 것은 큰 의미 있는 역할을 한 것으로 보여진다. 앞으로 얼마 남지 않은 기간 동안 금융규제강화 등 기존에 설정되어 있는 의제들 외에 추가로 '개발의제'와 '세계금융안전망 강화'라는 의제에 대해 합의를 조율하고 또 실제 정상회의에서 이를 발표할 수 있도록 하는 것은 실로 힘겨운 과제임에 틀림없다. 하지만 이번 정상회의가 성공적이지 못할 경우 지구촌 사회와 세계경제가 치루어야 할 비용은 크다. 반면 만약 향후 G20 정상회의가 세계경제지배기구로서 확고히 자리를 잡게 된다면 그 것은 바로 이번 서울 정상회의가 그 징검다리 역할을 하게 되었기 때문일 것이다.

본 논문에서 논의했듯이 지금의 국제통화제도는 과거 금본위제도나 브레튼우드 체제와 같이 규칙과 규범(rule and order)에 의해 작동하는 제도가 아니고 각국의 자유로운 외환, 환율제도의 채택에 의해 운용되고 있는 무제도(non-system)나 다름이 없다. 이러한 제도가 안정적으로 작동하고 또 이 제도 하에서 세계경제의 불균형을 성공적으로 조정해나가기 위해서 무엇보다 중요한 것은 국가들간의 정책협력이다. 환율정책, 재정 금융 정책, 나아가서 구조조정에 대한 정책들을 주요국들이(특히 미국, 중국, 유럽) 서로 협의하고 조정 방향에 대해 합의하며 이를 실천해 나갈 때 세계경제는 지금 가지고 있는 제도의 취약성을 보완하고 보다 안정적인 성장경로를 달릴 수 있을 것이다. 또한 현재 세계가 가지고 있는 국제통화, 금융제도의 취약성과 부적절성을 개선해나가기 위한 제도개편을 위해서도 국제간 협의, 합의를 이루고 이를 추진해 나갈 수 있는 유효한 기구 혹은 협의체의 구성은 반드시 필요하다.

이제 더 이상 G7 은 이러한 문제들을 협의하고 추진해나갈 수 있기에 적절한 협의체라고 할 수 없다. 새로이 출현한 G20 회의에서 이러한 문제들을 논의하고 협력해나갈 수 있는 것이다. 그러나 G20 회의가 이러한 역할을 성공적으로 해내고, 향후 세계경제지배구조의 중심 협의체로 자리 잡기 위해서는 상호평가(mutual assessment) 기능의 강화, 사무국의 설치, 위원회의 운영 등 이 회의체의 실효성을 높일 수 있는 많은 제도적 장치가 보완되어야 할 것으로 보인다.

¹⁵ 1988 년 Toronto 정상회의에서 비로소 공식적으로 정상간 합의를 하였음.

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CHAPTER 6

Thank you very much for the introduction. Let me first of all thank the organizers of the conference for inviting me to give this opportunity to meet all leading economists and experts. Now I'd like to extend my warm welcome to all participants, particularly to those who are from abroad. You know Americans and Westerns usually begin their speech with a joke but the people from audient usually start with apologies. I should start with apologies as well, since I didn't bring any prepared text for this luncheon speech, instead, if you allow me, I will try to be very informal and casual about my remark. Since I am invited here as a chair of presidential committee for G20 summit, I thought I am expected to brief you on how the Korean Government is preparing the agenda for the forthcoming summit. So what I'd like to do here this afternoon is, given my time constraint, I will make very quick overview of the agenda for the Seoul summit, in doing so, I will not get into details, but in giving you a quick overview. I will spend little bit more time on those agenda items which are directly relevant to the very topic of the conference, global financial architecture for stability.

Broadly speaking, we can consider the Seoul agenda in two parts. The first part has to do with follow ups of decisions, agreements made by G20 leaders for previous summits. Then the remaining, I will say about 60-70% account for this follow ups, the remaining 30-40% has to do with a new additional agenda. Korea as a chair country has been proposing and working with the rest of G20 countries and relevant international organizations to have an agreement on the new agenda items by the Seoul summit. So we can look into this agenda from these two perspectives.

Let me now draw your attention on the follow up agenda. For this follow up agenda, again, there are four separate issue areas. First is macroeconomic policy coordination and cooperation, and second is IFI reform and then third issue areas is to do with financial regulatory and supervisory reform and then the forth area is trade and energy subsidy and anti corruption and many other subjects. So we can look into these follow up agendas in these four separate issue areas. You can see that the second and third, the IFI reform and financial regulatory supervisory reform issue areas are directly relevant to your discussion. I will just say few words on the first and last subject areas.

First is the macroeconomic cooperation and coordination area. As you know the first stage of what is called the mutual assessment process has been completed, which was led by the IMF. The IMF got the template of policies from G20 countries. They analyze and then came out with package of policy options for group of countries, such as developed surplus countries, advanced surplus countries, emerging surplus countries, for example. So IMF policy options at the first stage of the mutual assessment process were only at the countries group level, rather than get down to individual country level. So IMF submitted the report to the leaders in Toronto. Now the ownership is in G20 now. We are already getting additional statistics from G20 countries so that the G20 now can get into this mutual assessment process and the goal is get down to individual country level. Our ambition there is that will get down to individual country level and to recommend to come up with policy recommendation as specific as possible, not just a general principle. The essence is implementing the framework for a strong sustainable and valance growth. That's the macroeconomic policy coordination and cooperation.

The last issue area, which is trade and energy subsidy, anti corruption and others, as you know the trade, leaders decided to extend the stance to another three years, until 2013, and of course the WTO will continuously monitor in this regard and submit quarterly report to the G20 process, and the fossil, refuel subsidy area and there Korea co chaired with United states in producing reports on the fossil and refuel subsidy and actually at the

Toronto summit you can look into the report G20 website is publically available. So where you will find that the individual countries promised what they will do in terms of reducing the fossil and refuel subsidy as an only plan, so the remaining job in this regard is to again follow up on their promise and so we can grow continuously working toward this end. And the anti corruption area, again this is Americans insisted to include this in the agenda for Seoul summit, already working group has been established and will come up with report soon. So these are two topic areas which are not directly relevant to this global financial architecture, so I will stop my very brief remark on that.

Now let's move onto the IFI reform and financial regulatory supervisory reform area. IFI reform is again more down to IMF reform. IMF reform has different components but the most critical component is the quota adjustment as you know the leaders in Pittsburgh agree to have a shift of at least 5% of quota share from overrepresented countries to underrepresented countries. And also they emphasize that they will shift this 5% toward emerging and developing countries. In fact, if you carefully read the communication, the language is quite confusing. Because of that ambiguity, there are some problems, for example, Saudi Arabia, which is still belong to emerging world but it is overrepresented country. As well as Saudi, we are still emerging country so we don't have to give up on any additional portion of quota. Because if you read the communication it says from overrepresented to underrepresented and also to the emerging and developing world, so it's little bit confusing. But this is a minor problem, Saudi is not a minor problem but still it is. Leaders agreed to shift 5% mostly developing and emerging countries. But always devil is in the tail. Who are going to give up? They are mostly European. So we have to work hard on this. Actually Korea insisted that this quota adjustment should be completed by November Seoul summit rather than wait until January 2011 which was originally committed by the leaders. It is not just matter of two months, it has very significant implication to it that is the leaders once they commit they carry this out and they can expedite with their general agreement this whole G20 process. We wanted to show that to the world and to the G20 member countries themselves. The leaders agreed on that but as I said we have to work out who will have to give up and who will get more. Since it is zero sum game, it is very difficult to achieve it. But we are quite confident that it can be done by November. The China and the US as well very strongly support this quota adjustment. So this quota adjustment itself, when it is important issue area, we have to work hard. The thing is that the US, for example, although the US support the early completion of this quota adjustment, US raised new issue of formula of quota adjustment. According to current formula which not only considers variables such as GDP on market exchange rate basis and market openness and some other variables, US shares will be reduced a bit, now US share is little bit over 17%, but if we use 2008 statistics, and with the same current formula, US share will go down but veto and share will be still with them. That is why Americans say that well let's design new formula which will give more weight to the GDP and more space on the market exchange rate base and PPP base. If you only consider GDP on market exchange rate base, US share will go up to around 24%, and with PPP base it's even higher. So Americans brought this up. What we have been saying is that let's get this 5% thing done and then let's open this formula. Once we open the formula box, we just cannot get 5% adjustment by November. This is one complication we have, so we have to work this out.

Another important reform regarding IMF reform is quota size increase. Leaders agreed that the IMF quota should be increased substantially. We, as a chair country, have been advocating the idea that the quota size should be increased by at least 100%. As of now the total IMF quota is 250 STR which is equivalent to about 370 billion US dollars. There is an addition, of course, 570 billion dollars - borrowed capital, not the permanent quota, so Korea and Japan and most of emerging economists saying that the IMF is quota based institution so let's increase the quota so we can gradually reduce this borrowed capital portion which is mostly based on what is called NEP, a new arrangement to borrow. But in any case we will

be insisting the quota should be increased by 100% but it is quite difficult to have all 100 % but at least we have to get over 50%. Because without increasing quota to 50%, this 5% shift itself process will be very complicated. So this is IMF reform regarding quota.

And for the IMF reform area, there is a selection of heads of the IMF and World Bank and the voice reform, particularly composition and number of board members. As we called, leaders in Pittsburg agreed that the heads of IFIs should be chosen based on merit rather than nationality. If you really relay on merit based selection that means your nationality won't be a factor. But many developing countries, in particular, insist that non nationality bound should be included in the communicate but US and developed countries support to the idea. In Toronto, Korea suggested putting an additional word instead transparent and open process of merit based selection. What we have in mind is that IMF may want to have a selection committee which consists of outside experts rather than only governors and the board members. But anyway this is one issue area which has to be continuously worked on. But I don't think this can happen by Seoul summit. There are 24 board members and Americans raised an idea of reducing them to 20. Without reducing, emerging countries representation that means more European countries will have to give up on the board seat. Again, this is also very difficult to get an agreement. But on this IFI formula, the main thing is quota adjustment and we just hope that 5% shift will be done by November. We'd like to have at least more than 50% of quota increase agree by that. So this is IFI reform area.

The third issue area is financial regulatory and supervisory reform. Here the financial institution's capital based framework reform is the key issue which is again boiled down to Basel Three. The leaders in Toronto agreed that by Seoul summit concrete agreement should be reached on this issue. I am sure you must have read the report recently. In fact on July 26 in Basel, the governors and heads of supervisors' body met and there were some much hidden discussion there. Germans opposed to the revised proposal made by this whole representatives there. Germans were very much still interested in, they didn't oppose to the framework as such but they were more concerned about collaboration and specific numbers. As you know, France, Japan and German have been in the opposing camp toward this Basel Three concept, but fortunately this time, France and Japan did not oppose very strongly on this, rather kept quiet, but German did. But still the general consensus has already established, so we feel that this final agreement can be reached before Seoul summit. In fact, you know it's very interesting inside story, at the last meeting the chairman Bernanke, playing the role of mediating between the Germany and rest of the groups. The rest of the groups were so mad at the Germany. They wanted to name Germany in the communicator which opposed to this only country, but Bernanke said that let's not mention about Germany but say one country oppose this that. That gives the future possibility to Germany to agree on this issue. We feel that this Basel Three agreement will be made before Seoul summit. It is our wish that Basel Three will be called Seoul One if we success on that. This is where we stand now.

The other important issue area in financial supervisory and regulatory reform area is so called SIFIs; Systemically Important Financial Institutions. The leaders in Pittsburg gave mandate to financial stability board to come up with specific policy recommendation toward SIFIs by October. Financial stability board is now working on it and we are working quite closely with the financial stability board. So again our hope is that based on financial stability board's recommendations, the leaders in Seoul, November, can make some general agreement on addressing the SIFI issue so that it can be another at least one achievement in Seoul summit. By the way you know I attended the Toronto Summit and on my way back, I went to Washington DC and then New York, I talked with US policy makers and Paul Volcker and I was asking regarding SIFIs. He said it's very difficult to define SIFIs, which is

true, and then he said once you classify certain institution's SIFI then immediately it will cause moral hazard problem because people know the SIFI is too big to fail. So he said that's not good idea the approach. His only concern is to separate commercial bank activities from the investment bank activities. And then he'd like to see only commercial bank which is deposit commercial bank should be supportive in a various way not just investment bank. That is his idea of proposing. Anyway it was interesting to hear his views on SIFIs. So this financial sector reform agenda is being prepared. We would like to have the concrete agreement on the Basel Three or Seoul One and then this general agreement on SIFIs.

This is following up area and we have a new additional agenda item; Korea has proposed and the leaders adopted it as a part of Seoul Agenda. But we have to work out in details. First is development and second is financial safety net. First development, to give you a general idea so far the United Nations and the G7 have been dealing with development issue but primarily from the perspective of eight and alleviation of ____ but what we are concentrating and development agenda is you might call gross oriented development approach and mostly to promote the capability of development. We have various different pillars, include of human resource development and infrastructure which will like to utilize the market mechanism as much as we can and private sector involvement you might call PPP, private public partnership approach and knowledge sharing and so forth. So we would like to have this development agenda which put emphasis on the development capability building rather than eight related programs. Financial safety net area, the general idea is this; we like to have the global financial safety net strength and it is provided by IMF mostly, we would like to strengthen the existing IMF facility and we would like to introduce a new facility at the IMF. Of course again it is very important to have IMF is set for reform before you keep all this tasks. You will make IMF more credible and legitimate and operational effective. And will this the G20 determine to be more task to the IMF and the financial safety net again so most specifically speaking there's the flexible credit line (FCL) and precautionary credit line (PCL) and then we would like to have multilateralized at IMF level the SWAP arrangement. For this third mechanism IMF needs more resources, for that reason we are pushing for at least 100% quota increase but again depending on the availability of resource the third mechanism may not be fully agreed in Seoul, but at least first two will like to have the agreement on. This is financial safety net area. I am sure you must discuss in details.

This is what we are now working and our ambitions is that after the Seoul summit, not We, Koreans, but outside of the world, at least 3-5 Korean initiatives at the Seoul summit, Korean initiatives not only initiated it but some of the initiatives been concluded and five should include in development and financial safety net and possibly the Basel Three, Seoul One or at least the SIFI and then another area which I didn't mention is that strengthening the IMF's surveillance and the early warning mechanism, again for this what we are thinking is we will give leaders agree to give mandate to France which is the next chair country. Seoul this should can be initiated. This is our ambition. In addition to this we are now trying to institutionalize business summit, but I don't think I have time to get into that.

I think I've covered most of important part of agenda. As of now we are working very hard. It's very difficult process, Koreans never did it before. So far whenever you go to international meeting and forum, you always go there with pre-determined agenda and governments said "agenda number one, first item, let's say yes or no" and then we develop the logic. And the second was as well. You persuade them why we say yes or no and if we succeed we hooray. But now we have to make this agenda itself and making up agenda is not difficult because itself involves the different interest of different countries. So you have

to make up the agenda and then on this every agenda items you have to have 20 countries agreement on this. We never had this kind of experience. It is very difficult and complicated process but fortunately, all the major international organizations, IMF, World Bank, OECD, WTO, Financial Stability Board, you name it all the international institutes, eager to work with us to participate in the process because they don't want to be left out of this process and none of them want to be left out. So this is very fortunate thing, we have to work very hard with this institutions very closely. And also major private think tank all of the world, domestic experts like KDI and institutions have to work very closely. International private institutions, think tank as well should participate in this process. With that we hope that we will get some really concrete and good result in November in Seoul. We need all assistance and encouragement. Okay, let me stop here. Thank you very much. Thank you.

CHAPTER 7

Financial Reform in the Post-Crisis Korea and Lessons for Sustainable Growth

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I. Introduction

In the aftermath of the Asian economic crisis of 1997-98 South Korea (henceforth Korea) has undertaken a number of institutional reforms. These include the measures undertaken to achieve macroeconomic stability, improve corporate governance, further liberalize the trade and capital accounts, and ensure financial stability. To improve corporate governance, for instance, measures were introduced to place outside directors on the corporate board, strengthen the position of minority shareholders, and require *chaebol* affiliates to combine their financial statements and stop cross-credit guarantees between affiliates (Jung 2002). Although many of these changes were carried out under pressure from the IMF and caused a severe economic hardship and popular resentment, they were basically measures congruent with the policy stance that the Korean government had pursued over the preceding two decades (Jwa 2001, ch.9). What the crisis of 1997-98 had done was to bring to culmination the institutional reforms that began in the early 1980s in an attempt to transform a state-led to a freer market economy.

More than a decade has passed since the crisis and since Korea began undertaking various policy and institutional reforms in its wake. With this passage of time we are now in a better position to review and evaluate what these reforms have accomplished and to learn whether enough has been done to prevent the recurrence of such crises. This is especially so in light of the Great Recession that recently took place in the United States, a country that had been taken as the archetype for Korea's institutional reform. It now appears that there is no common model to follow in institutional reform; each country will have to find its own blueprint for reform as neither the Stalinist planned economy nor a text-book version of a free market economy can be seen as a model to follow. Korea is one country that has fared the two financial crises relatively well and may thus offer some useful lessons, if not a model to follow, for the developing countries set to reform their financial systems.

The rest of the paper is organized as follows. In section 2 we examine various financial reforms that Korea has undertaken since the crisis of 1997-98. We conclude that the reforms brought to end the socialization of private risks, which we believe was a main cause of the crisis. In section 3 we focus on the post-crisis reforms in financial supervision and supervisory failures relating to credit-card companies. A lesson that we draw from this exercise is that institutions are interdependent and reforming one requires reforming its complementary institutions if the reformed institution is to function effectively. Section 4 concludes the paper.

II. Financial Reform and Institution Building

In the wake of the 1997-98 crisis the Korean government carried out a number of reforms in the financial sector. To salvage financially distressed commercial banks it reduced the number of banks while creating state-owned corporations to clean up non-performing loans and strengthen the capital base of the banks. The Bank of Korea Act was revised to ensure central bank independence with price stability as its main mandate, and an independent consolidated supervisory authority, the Financial Supervisory Commission (FSC), was created to oversee the banks, security houses and insurance companies.

The bills necessary for these reforms passed through the National Assembly in December 1997 with the help from the president-elect, Kim Dae-jung. These were the bills prepared by the Kim Young-sam government before the crisis but were sitting idle in the National Assembly since mid-November. What the crisis had done was to remove the opposition to the reform and provide the president-elect a political leverage to legislate the ready-made financial sector reform bills.

1. Restructuring of Financial Institutions

At the time of the crisis, many Korean banks were significantly under-capitalized and several of them effectively lost their capital base. Because of large non-performing loans (NPLs) and a weak capital base, the troubled Korean financial institutions struggled to improve their BIS ratios by curtailing lending since raising new capital was virtually impossible. Such financial implosion further intensified the already severe credit crunch and resulted in massive corporate bankruptcies.

In these circumstances a top priority in financial restructuring was the disposal of NPLs and the recapitalization of the banks. The *Act on the Structural Improvement of the Financial Industry* (ASIFI) was enacted in January 1997. However, it was not until January 1998 when the ASIFI was significantly amended that a legal basis was established to facilitate financial sector restructuring.

First, the Korean government sought to identify insolvent financial institutions and resolve them¹. The Financial Supervisory Commission (FSC) ordered twelve banks that had capital adequacy ratios of less than 8 percent at the end of 1997 to prepare rehabilitation plans by April 1998. After due diligence was conducted on the twelve banks, a turnaround strategy was to be submitted and reviewed by the Bank Evaluation Committee comprised of accountants, lawyers and experts to assess whether the strategy was viable. In June 1998, rehabilitation plans of five banks, which were identified as being insolvent, were rejected by the FSC following a comprehensive review of their financial conditions.² Each of these banks was restructured through P&A³ (Purchase of assets and Assumptions of liabilities) agreement by relatively healthy banks.⁴

The plans of the other seven banks with capital adequacy ratios below 8 percent at the end of 1997 were given tentative approval to continue operations under the condition that those banks prepare a quarterly report on the progress of restructuring such as cost reductions through branch closures and staff downsizing.

In addition, the government offered support by recapitalizing the seven banks and purchasing of their impaired assets. As little progress was being made in the restructuring, the government stepped in by encouraging mergers of the troubled banks. As such, in January 1999, two major banks, Korea Commercial Bank and Hanil Bank, were merged to form Hanvit Bank, and again in July 1999, another major bank, Chohung Bank acquired two regional banks – Kangwon Bank and Chungbuk Bank.⁵

¹ Soon after the financial crisis, the government nationalized two major banks — Korea First Bank and Seoul Bank — in January 1998. In preparation for selling the banks to foreign investors, due diligence by Coopers & Lybrand was initiated and financial advisors led by Morgan Stanley were engaged.

² The assessment by the Bank Evaluation Committee of the twelve banks that had BIS capital ratio of less than 8 percent was based on the bank's financial and operating conditions in terms of capital adequacy, profitability, liquidity position, asset quality, and evaluation of management. Also, the capital structure and capital-raising strategy of the banks were reviewed. Based on this, the Committee submitted its recommendation to the FSC for its approval a bank's rehabilitation plans. Banks that were not approved were restructured through P&As.

³ Under P&A, deposits (liabilities) are typically taken over by a healthier bank to protect depositors, while only performing loans (assets) are taken over by the bank. Non-performing loans are sold, written off, or disposed.

⁴ The suspended banks and their respective acquirers are Daedong Bank by Kookmin Bank, Dongnam Bank by Korea Housing & Commercial Bank, Dongwha Bank by Shinhan Bank, Chungchung Bank by Hana Bank, and Kyungki Bank by KorAm Bank. In order to participate in P&A, the acquiring banks had to be invited on the recommendations of the FSC which required acquiring banks to meet the following conditions: 1) BIS ratio of more than 9 percent, 2) ability to absorb troubled assets and continue normal operations following recapitalization, and 3) potential ability to grow market share and branch networks, achieving economies of scale.

⁵ Among the seven troubled banks, only the Korea Exchange Bank did not merge but received a capital injection from Commerzbank.

At the same time, bank mergers not directly led by the supervisory authority were also undertaken. With support from the government, in January 1999, Kookmin Bank merged with the ailing Korea Long-Term Credit Bank, which enabled them to achieve synergy between Kookmin's wide retail network and Korea Long-Term Credit's corporate finance. In addition, Hana Bank also merged with the Boram Bank amid the wave of consolidations. Note that both the Korea Long-Term Credit Bank and Boram Bank had been showing a possibility of significant undercapitalization and, without the mergers, corrective supervisory actions would have been inevitable.

The bank consolidation trend was marked in April 2001 with the merger of Korea's two large banks – the Kookmin Bank, the largest in asset size, and the Korea Housing & Commercial Bank, the third largest. The merger, which created the largest bank in Korea, was the first bank merger between healthy banks in genuine sense. In fact, as of the end of 2003, the Kookmin Bank's assets totaled 214.8 trillion won, accounting for nearly 27 percent of total assets in the banking sector. Furthermore, in December 2002, the Seoul Bank, which had been nationalized following the crisis and unable to find any strategic investors, ultimately merged with the Hana Bank.

As a result of this bank resolution the number of banks decreased from 33 to 18. This was unprecedented for Korea as there had not been any major bank failures until 1998. In contrast, by June 2009 a total of 945 financial institutions disappeared. Table 1 shows how the number of financial institutions changed between the end of 1997 and June of 2009. In the case of non-bank financial institutions (NBFIs), we find that 29 merchant banking corporations, 16 securities companies, 14 investment trust companies, and 22 insurance companies vanished.

Table 1. Financial Institutions Closed or Merged

(As of June 2009, number of institutions)

	Total No. of Institutions (end-1997) (A)	Type of Resolution					New Entry	Total No. of Institutions (June 2009)
		License Revoked	Merger	Others ¹⁾	Subtotal (B)	Ratio (%) (B/A)		
Banks	33	5	11	-	16	44.9	1	18
NBFIs	2,069	169	196	564	929	42.4	147	1,287
Merchant Bank Corporations	30	22	7	-	29	96.7	1	2
Securities Companies	36	5	8	3	16	44.4	27	47
Insurance Companies	50	10	6	6	22	44.0	25	53
Investment Trust Companies	31	6	8	-	14	45.2	50	67
Mutual Savings Banks	231	113	28	1	142	61.5	17	106
Credit Unions	1,666	2	137	553	692	41.5	14	988
Leasing Companies	25	11	2	1	14	56.0	13	24
Total	2,102	174	207	564	945	45.0	148	1,305

Note: 1) Includes dissolution and asset transfers to bridge institutions.

Source: Financial Service Commission, Public Fund Management White Book, August 2009.

Second, the government used asset management companies to remove non-performing loans from the banking sector. The government created two state-owned corporations to undertake this task: the Korea Asset Management Corporation (KAMCO) and the Korea Deposit Insurance Corporation (KDIC). The KAMCO was set up with initial government funds of 1.5 trillion won, which was used to buy up non-performing loans from troubled financial institutions that had failed or had been likely to fail, and to collect those loans. KAMCO's purchase of NPLs associated with *chaebols* helped to facilitate creditor-led corporate restructuring beginning in 2001. The KDIC insured all the deposits including those at non-bank financial institutions and paid off the depositors of liquidated institutions. The KDIC also assisted healthy banks to acquire failed financial institutions. The government also used the KDIC as a conduit for recapitalizing banks with public funds.

Table 2 shows the total amount of public funds spent by KAMCO and KDIC during 10 years from November 1997 to July 2009. Figure 1 shows how much of the funds were recovered. By July 2009, about 168.6 trillion won (25 percent of Korea's GDP in 2002) was spent, of which 56.0 percent was recovered. Almost a half of the funds (82 trillion won) were used for recapitalization.

The amount used for asset purchase by KAMCO was smaller but significant: it has purchased 111 trillion won (in book value) of non-performing assets at 38.5 trillion won and recovered 42.6 trillion won (from the sale of the acquired NPLs), which amounted to 110.7 percent of the injected fiscal money.

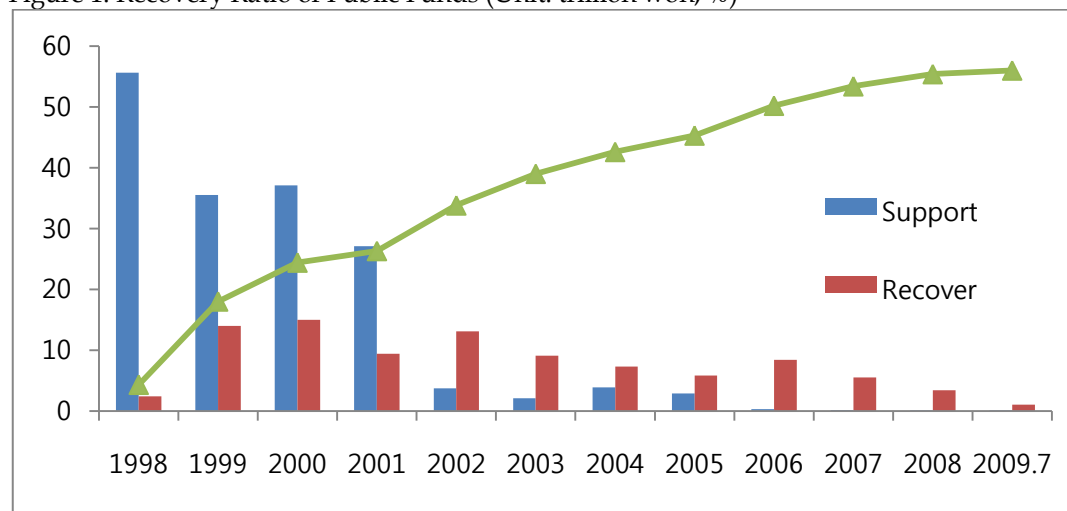
Table 2. Fiscal Support for Financial Restructuring (Nov/1997 ~ July/2009)

(Unit: trillion won)

	KDIC and Others				KAMCO	Total
	Recapitalization	Capital Contribution	Deposit Repayment	Purchase of Assets	Purchase of NPLs	
Banks	34.0	13.9	0	14.4	24.6	86.9
NBFIs	29.5	4.7	30.3	3.3	11.5	79.3
Merchant Banking Corporations	2.7	0.7	18.3	0.0	1.1	22.8
Insurance Companies	15.9	3.1	0.0	0.3	1.8	21.1
Securities and ITCs	10.9	0.4	0.01	2.1	8.5	21.9
Mutual Savings Banks	0.0	0.4	7.3	0.6	0.2	8.5
Credit Cooperatives	0.0	0.0	4.7	0.2	0.0	4.9
Others	0.0	0.0	0.0	0.0	2.4	2.4
Total	63.5	18.6	30.3	17.7	38.5	168.6

Source: Financial Service Commission, Public Fund Management White Book, August 2009.

Figure 1. Recovery Ratio of Public Funds (Unit: trillion won, %)



Source: Financial Service Commission, Current Situation of Public Fund Management Operation, August 2009.

Financial sector restructuring also progressed through employment adjustment (Table 3). By yearend of 1999, the total employment of commercial banks declined by approximately 30 percent to reach slightly over 90 thousand persons, a significant decrease from 128 thousand at the end of 1997. In 2001-2007 the number of employees in the banking sector remained more or less around 90,000 and only lately has shown an upward trend.

Table 3. Number of Employees by Financial Sector (1997~2009)

	Commercial banks	Merchant banks	Mutual Savings banks	Credit unions	Insurance	Securities
1997	128,503	1,510	9,975	30,122	83,304	25,515
1998	94,690	1,251	7,971	27,775	65,183	24,460
1999	95,540	943	6,610	24,164	61,745	30,253
2000	91,905	588	5,781	23,433	56,726	33,858
2001	90,122	285	5,464	22,483	50,818	36,715
2002	91,398	258	6,607	19,834	47,353	36,273
2003	96,223	159	6,293	19,045	46,567	33,353
2004	96,031	146	6,060	18,716	47,770	30,703
2005	94,675	145	6,418	18,448	51,455	29,817
2006	99,573	159	7,079	18,284	52,701	31,666
2007	104,001	158	7,728	18,194	54,040	36,693
2008	106,633	170	7,748	18,013	56,593	39,449
2009	104,310	175	8,018	17,782	53,812	40,596

Source: Financial Supervisory Service, Monthly Bulletin of Financial Statistics

2. Deregulation in Financial Intermediation Industries

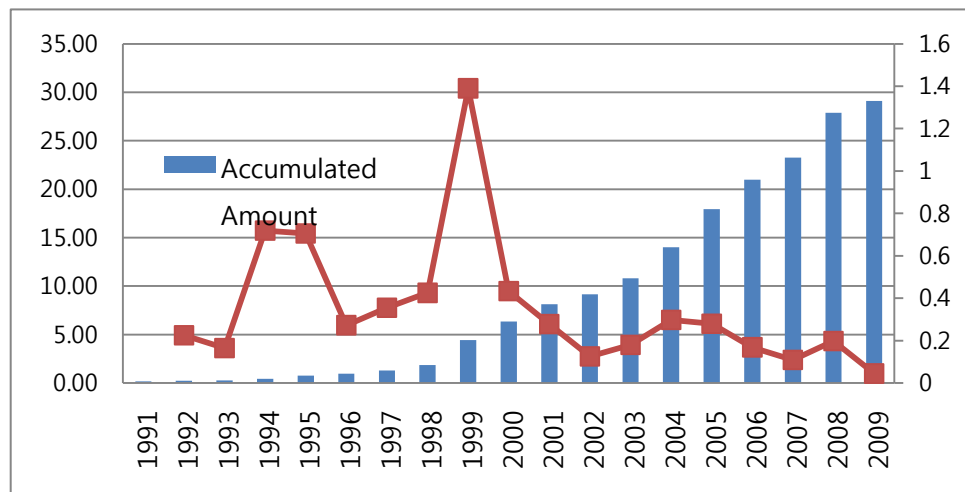
The government undertook efforts to reform the financial sector by deregulating interest rates and allowing financial institutions to expand their scope of business. Liberalization of interest rates that began in 1991 completed the fourth and last phase in February 2004.⁶ Embracing the idea of *Universal Banking*, the government allowed financial institutions to expand the range of services and products they could offer. In 1998 the banks were allowed to issue beneficiary certificates and *Bancassurance*. The range of securities offered by securities companies was also expanded in 2003, and in 2000 the outsourcing of a non-core business through alliances with other financial institutions was allowed. In particular, financial holding companies (FHCs) were introduced in October 2000 as part of restructuring efforts. Under this structure, numerous synergistic effects such as enabling the cross-selling of financial products, lowering funding costs, and streamlining IT investment are expected. It was also expected by the government that the affiliated companies of FHCs would retain their client base and avoid employment downsizing, thus helping lessen employee resistance to the reform efforts in contrast to the P&A approach used in 1998.⁷

The financial reform after the crisis also included the opening of the financial industry to foreign investors, completely eliminating restrictions on foreign equity ownership of financial intermediaries. In August 1998, the Foreign Investment Promotion Act was enacted for the purpose of attracting foreign direct investment by liberalizing even uninvited acquisitions by foreign investors. Foreign portfolio investments in the stock and bond as well as short-term money markets were also completely liberalized. As a result, foreign investments in the financial intermediation industry steadily increased, as can be seen in Figure 2. As of the end of 2009, the total cumulative amount of inward FDI reached \$29.1 billion. Foreign ownership of Korean banks surged. For example, the Korea Exchange Bank was acquired by Lone Star in 2003, KorAm Bank by Citi Bank in 2004, and the Korea First Bank by Standard Chartered Bank in 2005. One exception to this trend has been the Woori Financial Group, which is still majority-owned by the government.

⁶ According to the plan announced by the government, the first stage of the four-stage interest rate liberalization which began in 1991 sought to deregulate most of the short-term lending rates of the banks and NBFIs. The second stage sought to deregulate starting 1993 all lending rates of the banks and NBFIs except for loans provided by the government or central bank rediscount window. The third stage sought to deregulate all other interest rates starting in 1994. Finally, all rates on loans and deposits were to be determined by the financial institutions by 1997.

⁷ The first financial holding company was created by the government. In April 2001, the government established the Woori Financial Holdings to place two nation-wide banks (Hanvit and Peace) and two regional banks (Kwangju and Kyungnam) under it. All the four banks were suffering from massive non-performing loans. The government took over the banks, cleaned up their balance sheets, and injected public funds so that their capital ratios exceeded 10 percent, before they were acquired by the holding company. In addition to the banks, the Woori holding company also had a securities company, an investment trust company (ITC), and a credit card company. Then, in September 2001, a second financial holding company was established, Shinhan Financial Holdings, under which Shinhan and Cheju Banks along with a life insurance company, a securities company, an ITC, and a credit card company were placed. In September 2003, Chohung Bank, the fourth largest bank at the end of 2002, was also placed under the Shinhan Financial Holdings, making it the second largest financial group in Korea. In 2003, another FHC, Dongwon Financial Holdings, was established. However, unlike Woori and Shinhan Financial Holdings, only NBFIs were placed under this holding company. Recently in December 2005, Hana Financial Holdings, the fourth financial holding company group in Korea, was launched controlling four major subsidiaries – Hana Bank, Daehan Investment Securities, Hana Institute of Finance, and Hana INS.

Figure 2. Inward FDI in Financial Industries (US\$ billion, %)



Source: Ministry of Knowledge and Economy

The removal of restrictions on foreign investment was accompanied by the liberalization of foreign exchange transactions. In particular, the Foreign Exchange Management Law that had been effective for over 50 years was abolished in 1999, and replaced by the Foreign Exchange Transaction Law. The old law was based on a positive list system in capital account transactions, prohibited all capital account transactions unless they were on the list of explicitly allowed transactions. The new law introduced a negative list system that allows all capital account transactions unless they are on the list of prohibited transactions. Under the old law, foreign exchange transactions had to be accompanied with *bona fide* demand for foreign exchange such as payments for imports, thus preventing speculative transactions. Under the new law there were no such requirements.

More recently, the Korean government started to encourage capital outflows as the economy started to experience persistent current account surpluses. In 2006, for instance, restrictions on overseas securities investment and real estate acquisition by Korean individuals were partially eliminated. Table 4 summarizes the key capital account liberalization measures in Korea during and after the crisis. These measures substantially increased the *de jure* measure of capital market openness. Indeed, Korea's liberalization index increased from 65.0 in 1997 to 85.1 in 2006, which is comparable to those of Japan and the United Kingdom (Table 5).

Table 4. Key Measures for Capital Account Liberalization in Korea

Dates	Measures
Dec 1997	Full liberalization of corporate and government bond markets
Apr 1998	Establishment of foreign subsidiaries allowed
May 1998	Opening of all money market instruments (CP, CDs, RPs, etc.) Removal of ceilings on foreigners' stock market investment (with exception of investment in some state-owned enterprises)
Apr 1999	First phase of foreign exchange liberalization: capital account transaction regulation changed from positive to negative list system
Jan 2001	Second phase of foreign exchange liberalization: abolishment of ceilings on overseas payments for overseas expenses for travel, stay, education and emigration
Dec 2005	Abolition of capital transaction licensing system, replaced by an <i>ex post</i> reporting system
Jan, Mar 2006	Removal of ceilings on outbound FDI by individuals and of restrictions limiting the types and items of overseas securities investment by individuals
May 2006	Early implementation of foreign exchange liberalization plan: 1) advancing schedule of plan from 2011 to 2009, 2) allowing acquisition of overseas real estate up to US\$1 million Reduction of tax rates from 25 percent to 14 percent on interest income of foreigners arising from holding domestic bond.
Jan 2007	Raising of limit on acquisition of overseas real estate by Korean nationals for investment purposes, from US\$1 million to US\$3 million
Dec 2007	1) full completion of first phase of foreign exchange liberalization plan, as scheduled 2) abolishment of reporting requirement for capital transactions up to US\$50,000, and reduction of documents required for reporting

Source: Ministry of Strategy and Finance, Cited from Kyungsoo Kim, Byoung-Ki Kim and Young Kyung Suh, "Opening to Capital Flows and Implications from Korea," Working Paper No 363 (Institute for Monetary and Economic Research, Bank of Korea, February 2009)

Table 5. Evaluation on the Degree of Liberalization of Korea's Financial Markets

Korea		OECD	US	UK	Germany	Japan
1997	2006					
65.0	85.1	89.3	95.0	86.1	89.1	86.1

Note: Figures are measured using the on/off approach of OECD's Capital Flow Liberalization code.

Source: Deok Ryong Yoon et al, Economic Effects and Policy Implications of Financial Opening in Korea, Policy References 08-09 (Korea Institute of International Economic Policy, 2008)

Foreign investments in the Korean stock market also increased after 1998, when the maximum limit on foreign ownership of Korean firms were lifted. Foreigners' share of equity ownership (in terms of the market value) increased from 13 percent in 1996 to 42 percent in 2004. As of 2007, the share was around 32 percent, somewhat down from 2004 but substantially higher than the rate in 1996. During 2003-07, gross capital inflows to Korea averaged \$43.5 billion a year. This was led largely by foreign portfolio investments and foreign currency borrowings by Korean financial institutions, which accounted for 50.1 percent and 45.3 percent of total capital inflows, respectively. In 2003-04, foreign investments in equities were greater than that in debt securities, but in 2006-07 the former turned negative while the latter exploded. The share of foreign direct investment in total capital flows in 2003-07 was 15.5 percent.

3. Financial Sector Governance and Regulatory Reform

Since the onset of the financial crisis the government has undertaken various measures to strengthen prudential regulations and improve the financial sector's internal and external governance structure. This is certainly quite a remarkable achievement when compared with what was achieved during the pre-crisis period.

As to the governance reform in the financial sector, the most dramatic and effective measure is no doubt the closure of insolvent institutions. Indeed, the closure of nonviable banks opened a new chapter in Korea's financial history, where no single commercial bank had been closed for the four decades prior to the crisis.

Since January 1998, under the "Act Concerning the Structural Improvement of the Financial Industry", the supervisory authority has been able to order equity write-offs against shareholders deemed responsible for the insolvency of banks. In order to encourage shareholders and internal auditors to assume the role of monitoring the management, conditions required for exercising minority shareholders' rights were significantly eased. Also, starting in 1999 financial institutions are required to fill 50 percent of their board of directors with outside directors. Moreover, the financial disclosure required of banks and securities and insurance companies was changed from a semi-annual to a quarterly basis. Since 2005, a class action suit was introduced to protect shareholders from stock price manipulation, insider trading, and false financial disclosure.

The FSC has also established and executed an efficient sanction system in which, if necessary, civil and criminal liabilities can be imposed on the directors. An equivalent sanction may now be imposed on the external auditors and examiners of supervisory authorities for dereliction of duties. One prime example is a law suit against former directors of the Korea First Bank by a group of minority shareholders, which resulted in the damage of 40 billion won to be paid by the former officials (two presidents, a director and an auditor) to the bank for wrongful behavior and managerial failures.

Besides these measures, the supervisory authority has decided to apply stricter standards in prudential regulation and supervision. First, the banks are now required to engage in prompt corrective actions (PCAs) when the FSC deem it necessary on the grounds of capital adequacy ratios that are less than stipulated levels, the composite grade of CAMELS (Capital, Asset quality, Management, Earnings, Liquidity, Sensitivity of market risk), and the individual grade of capital adequacy of asset quality of a bank. PCA consists of three sets of progressively more stringent corrective procedures (Table 6). Initially, the PCA was applied to banks, merchant bank corporations, and securities companies in April 1998 and were subsequently extended to insurance companies and mutual savings banks (June 1998), and credit unions (December 1999).

Table 6. Prompt Corrective Actions for Korea's Banking Sector (Revised in March 1999)

Measures	Conditions when measures are taken		Decision-maker	Details of Measures
	BIS ratio	Others		
Management Improvement Recommendations	Below 8%	Above the third rate in CAMELS, but below the fourth rate in terms of quality of assets or capital adequacy. It seems evident that the above cut-off conditions are not satisfied because of the large financial debacle.	Governor of Financial Supervisory Service (FSS)	Restructuring of organization 2. Cost reduction Increasing the efficiency of business unit Management Restrictions in fixed asset investment, entry to new business, and new financial investment Management of insolvent assets Recapitalization Restriction of dividend payout Special allowance for bad debts.
Management Improvement Requirements	Below 6%	Below the fourth rate in CAMELS It seems evident that the above cut-off conditions are not satisfied because of the large financial debacle	Governor of FSS (after FSC vote)	Closure or consolidation of existing business units or restriction of new ones Retrenchment of organization Restriction of holding risky assets and management of assets Restriction of deposit rate Restructuring of subsidiaries Requirement of management turnover Partial suspension Planning of M&A, or transfer of business Measures specified in Clause 2, Article 34 of the Act Concerning Structural Improvement of Financial Industry
Management Improvement Orders	Below 2%	Unsound financial Institutions specified in Clause 3, Article 2 of the Act Concerning Structural Improvement of Financial Industry	FSC	Write-off of shares Prohibition of execution by management and nomination of manager M&A Suspension for less than 6 months Transfer of contracts

Source: Financial Service Commission

Second, the FSC expanded the scope of regular disclosure items to the level dictated by International Accounting Standards (IAS) in order to strengthen the disclosure system of the banks.

Third, loan classification standards as well as provisioning requirements were strengthened in accordance with the international practices (Table 7). Also, forward-looking asset quality classification standards were introduced to commercial banks at the end of 1999. Such criteria are based on the ability of debtors to generate sufficient future

cash flows rather than on their past payment histories. Similar standards were introduced for merchant bank corporations (June 2000) and insurance companies (September 2000).

Fourth, the asset category subject to loan loss provisions was widened to include commercial papers, guaranteed bills and privately placed bonds in trust accounts. In addition, the evaluation standard for marketable and investment securities held by banks has been changed from the "lower-of-cost-or-market" method to the "mark-to-market" method.

Table 7. Loan Classification Standard and Required Provisions

	Prior to July 1998	As of June 2010
Definition ¹		
Normal	-	-
Precautionary	3~6 month past due	1~3 month past due
Substandard	More than 6 months past due, secured	More than 3 months past due, secured
Doubtful	More than 6 months past due, unsecured	3-12 months past due, unsecured
Estimated Loss	Expected losses	More than 12 months past due, unsecured
Loan loss reserve requirement		
Normal	0.5%	Above 0.85%
Precautionary(special mention)	1%	7%
Substandard	20%	20%
Doubtful	75%	50%
Estimated Loss	100%	100%
Provisioning for outstanding Guarantees	Not required	20% of "substandard", 50% of "doubtful", and 100% of "estimated loss"

Source: Financial Supervisory Service

In tandem with these prudential regulations, the FSC has strengthened direct regulations with respect to exposure limits of banks and merchant banks, among others (Table 8). First, the definition of exposure to a single borrower has been broadened to include not only the loans and payment guarantees in the conventional sense but also all direct and indirect transactions that carry credit risks such as corporate bond and CP holdings. Second, since May 1999 the combined exposure to firms affiliated with the same *chaebol* has been tightened to 25 percent of banks' capital from 45 percent. Third, the total sum of large exposures of more than 10 percent of a bank's capital to a single borrower or a group of firms affiliated with the same *chaebol* has been limited to 5 times of the bank's capital. Fourth, the exposure to large shareholders of a bank who hold 10 percent or more of the shares has been limited up to the equity shares of the large shareholders in question with a maximum of 25 percent of the bank's capital. Obviously, the main purpose of these regulations is to prevent *chaebol*-affiliated financial institutions from taking too many risks by maintaining unduly large exposures to other subsidiaries of the same *chaebol*.

Table 8. Ceilings on Credit Exposures of Financial Institutions

	Commercial Bank	Merchant Bank Company	Insurance Company
Credit Exposures to a Single Borrower	Up to 20% of bank's capital	Up to 20% of bank's capital	
Combined Credit Exposures to Firms Affiliated with the Same <i>Chaebol</i>	Up to 25% of bank's capital	Up to 25% of bank's capital	Up to 3% of total assets
Total Sum of Large Credit Exposures	Up to 5 times of bank's capital	Up to 5 times of Bank's capital	Loans and securities holdings up to 5% of total assets, respectively
Credit Exposures to Large Shareholders of Financial Institutions ¹⁾	Up to ownership shares of the shareholder in question with maximum of 25% of bank's capital	Up to ownership shares of the shareholder in question with maximum of 25% of bank's capital	

Note: 1) Large shareholders are those that own 10% or more of total shares with voting rights.

Source: Financial Supervisory Service

4. Post-Crisis Structural Changes in the Financial Sector

After the crisis, the share of the banking sector in total assets decreased from 67.4 percent in 1996 to 63.5 percent in 2006 and further to 59.7 percent in 2009 while the market shares of insurance and securities companies expanded (Table 9).

Table 9. Share of Assets by Sector

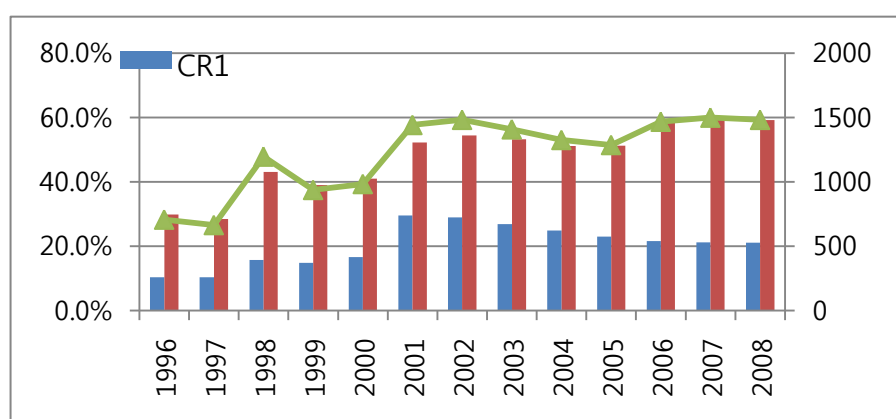
	1996	2006	2009
Commercial Bank	67.4%	63.5%	59.7%
Insurance	13.6%	20.8%	21.2%
Mutual Savings and Finance	5.2%	3.3%	4.0%
Securities	4.0%	6.0%	7.8%
Credit Unions	2.4%	1.7%	1.9%
Others	7.5%	4.7%	5.4%
	100.0%	100.0%	100.0%

Source: Financial Supervisory Service, Monthly Bulletin of Financial Statistics

As a result of the government-led financial restructuring, which brought about massive consolidation, market concentration has increased significantly in Korea's banking industry. To find out the degree of market concentration in the banking industry, we use two types of measurements. The first is the so-called k-th bank concentration ratio (CR_k),

which takes the market shares of the first to the k-th largest bank in the market. The second metric is the Herfindhal-Hirschman Index (HHI)⁸, which is calculated by summing the squares of the individual percent market shares of all the participants in the market. Total assets are taken as the measure of the bank size. The large increase in market concentration was mainly due to the consolidation in the banking industry that brought about the merger of Korea's two large banks including Kookmin Bank and Korea Housing & Commercial Bank in April 2001. In terms of CR3, the ratio rose substantially to 54.4 percent in 2002 from 28.4 percent in 1997, decreased in 2003 and 2004, and then increased to 59.2% by 2008 (Figure 3). Similarly, the HHI showed a sharp increase from 664 in 1997 to 1,481 by the end of 2002, and has remained at a level similar to the one in 2008, which is considered as being "moderately concentrated."

Figure 3. Concentration Ratio of the Banking Sector in terms of Assets



Note: 1) CR1: market share of the largest bank in the market.

2) CR3: market share of the 3 largest banks.

3) HHI: Herfindhal-Hirshman Index

Source: Bank Management Statistics

Since the onset of the crisis, the Korea's financial industries have witnessed an emergence of financial conglomerates, which has increased the number of institutions affiliated with them as well as their total assets (Table 10).⁹

⁸ Regulators assessing the effect of mergers on concentration in local financial markets typically rely on HHI. U.S. Department of Justice divides the spectrum of market concentration into three categories: "not concentrated" (HHI below 1,000), "moderately concentrated" (HHI between 1,000 and 1,800), and highly concentrated (HHI above 1,800).

⁹ Prior to the crisis in Korea, there had existed two types of financial groups. One is the "financial conglomerate" defined as "any group of companies under common control whose exclusive or predominant activities consist of providing significant services in at least two different financial sectors (banking, securities, insurance)" (Joint Forum on Financial Conglomerates, 1999). Since the holding company structure was prohibited in Korea because of fears of suppressing competition, financial conglomerates were established under parent-subsidiary model in the mid 1980s, in which their organizational structure took the form of a parent's participation in financial subsidiaries. Later on, as was mentioned in the proceeding section, financial holding companies were introduced in Korea following the crisis as a part of the government's restructuring efforts. Another form of financial group prevalent in Korea has been the "mixed conglomerate," which are predominantly commercially oriented, but contain at least one regulated non-bank financial institution (NBFIs). In Korea, many NBFIs are owned by the

Table 10. Financial Conglomerates in Banking, Insurance, Securities, and Investment Trust Companies (in trillion won, %)

		1996				2006			
		Number of Institutions		Assets		Number of Institutions		Assets	
		No.	%	Amount	%	No.	%	Amount	%
Financial Conglomerates	FHC	0	0	0	0	21	17.8	541.7	42.6
	P-S	20	19.6	256.9	43.9	15	12.7	333.7	26.2
	Mixed	40	39.2	73.2	12.5	26	22.0	241.7	19.0
	Subtotal	60	58.8	329.9	56.4	62	52.5	1,117.1	87.8
Non-Financial Conglomerates		42	41.2	255.0	43.6	56	47.5	155.5	12.2
Total		102	100	584.9	100	118	100	1,272.6	100

Source: Updated the data in Hahm and Kim (2006)

Hahm and Kim (2006) explore impacts of financial conglomeration on the profitability and risk taking behavior based upon the recent performance of financial institutions in Korea. Indeed, new business opportunities have opened up for financial conglomerates from consolidation and diversification, which in turn influence profitability, capital adequacy, and risk profile of their business portfolios. As a result, insolvency risks of respective financial conglomerates would also change.¹⁰ Hahm and Kim (2006) show that for the post-crisis period of 2001-03 larger financial institutions show a significantly higher profitability and lower variability in ROA, indicating that they are operating on a superior efficient frontier (size effect). Such a size effect of higher profitability and lower risk seems to reflect the economies of scale and diversified portfolios achieved through financial consolidation.

Once the size effect is taken into account there exists no significant evidence supporting the argument that conglomerates are taking higher risks relative to non-conglomerate independent institutions in the post-crisis Korea. The weak effect of financial conglomerates on the behavior of financial institutions suggests that Korea's business scope regulation still takes a "compartmentalism" approach rather than a "universal banking" approach. Furthermore, this compartmental regulatory approach takes a positive list approach that permits only those products on the list.

Profitability in the banking sector has improved considerably after recovering from years of poor performance (Figure 4). In particular, banks' profitability turned around significantly in 2001, following the second wave of injection of a large amount of public funds. Although public funds played a key role in improving the profitability of banks, restructuring efforts in the banking sector also helped enhance the financial performance of banks. As mentioned earlier, the banks were downsized significantly in terms of the number of employees and branches. Furthermore, the introduction of automated teller machines (ATM) and internet-banking contributed to improving banks' cost efficiency.¹¹

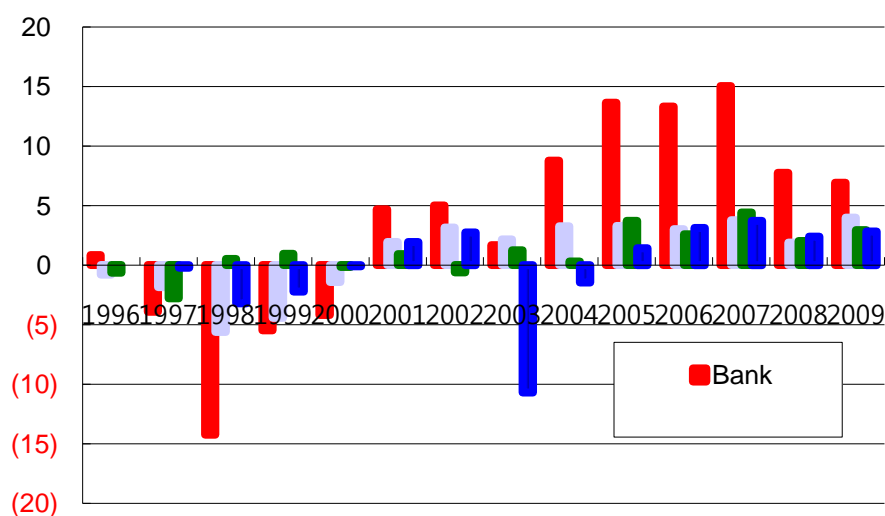
chaebols. According to the Fair Trade Commission, the amount of assets for 10 largest mixed conglomerates totaled about 172 trillion won as of the April 2005, of which Samsung's share of assets totaled about 110 trillion won, or 64% (Hahm and Kim, 2006).

¹⁰ To obtain measures for financial risks, Hahm and Kim (2006) use both standard deviation on return on asset (ROA) and z-score index. The z-score was constructed by dividing the sum of average ROA and average equity capital to asset ratio by standard deviation of ROA for a certain period.

¹¹ After introduction of internet-banking in 1999, the number of customers using internet-banking increased over 10 million in less than two years, reaching over 30 million in 2006. As of March 2006, transactions conducted over the internet totaled 65 million per month, amounting to 470 trillion Won. Kim and Park (2003) tested the hypothesis that internet-banking reduces cost and ultimately enhances profitability for banks. Their analysis

Profitability of credit card companies suffered significantly in 2003, after burst of credit card bubble formed during 1999-2002. It seems that profitability of credit card companies has improved since 2005.

Figure 4. Profitability: Profits/Losses for Financial Industries



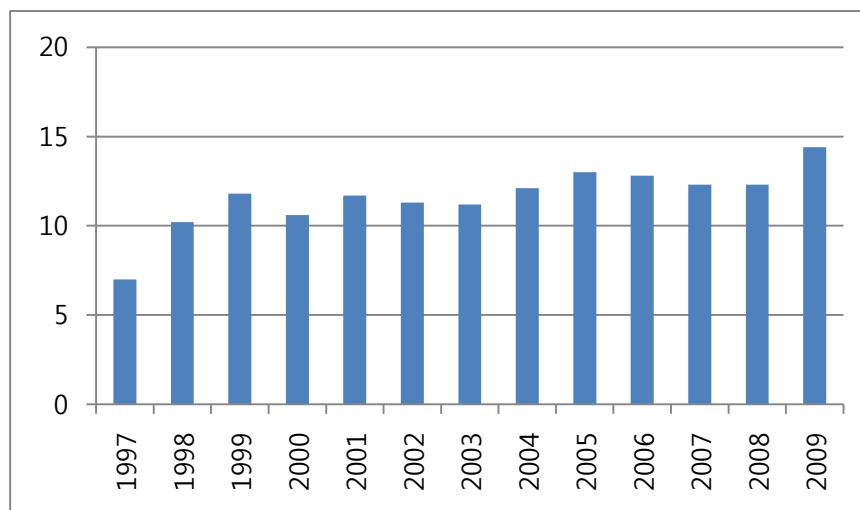
Source: FSS, Monthly Financial Statistics

The soundness of banks improved markedly, thanks to the injection of public funds as well as strengthened prudential regulations and an improved internal risk management. Indeed, the BIS ratio improved from 7.0 percent in 1997 to 14.4 percent in 2009 (Figure 5). At the same time, NPL ratio decreased from 14.5 percent in 1999 to 1.8 percent in 2009 (Figure 6). These changes may indicate that Korea is similar to advanced countries in terms of these metrics although the standards of risk management, particularly the evaluation of company's creditworthiness and human resources are not up to a par with the international standard.

Following the liberalization of financial intermediation industries, the share of foreign ownership in Korea's banking sector increased significantly (Figure 7). This holds true for all banks except for Woori Financial Group, which is largely owned by the government. As a result, the market share of foreign owned banks has increased considerably over the past several years (Figure 8). As for the NBFIs, the market share of foreign owned institutions increased steadily up to 2007 but fell since then (Figure 9).

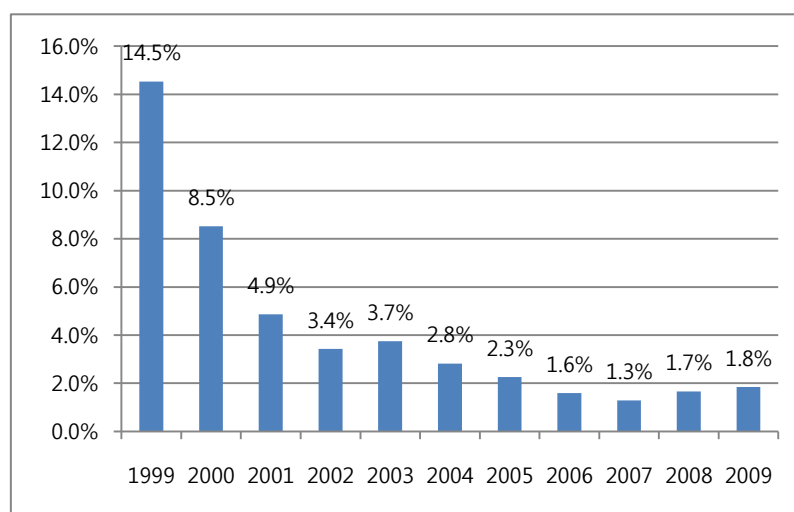
suggested that internet-banking does contribute to cost reduction but does not necessarily affect profitability. This implies that internet-banking raises social welfare by passing on the benefit of cost reduction to customers through fee reductions rather than resulting in enhanced profits.

Figure 5. Bank's BIS Ratio (%)



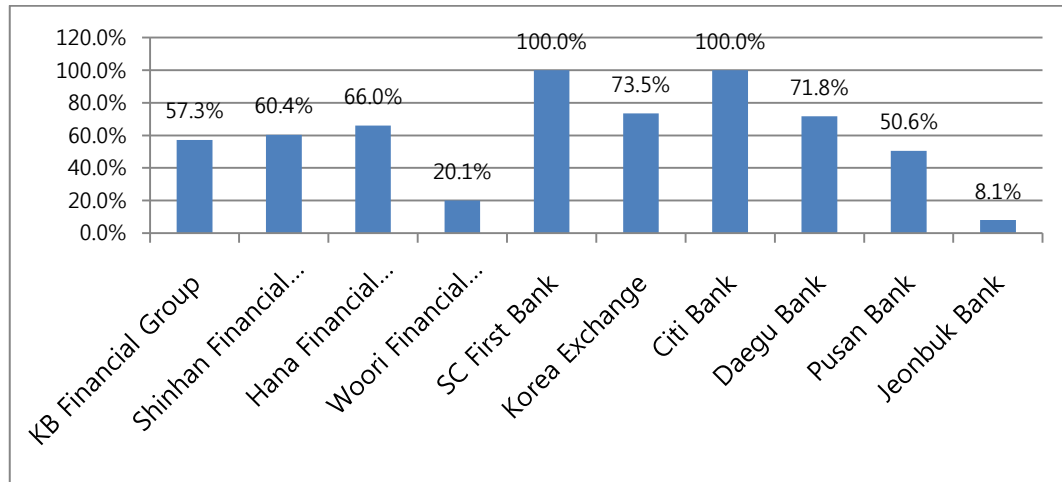
Source: FSS, Financial Statistics System

Figure 6. NPL Ratio for the Entire Financial Sector



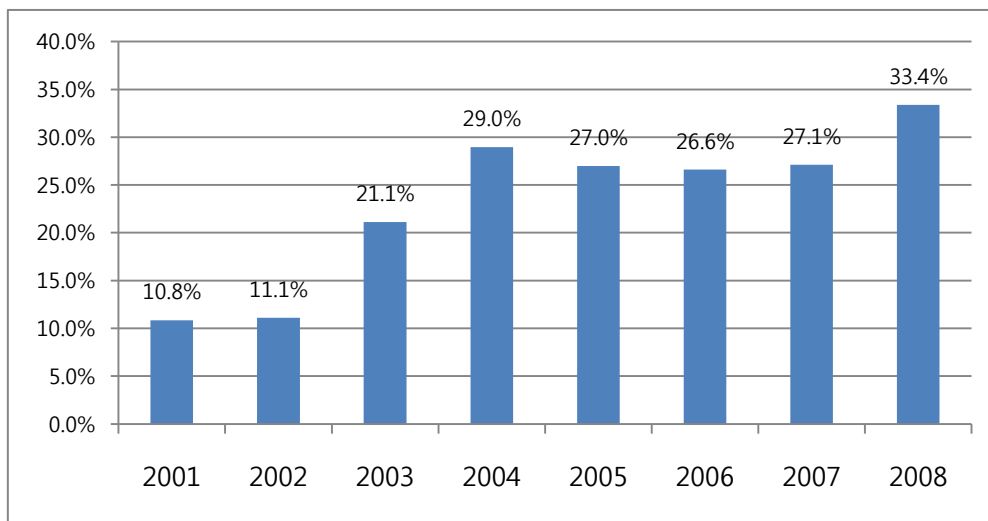
Source: FSS, Monthly Financial Statistics

Figure 7. Share of Foreign Ownership in Korea's Banking Sector (as of July 15, 2010)



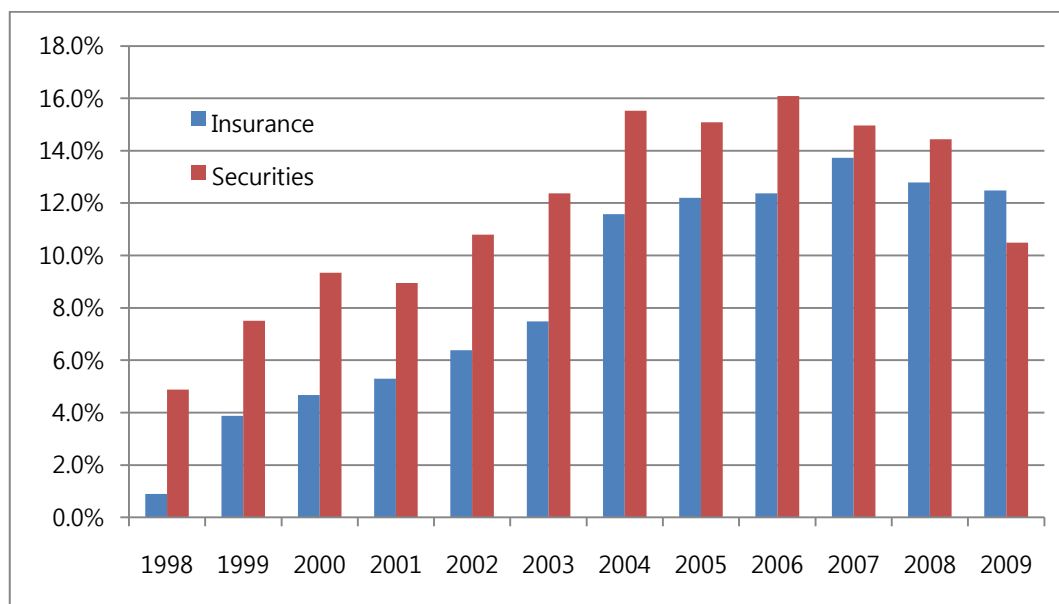
Source: Korea Exchange

Figure 8. Market Share of Foreign Owned Banks in Korea's Banking Sector



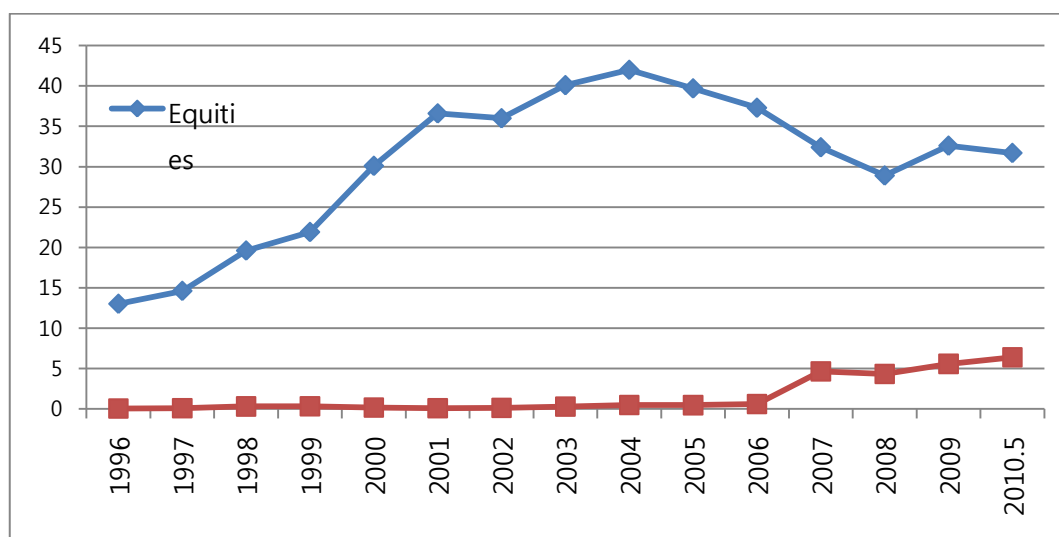
Source: FSS, Monthly Financial Statistics

Figure 9. Market Share of Foreign Owned NBFIs by Industry



Source: FSS, Monthly Financial Statistics

Figure 10. Foreign Investor's share of Equity and Bond Markets (%)

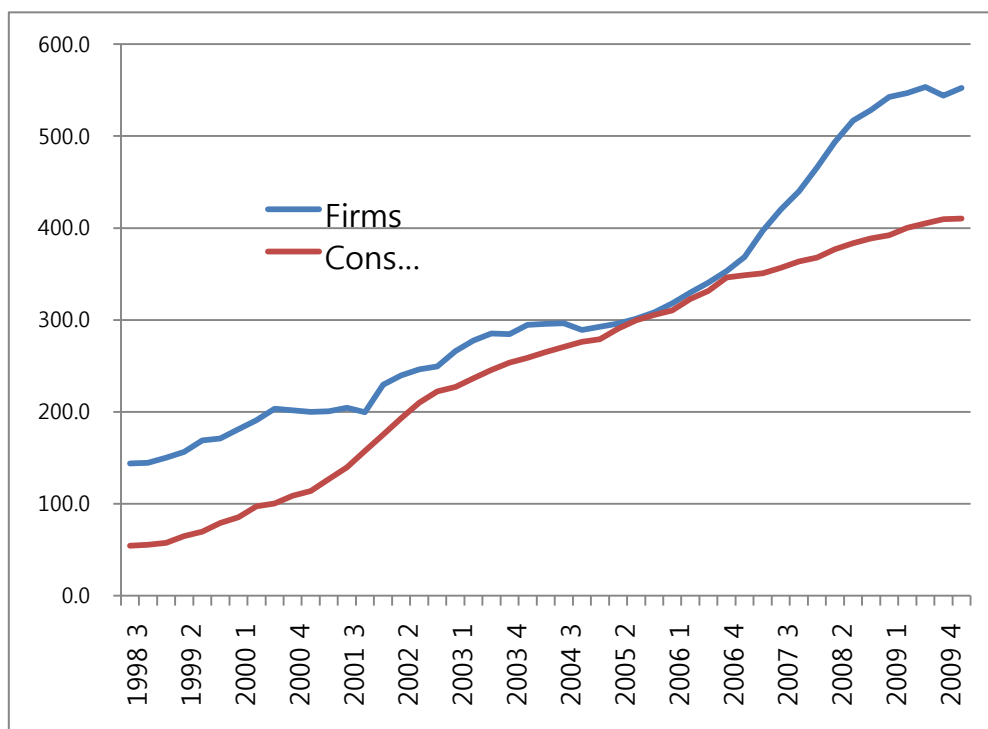


Source: FSS, Monthly Financial Statistics

Moreover, the share of foreign investors has increased in the equity market, following the lifting of ceiling restrictions on foreign ownership in 1998. It increased from 13 percent in 1996, peaked at 42 percent in 2004, and fell slightly to about 32 percent in May 2010 (Figure 10).

Finally, Korea's financial institutions have experienced a structural change in their portfolios as debt reduction for large firms paralleled a rapid growth in consumer loans. As can be seen in Figure 11, outstanding loans for consumers were far less than the loans to firms in the years preceding the crisis, but the gap between the two has greatly been reduced as consumer loans increased rapidly through 2005. After 2006, however, loans to firms rapidly expanded due to a growth in SME loans. Financial institutions have focused on expanding in home financing, which may account for the high correlation between household home financing and housing prices (Figure 12).

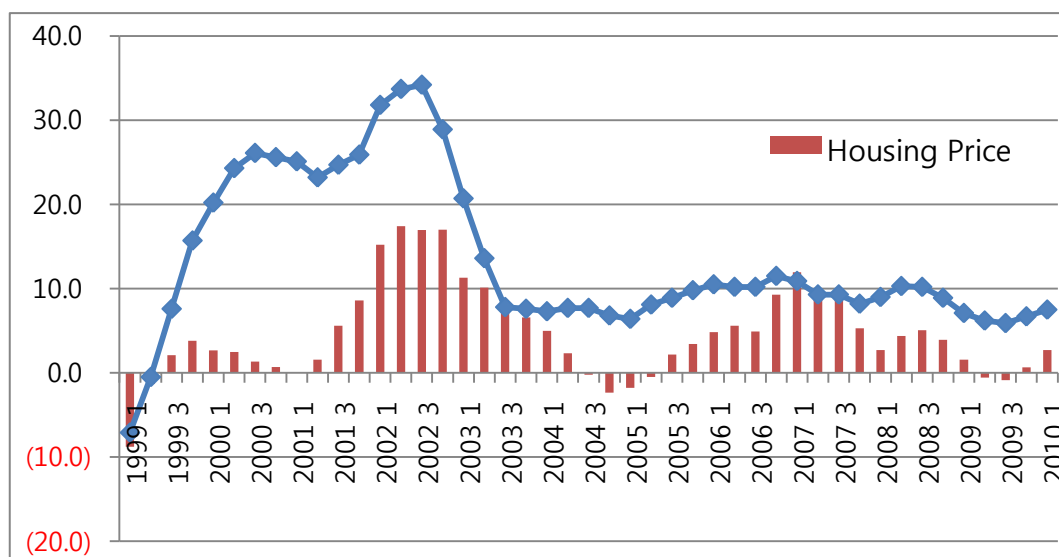
Figure 11. Outstanding Loans by Financial Institutions by Sector



Source: Bank of Korea, Economic Statistics System

Figure 12. Growth of Household Credits and Housing Prices

(Unit: %)



Source: Bank of Korea, Economic Statistics System, National Statistics Portal

As discussed above, Korea's financial sector has undergone massive restructuring, which we expect has made it more stable and resilient. Perhaps the most important reason for this change is the realization on the part of financial institutions as well as corporations and individual households that the past practice in risk management cannot and will not continue. During the preceding few decades of rapid economic growth many of the risks were in fact socialized as the government made it a practice to bail them out if they fell into a perilous financial situation. This practice encouraged investments beyond prudent limits, thus planting the seeds for the financial crisis of 1997-98. This crisis, which forced many financial institutions and corporations out of business and many workers out of work, has made it clear that the old practice cannot continue. The post-crisis reform has made them realize that the socialization of private risks cannot continue, and they themselves will have to bear the risks. This change in perception as well as, hopefully, in practice will improve the long-term viability of individual firms as they become more prudent in making investments and thus help render the economy less vulnerable to external shocks.

There still remain many institutional reforms that Korea need to undertake if its financial system is to function as hoped for. This necessity arises because the effective functioning of a given institution depends on the presence of complementary institutions and/or the absence of institutions that interfere with its effective functioning. The following section examines the post-crisis institutional reform in financial supervision as a case study of institutional interdependencies and difficulties involved in institutional reform.

III. Post-Crisis Reform in Financial Supervision

In the new post-crisis system of integrated financial supervision the FSC/FSS is the sole supervisory agency for both banks and non-bank financial intermediaries, formerly the charges of the Bank of Korea (BOK) and the Ministry of Finance and Economy (MOFE), respectively. The monetary and credit policy functions, over which MOFE had a considerable authority, are now wholly vested in BOK with authority to pursue the goal of monetary stability much strengthened. The Korea Deposit Insurance Corporation (KDIC), which began its deposit insurance operation for insured banks in January 1997, became an integrated deposit insurance agency in April 1998, taking in as its charge not only insured banks but also insured NBFIs. With these changes now in place MOFE, FSC/FSS, BOK, and KDIC are the four public agencies that are independently responsible for keeping Korea's financial system efficient and stable.

All these changes clearly attest to the fact that Korea has undertaken a number of major institutional reforms in financial supervision. In spite of this, however, questions have been raised on whether Korea has in fact established a well-functioning system of financial supervision (Kim and Lee 2006, Kwon 2004). As will be discussed, the costly financial instability relating to credit-card companies and household debts that afflicted Korea in 2003 suggests that there yet remain a number of institutional reforms that Korea must undertake if it is to have a well-functioning system of financial supervision.

The post-crisis reform in financial supervision in Korea has largely been limited, as to be expected, to changing formal institutions of financial supervision. Although they were created or reorganized as *independent* agencies in the aftermath of the crisis, FSC/FSS and BOK have not in reality functioned as such due to constraints imposed on them by other extant, formal as well as informal, institutions in Korea. For example, lacking independence the supervisory agencies have failed to properly carry out their statutory responsibilities and prevent the abuses and misconduct by credit-card companies that led to the financial instability of 2003. In fact, this is a point alluded to by the World Bank (2003: 2) when it recommended that the division of responsibilities between MOFE, FSC, and the FSS should be made more transparent and steps be taken to assure the independence of the regulator. In other words, the financial reform in Korea is far from being completed as it has failed to address the issues relating to interdependencies among institutions.

As part of the post-crisis reform of the financial system the Korean government undertook a major structural reform in its main economic ministry, MOFE. It was reorganized in 1998 with some of its functions transferred to other public agencies: its non-bank supervisory function was transferred to FSC/FSS while the monetary and credit policy functions were transferred to BOK. In addition, budgetary functions were taken away from MOFE. This reorganization of MOFE was prompted by the realization that policy making had become overly concentrated, undermining the checks and balances required for effective government (MOFE 2002) and the criticism that those weaknesses had contributed much to the outbreak of the 1997-98 financial crisis in Korea.

The reform of MOFE and in financial supervision led to the division of responsibilities and powers that had been concentrated in MOFE among a number of public agencies. MOFE was given the task of preparing and coordinating economic policies, drafting tax and customs legislation, and formulating policies for the financial system; FSC/FSS that of supervising financial institutions; BOK that of maintaining monetary stability and keeping an oversight of the financial system; and KDIC that of protecting depositors. In other words, the defining characteristic of the new regulatory regime is the division of responsibilities among a number of public agencies with each of them given its own policy mandate and responsibilities while they all share the common objective of securing financial stability (Kim *et al.* 2002). The new regime, however, has not been able to achieve this objective as it

failed to bring about inter-agency cooperation necessary for policy coordination and to maintain checks and balances among them.

In spite of the apparent division of responsibilities among specialized and separate agencies it was not long before the new regulatory regime in effect turned into a hierarchical system headed by MOFE (Kim *et al.* 2002). With the power to initiate legislation MOFE has become the most powerful agency dominating other agencies although the system is supposed to work on the basis of the division of responsibilities and powers. In fact, FSC/FSS and BOK have come under the direct influence of MOFE, and there has been very little of either functional cooperation or horizontal checks and balances among the public agencies. Appearance to the contrary, the *modus operandi* of the new regulatory regime has remained the same as that of the old one in which all the powers and policy functions were concentrated in the hands of MOFE (Kim 2004a and 2005).

Given the scope and power of the FSC, FSS, and SFC, their independence is a matter of great importance. Although embodied in the law, in practice their operational independence has been called into question because of the role taken by MOFE in interpreting laws and supervisory regulations that give the FSC, FSS, and SFC only limited freedom in implementing supervision. In addition, the rapid turnovers of the FSC chairmanship (the chairman also is the governor of the FSS) and the policy whereby FSC staff sometimes move to and from MOFE have the potential to detract from the credibility of supervisory independence.

The 2003 episode relating to credit-card companies is an exemplary case demonstrating the failure of the reform in formal institutions to alter in a significant way the manner in which financial supervision is carried out in Korea. This failure is a consequence of limiting the scope of reform to those institutions that are directly involved in financial supervision and not extending it to other institutions that, although not directly involved, affect the way the supervisory agencies operate.

1. Supervisory Failures Relating to Credit-Card Companies

In 2003, the financial markets in Korea suffered instability with serious prudential problems relating to credit-card companies and huge household indebtedness. In March that year the solvency of those companies began to be widely questioned, and soon the financial markets were shaken with instability. To prevent an impending crisis MOFE, FSC/FSS, and BOK intervened, taking the lead in arranging rescue plans and forcing credit-card companies to abide by hastily drawn-up restructuring packages (Kim 2004b). Soon afterwards the markets returned to a seemingly stable situation.

The basic underlying problem, however, persisted, threatening market stability. For instance, the LG Card, the biggest credit-card company in Korea, became illiquid in November 2003, subsequently became insolvent and had to be bailed out in January 2004. At the yearend of 2003 there were over 3.7 million credit defaulters¹² (one-sixth of Korea's

¹² According to MOFE (2004), individual consumers who were on the list of credit defaulters totaled over 3.7 million at the yearend of 2003. The default by 2.4 million (64.4% of these credit defaulters) was related to credit card uses. Compared with the situation at the yearend of 2002, the year 2003 saw a dramatic increase both in the number of credit defaulters (1.1 million) and in the number of credit-card related credit defaulters (0.9 million). The ratio of the latter to the former also increased from 56.7% to 64.4% in 2003. Since Korea had about 22.9 million economically active people at the yearend of 2003 (BOK 2004b), we can surmise that roughly one person out of six was a credit defaulter and one out of nine or ten a credit-card related credit defaulter. The register system of credit defaulters has been abolished in Korea since April 28, 2005 when the Act for the Use and Protection of Credit Information was revised. Now efforts are being made to build up the infrastructure for managing credit information such as credit bureaus. As regards individual consumers, a credit defaulter is by definition a person who has loans in arrears in excess of KRW 300,000 (or equivalently US \$261 at the exchange rate of US \$1 = KRW 1,150) for over three consecutive months (MOFE 2004).

economically active population) with total credit to household amounting to US \$389.2 billion¹³ (over three-fifths of Korea's GDP for 2003) (BOK 2004, MOFE 2004).

What brought about such huge credit default and household indebtedness? As the following quote from FSS (2002) points out, much misconduct had been carried out by credit-card companies:

[G]ranting cards to minors without parental consent, renewal or re-issuance of cards after expiration without the consent of the member even though no transaction took place in the member account, ... attempts to attract new members with offer of high-priced giveaways, ... setting credit limits well beyond the card members' income or ability to pay only after perfunctory or negligent verification process, and using the offer of high credit limit as a marketing tool to attract new members¹⁴

It is obvious that misconduct on the part of credit-card companies such as these contributed to the huge credit default and household indebtedness, but it is also obvious that they could not have done so if they had been properly supervised by the appropriate supervisory agencies. We must thus hold those agencies ultimately responsible for the misconduct of credit-card companies and the consequent credit default and huge household indebtedness. The following discusses how the three supervisory institutions—MOFE, FSC/FSS, and BOK—failed to perform their supervisory role during 1999-2003 (Kim 2004b and 2004c).

2. Functioning of Supervisory Institutions—MOFE, FSC/FSS, and BOK

This section examines how the three supervisory institutions in Korea have presumably conducted themselves to guarantee the stability of the credit card markets and why they have failed to do so.

MOFE

MOFE began undertaking a series of deregulatory measures for credit-card companies in 1997-99. It included expanding the scope of financial activities permitted and removing the limit on corporate borrowing and the ceiling ratio (60 percent) of account balances of non-core credit-card businesses (*i.e.*, cash advances and card loans) to those of both core (settlement of credit-card payment) and non-core credit-card businesses (FSS 2003). These were soon followed in 1999-2001 with another series of deregulatory measures aimed at popularizing the use of credit cards by the general public. These include such measures as removing the monthly credit limit on cash advances, requiring corporate entertainment expenses to be paid with corporate credit cards, and offering further tax breaks for credit-card purchases (FSS 2003).

These deregulatory measures, clearly reckless in hindsight, were undertaken as part of government policies aimed at boosting domestic demand in the post-crisis economy. These, plus MOFE's actions to stimulate real estate investment in the middle of 1998, were probably warranted at that time when the economy was suffering from a credit crunch and a high rate of unemployment. MOFE, however, continued with the policy of promoting the use of credit cards well beyond the time when it was appropriate. This may have been a

¹³ An exchange rate of US \$1 = KRW 1,150 is used for conversion throughout the paper.

¹⁴ According to FSS (2001a), most of these practices became widely used by early 2001, rapidly popularized by street solicitors who were under contract with credit-card companies. As of the yearend of 2000 there were 31 thousand credit-card solicitors nationwide and they contributed to 58 percent of the total of 18.3 million credit cards newly issued during 2000.

conscious decision of MOFE putting a greater weight on the short-term goal of restoring the economy over a longer term goal of securing the stability of financial markets.

FSC/FSS

In February 2001, FSC/FSS first recognized signs of excessive competition among credit-card companies and decided subsequently to carry out a comprehensive set of measures to deal with the prudential problems relating to credit cards. They wanted to reintroduce, for instance, the ceiling ratio of account-balances of non-core credit-card business to those of both core and non-core credit-card business. FSC/FSS were, however, unable to put such measures into practice because of the opposition by MOFE, which was more concerned with securing sufficient domestic demand than maintaining financial stability.

The ceiling ratio, which had been set at 60 percent, was removed in 1999 in the hope that such a measure would accelerate economic recovery. In April 2001, FSC, being concerned with the rapid increase in non-core credit-card business such as cash advances and card loans, requested that MOFE provide a legal basis for FSC to reintroduce the ceiling ratio (BAI 2004). Faced with MOFE's opposition, FSC attempted on its own in May 2001 to re-impose the ceiling ratio at 50 percent (FSS 2001), taking the position that the re-imposition was a matter of regulatory discretion and was within their jurisdiction.¹⁵ MOFE, however, took issue with FSC, insisting that the re-imposition of the ceiling ratio required a revision in law and was not, therefore, a matter of regulatory discretion. Initially, MOFE was opposed to the reintroduction, fearing that such a measure would have a negative impact on the pace of economic recovery. Then, in May 2002, when the problems became more serious and urgently demanded a solution, MOFE finally agreed to revise the law. In June 2002 it belatedly reintroduced the ceiling ratio—one whole year later than thought appropriate and necessary by FSC/FSS.

The inability of FSC/FSS to reintroduce the ceiling ratio clearly demonstrates the lack of their autonomy in carrying out the supervisory task. The cause for this lack of autonomy lies, we argue, in the hierarchical relationship that MOFE has maintained with other public agencies. By being at the apex of this hierarchy and by turning discretionary regulatory issues into legislative matters MOFE has been able to dominate other agencies in policy matters, turning them practically impotent in carrying out their statutory responsibilities especially when in conflict with MOFE's own policy objectives (FSS 1999).

BOK

BOK itself took note of marked increases in cash advances of credit-card companies and in household debts as early as September 1999 but did not regard them as a major threat to financial stability. In the first half of 2002, however, BOK began to express its concern about the ever-increasing household debts although, like MOFE, it appeared to be torn between two conflicting objectives—boosting domestic demand for economic recovery and maintaining financial stability.

In May 2002, the BOK Monetary Policy Committee made a decision to move the target level of the call rate slightly upward by a quarter percentage point. The decision was made with the problems of household indebtedness and financial instability in mind. A couple of weeks or so later, MOFE made a complete and abrupt turnaround in its policy stance, giving up its long maintained policy of boosting domestic demand. BOK itself then became

¹⁵ The ceiling ratio was correctly regarded then as one of the most powerful direct measures with a great impact on profitability and business patterns of credit-card companies.

expressly concerned with the prudential problems of credit-card companies and household debts.

BOK is *not* a part of the government unlike FSC, which is a government agency at a lower level of hierarchy headed by MOFE. But, its passive inconsistent patterns of behavior towards prudential problems relating to credit-card companies and household debts strongly suggests that in spite of the statutory independence it has gained with the post-crisis financial reform BOK has been subject to influence from MOFE. A weakened legal basis of BOK involvement in the matters of financial stability, which is a consequence of the 1997 revision of the Bank of Korea Act, may have contributed in part to such a situation. More likely, MOFE has been able to exert its influence on BOK by having a strong voice in appointing a majority of members of the BOK Monetary Policy Committee.¹⁶

The Ruling Party-Administration Consultation Meeting held in May 2002 marked the watershed at which MOFE basically abandoned its policy of boosting domestic demand and began to attend to the prudential problems relating to credit-card companies. With this change in policy stance by MOFE all other public agencies, including FSC/FSS and BOK, followed suit and became outspoken and decisive in their views and actions regarding the prudential problems.

What FSC/FSS and BOK, nominally independent, had done before the change in policy stance was to follow the policy of MOFE that was primarily concerned with short-term macroeconomic policy objectives. But, as soon as MOFE made a turnaround in its policy stance in May 2002 and became concerned with financial stability, FSC/FSS and BOK likewise made their policy turnaround. Such behavior by FSC/FSS and BOK clearly demonstrates that in spite of their statutory independence they have not acted independently. In short, the prudential problems relating to credit-card companies and household debts were a failure of an institutional structure in which MOFE dominated other public agencies, making it difficult for them to carry out their own statutory responsibilities. Clearly, then, unless this institutional structure of MOFE dominance is done away it is unlikely that supervisory institutions such as FSC/FSS and BOK will function as independent supervisory agencies.

IV. Concluding Remarks

The financial crisis of 1997-98 brought to culmination a long drawn-out process of reform that began in the early 1980s with a shift in paradigm among the policy elites in Korea. The actual course of reform was, however, influenced by powerful interest groups jockeying for their own parochial interests, although they all seem to have shared a common objective—establishment of a “liberal economic order” (Choi 1987). The economic crisis redoubled the nation’s commitment to that goal when President Kim Dae-jung pronounced the post-crisis reforms as an instrument to “put an end to the previous system of governmental control and to guarantee the greatest possible degree of autonomy for the management of financial institutions” (Kim 1999, p.50). As he saw it, Korea’s future lay in the establishment of a free and open market economy and there was no going back to the state-led growth model of the earlier years.

¹⁶ The BOK Monetary Policy Committee consists of seven members—BOK Governor and Vice Governor and five members recommended by five institutions and appointed by the President of the Republic of Korea. The five institutions are BOK, MOFE, FSC, the Korea Chamber of Commerce and Industry, and the Korea Federation of Banks, each recommending one prospective member. With its ability to influence most of those institutions, MOFE does have a strong voice in the selection of most members of MPC.

By the beginning of the 21st century, Korea had fully recovered from the crisis of 1997-98 with its economy growing rapidly after 1999. Furthermore, it has managed to weather relatively well the Great Recession of the past few years. This record of economic performance may bespeak well of the rightness of the post-crisis reforms. There, however, remains the question of whether the specific reforms undertaken to establish a “liberal economic order” will turn out to be the right choice for Korea in the long run. Formal institutions transplanted from abroad may not function effectively or, worse, may even be a source of social conflict, if they are not compatible with the country’s extant institutions. If the reforms are to succeed in bringing about sustained economic growth in Korea, imported institutions will have to be modified to suit the local-specific conditions and/or changes may have to be made in those conditions including many of the country’s informal institutions. Establishing effective new institutions, whether by modifying the imported institutions or by altering other institutions to adapt to the imported ones, is a slow evolutionary process with no ready made blueprint to follow (North 1990).

Our study of Korea’s experience in financial reform and especially the reform of financial supervision points to the complexity relating to institutional reform in general; that is, reforming a particular institution, if it is to be successful in effect, cannot simply end with it. The fact that there are interdependencies among various institutions—formal as well as informal—in the economy implies that the reform of a particular institution will have to be accompanied by reforms in other institutions that directly or indirectly affect the functionality of the reformed institution. That is, reforming an institution requires reforming the entire institutional structure in which it is embedded. Some of the institutions in that institutional structure may be known prior to the reform while others may be revealed only afterwards (Streeck 2003). Furthermore, they may include society’s overarching institutions such as culture and social norms and changes in such institutions, if possible, would have society-wide implications.¹⁷ Obviously, reforming all the interdependent institutions at once—a sort of a “big-bang” approach—will be difficult, if not impossible, since we may know little about what they are prior to the reform and how they may interact with the particular institution in issue.

Market competition may be, as pointed out by Jwa (2003), what we need to sort out effective and efficient institutions from those that are not. There is, however, a limit to this process as institutions are a public good and thus cannot be relied solely on market competition. Clearly, competition is essential for weeding out ineffective and inefficient institutions, but it is the state that determines the outcome of market competition by setting up the framework within which market forces can and do operate (Toye 1995). There may be no ready-made answers to what this framework is for a particular country at a given point in time. For whatever the reasons, some societies create new institutions and prosper when faced with new economic opportunities and constraints imposed by economic and political forces (Platteau 2000). Whether Korea will turn out to be one of such societies remains to be seen.

¹⁷ Unlike goods and services that people buy and sell on the market, institutions are “cultural embodiments” that reflect the value systems and historical antecedents of the societies in which they prevail. This makes it difficult to transplant the institutions that have worked well in one society to another that has a different history (Platteau 2000)

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What Happened to Efficiency and Competition after Bank Mergers and Consolidation in Korea?

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Abstract

Market concentration in the Korean banking industry has markedly increased since the financial crisis of 1997-1998 because of M&As, P&As, and consolidation of banks. With this change, there has been a growing concern over market power in the Korean banking sector. We examine the effects of market concentration on bank efficiency and competition for the period of 1992-2006. Three different indicators of bank inefficiency are used in this study, including X-inefficiency that is derived from the directional technology distance function. This method treats nonperforming loans as an undesirable by-product inevitably arising from the production of loans. The level of competition is measured by the H-statistic of the Panzar-Rosse model and the level of the net interest margin and its standard deviation.

Empirical results indicate that market concentration has not improved bank efficiency through scale economies or scope economies. Instead, recent mergers, acquisitions and consolidation of banks resulted in an increase in inefficiency measured by the three different indicators: X-inefficiency, labor inefficiency and asset inefficiency. While an increase in market share of individual banks improved bank efficiency, an increase in the overall market concentration ratio resulted in lower efficiency. Our study also finds that the Korean banking sector has been monopolistically competitive throughout the sample period except for the crisis period according to the H-statistic. Although an increase in market concentration ratio has not changed the overall level of bank competition, it has a positive significant effect on the level of the average interest margin.

JEL classification: G21, L10

Key words: bank consolidation, market concentration, competition, efficiency, Korean banks,

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I. Introduction

During the last two decades a fundamental change in banking market structure occurred in many countries through mergers and acquisitions (M&As), purchase of assets and assumptions of liabilities (P&As) and consolidation under financial holding companies. Financial deregulation and financial globalization accompanied by advance in information technology triggered fierce competition among banks and necessitated M&As, P&As and consolidation in the world to reduce risk through business diversification and take advantage of scale economies. Korea is no exception. Over the last twenty years the Korean banking system went through many changes: financial deregulation, financial crisis, and restructuring. In this process, market concentration initially decreased as the number of banks increased due to financial deregulation prior to the Asian financial crisis of 1997-1998, but, after the crisis, the concentration ratio increased because of a decline in the number of banks due to bank closures and creation of mega banks through bank mergers, acquisitions and consolidation. The structural reform after the financial crisis introduced the financial holding company system and allowed mergers among larger banks, resulting in a few super-size banks.

Park and Weber (2006a) estimate Korean bank inefficiency and productivity change for the period 1992 to 2002. These estimates are derived from the directional technology distance function. Their method controls for loan losses that are an undesirable by-product arising from the production of loans and allows the aggregation of individual bank inefficiency and productivity growth to the industry level. Their findings indicate that technical progress during the period was more than enough to offset efficiency declines so that the banking industry experienced productivity growth. Park (2009) examines market concentration and competition in the Korean commercial banking market for the period of 1992-2004. The H-statistic of the Panzar-Rosse model indicates that the Korean commercial banking market was monopolistically competitive during the pre-crisis period and the post-crisis period with temporary deviation to the level of perfect competition during the crisis period. However, the crisis period could not pass the equilibrium condition test. The author concludes that increased concentration has not lessened the overall level of competition in Korea.

This paper is built upon Park and Weber (2006a) and Park (2009), but extends further to examine the effects of M&As, P&As and consolidation and the subsequent increase in market concentration on efficiency and competition in the Korean banking sector, using 1992-2006 data. While the previous two papers focus on measurement and changes in the levels of efficiency and competition of Korean banks, this paper examines what are the main determinants of the levels of efficiency and competition and how significant the effects of market concentration are in the Korean banking industry. Furthermore, updated data are used in this study. Section 2 describes the activities of M&As, P&As and consolidation occurring in the Korean banking sector and the resulting trend in market concentration during the sample period. Section 3 introduces the directional technology distance function used to estimate efficiency and analyzes the effects of market concentration on efficiency. Section 4 discusses the method used to measure the degree of competition and then estimates the effects of market concentration on competition. In the final section we offer a summary of our work and draw conclusions.

II. M&As, P&As, Consolidation and Market Concentration

Market concentration can be measured in a number of ways. The most straightforward method is to calculate what share of the industry's output is sold by a few dominant firms. This top k-firm concentration ratio (CR_k) is used by the Korean government to determine the degree of anti-competition of a proposed merger. The Fair Trade Commission in Korea regards a market with CR₁ greater than 50% or CR₃ greater than 70% as a highly concentrated market. Another formula now widely used is the Herfindahl-Hirschman index (HHI), and the US Department of Justice used this index in its antitrust policy. Table 1 presents the number of banks, HHI and CR₃ of total assets, total loans and total deposits for the period of 1992-2006. HHI is measured by the sum of the squares of each bank's market share in total industry assets, loans or deposits.

Table 1. Trend of Market Concentration in the Korean Banking Industry

Year	# of Banks	Total Assets		Total Loans		Total Deposits	
		HHI	CR ₃	HHI	CR ₃	HHI	CR ₃
1992	24	876.06	36.42	945.35	39.04	832.11	34.27
1993	24	827.22	34.69	897.83	36.94	789.16	33.10
1994	24	787.92	33.15	825.57	34.40	761.48	31.85
1995	25	714.79	30.15	742.38	30.36	703.21	28.88
1996	25	706.56	29.78	740.30	30.63	698.79	29.30
1997	26	664.23	28.32	704.33	29.37	662.33	28.07
1998	21	807.75	34.46	770.40	36.41	779.38	32.86
1999	17	936.73	38.67	1021.24	45.03	942.30	40.24
2000	17	982.71	40.99	1062.20	46.49	995.03	42.43
2001	15	1441.16	52.23	1623.02	55.43	1437.78	52.18
2002	14	1480.98	54.38	1575.62	56.93	1427.62	54.29
2003	14	1407.32	53.18	1498.29	55.71	1403.81	53.97
2004	14	1324.59	51.09	1446.04	54.89	1350.35	52.80
2005	14	1285.58	51.17	1387.38	54.34	1303.57	52.50
2006	13	1466.43	52.27	1551.96	61.45	1460.48	57.42

1. Total assets, loans and deposits include both banking accounts and trust accounts.

2. The correlation coefficients among the three HHIs are 0.995 or higher, and the correlation coefficients among the three CR₃s are 0.984 or higher.

There was a decreasing trend of market concentration in all three variables until the Asian financial crisis of 1997-1998. This trend began in 1982 as financial deregulation induced entry of new banks and caused fierce competition among the existing banks. Until the Korean government introduced a series of financial reforms in 1982, the number of national commercial banks was limited to five while ten much smaller regional banks were allowed in order to stimulate regional economic development. With financial liberalization, the number of national commercial banks increased from five to fourteen in 1992, leading to a decrease in market concentration. Just before the crisis, there was a concern of overbanking in Korea. However, closures of insolvent banks and mergers with blue-chip banks after the crisis resulted in a drastic increase in the market concentration ratio.

The change in market concentration after the crisis reflects the structural reform in the banking sector carried out by the Korean government. The Korean government began a two-phase financial restructuring. In its first-phase restructuring from 1998 to 2000, three

types of merger occurred. First, five insolvent banks were merged into five sound banks in the form of P&As in 1998. Dongwha Bank was acquired by Shinhan Bank, Daedong Bank by Kukmin Bank, Dongnam Bank by the Housing and Commercial Bank, Kyungki Bank by Hanmi Bank, and Chung Chong Bank by Hana Bank. Second, involuntary mergers between three groups of relatively sound banks were initiated by the Korean government. They are the merger of Commercial Bank of Korea and Hanil Bank to form Hanvit Bank, the merger of Choongbuk Bank and Kangwon Bank into Cho Heung Bank, and the merger of the Long-term Credit Bank into Kukmin Bank in 1999. Third, there was one voluntary merger of two privately-owned banks, Boram Bank merging into Hana Bank. The second and third types of mergers are in the form of M&As.

The second-phase restructuring that began in 2001 focused on restoring bank profitability. This structural reform also introduced the financial holding company system and allowed mergers among larger banks, resulting in a few super-size banks. In 2001, Woori Holding Co. consolidated the following four banks: Hanvit Bank, Kwangju Bank, Kyungnam Bank and Peace Bank. In 2002, there was a merger of Kukmin Bank and the Housing and Commercial Bank, and Shinhan Financial Holding Co. consolidated Shinhan Bank and the Bank of Cheju. In 2005, Hanmi Bank was acquired by Citi Bank and renamed as Korea Citi Bank. In the same year, the Standard and Charter Bank acquired Korea First Bank that was nationalized in 1998 and sold to the Newbridge Capital in 1999 and renamed it as SC Korea First Bank. In 2006, Cho Heung Bank was merged into Shinhan Bank.

As a result of P&As, M&As and consolidation, the number of banks was reduced and the average asset size of banks increased. While a few mega banks were established through mergers, acquisitions and creation of financial holding companies, small regional banks remained unchanged. The Korean banking industry experienced polarization in bank size, leading to greater market concentration. Some observers are concerned that this policy may have a negative effect on competition and efficiency in the Korean banking industry. The post-crisis period is also characterized by increasing market share by foreign banks and increasing foreign ownership share of domestic banks.

In summary, the Korean banking sector prior to the crisis could be regarded as a non-concentrated market with HHI less than 1,000 in total assets, total loans and total deposits (or with CR3 less than 30%), according to the horizontal merger guideline of the US Department of Justice. After the crisis, particularly after the second-phase restructuring, the Korean commercial banking market became a moderately concentrated market with HHI ranging between 1,000 and 1,800 (or CR3 as high as 61.5% in total loans). Although not reported in the table, HHI is in excess of 1800 in some specific sub-markets such as loans to households and deposits in foreign currency. HHI figures of Korea banks are higher than those of banks in other OECD countries of a similar population size. For example, HHI of Spanish banks was in the 700s and HHI of Italian banks was in the 600s according to the 2000 data of the European Central Bank. Will creation of mega banks contribute to improving efficiency and overall competitiveness of the Korean banking industry? Or will this have a negative effect on competition and efficiency. This paper discusses these issues and investigates the effects of market concentration on efficiency and competition.

III. Effects of Market Concentration on Efficiency

There are several methods for estimating efficiency. A frontier cost or production function is typically used to estimate efficiency (or inefficiency). A stochastic frontier approach based on parametric estimation decomposes the error term into an inefficiency component and a random component. There are two stochastic approaches: distribution-free and distribution-specific. If a distribution-free approach is to be used as in Berger (1995), then the differences among banks are assumed to be stable over time. The distribution-free approach requires that banks be in existence for the entire sample period. It is difficult to apply this approach in the case of the Korean banking sector for the period of 1992-2006 because of frequent bank entry and exit during this period. If a distribution-specific approach is used as in Maudos (1998), then it is necessary to know the distribution for both components of the error term. Without prior knowledge of the distribution, arbitrary assumptions about its shape are made in most studies.

As a non-parametric approach, data envelopment analysis (DEA) is frequently used. This approach has the advantage of identifying best practices based upon observed costs rather than some hypothetical average derived from a given functional form. The DEA approach assumes that any deviation from minimum cost is due entirely to inefficiency. Park and Weber (2006a) estimated X-inefficiency from a non-parametric directional technology distance function and this method is used in this study. This directional technology distance function allows efficiency to be measured for firms that face a technology where both desirable outputs and undesirable outputs are produced. This function has been used in measuring the efficiency of firms or industries that generate polluting by-products in addition to desirable outputs (Chung, Färe, and Grosskopf 1997, Färe et al. 2005, Yu 2004). For our purpose it is a useful tool for measuring the efficiency of banks that produce non-performing loans as a by-product of their loan portfolio.

X-inefficiency according to Park and Weber (2006a) is derived from the following directional technology distance function which seeks the maximum simultaneous expansion of desirable outputs, contraction of undesirable outputs, and contraction of inputs for the directional vector, g .

$$\vec{D}_T(x^j, y^j, b^j; g_x, g_y, g_b) = \max\{\beta : (x^j - \beta g_x, y^j + \beta g_y, b^j - \beta g_b) \in T^j\} \quad (A1)$$

Suppose we take the directional vector to be $g = (g_x, g_y, g_b) = (1, 1, 1)$. For this directional vector, the solution to (A1) gives the maximum unit expansion in desirable output and simultaneous unit contraction in undesirable outputs and inputs that is feasible given the technology. Other directional vectors can also be chosen. A directional vector such as $g = (x, 0, 0)$ gives the percentage contraction in inputs, holding outputs fixed. A direction such as $g = (0, y, b)$ gives the simultaneous percentage expansion in desirable output and contraction in undesirable output, given inputs. A bank that produces on the frontier is

efficient with $\vec{D}_T(x, y, b; g_x, g_y, g_b) = 0$. Values of $\vec{D}_T(x, y, b; g_x, g_y, g_b) > 0$ indicate inefficiency for the g -directional vector, and these values are used in this study as X-inefficiency. See Appendix 1 for more detailed discussions.

Alternatively, a simple, though rudimentary, approach is to approximate operating efficiency directly from the financial statements of each bank. We use a proxy for labor inefficiency or operating inefficiency: the operating expenses per employee. Similarly, we use a proxy for asset inefficiency: the operating expenses divided by total assets. The ratio of total loans to employees is suggested as a measure of operating inefficiency by Koch and

MacDonald (2003). However, with deregulation and universal banking practice, the financial intermediation function of banks through loans has weakened. Therefore, it would be desirable to use total assets that include securities, foreign exchanges and other investments in addition to loans.

We assume that Korean banks produce five desirable outputs and one undesirable output, using three variable inputs and one fixed input. The desirable outputs are commercial loans (y_1), personal loans (y_2), securities (y_3) and demand deposit (y_4) and fee income (y_5). In addition to three traditional outputs, we include fee income, following Roger (1998) and demand deposit, following Tortosa-Ausina (2002). This way of specifying output is also similar to that of Hao et al. (2001) in their estimation of a cost function for Korean banks. The undesirable output (b_1) is non-performing loans. The three variable inputs are full-time labor (x_1), physical capital which equals the asset value of premises and fixed assets (x_2), and total deposits (x_3). The equity capital is treated as the fixed input.

To examine the effects of market concentration on efficiency (or inefficiency) we estimate the following regression equation.

$$E_{it} = \alpha + \beta_k \sum X_{k,it} + \gamma_k \sum Y_{k,it} + \delta_k \sum Z_{k,t} + \varepsilon_{it} \quad (A2)$$

where E_{it} = different efficiency (or inefficiency) indicators of bank i at time t , $X_{k,it}$ = bank specific variables of bank i at time t , such as BIS equity ratio, NPL(non performing loans) SHARE, BRANCH and a dummy variable for regional banks, $Y_{k,it}$ = market power variables of bank i at time t , such as the market share and HHI. $Z_{k,t}$ = macroeconomic variables such as economic growth rate, inflation rate and a dummy variable for the crisis period. We use three different indicators of efficiency (or inefficiency) indicators: X-inefficiency derived from estimation of equation (A1), labor inefficiency measured by the operating expenses per employee (in log), and asset inefficiency measured by the operating expenses divided by total assets (in log). We use panel data including all Korean national and regional banks in operation in any year during the period of 1992-2006. Data used in this study are from the Bank Management Statistics by the Bank of Korea and from the financial statements of individual banks.

Table 2. Descriptive Statistics

Variable	Minimum	Maximum	Mean	Std. Deviation
Assets Share	.2245	29.4781	5.0004	4.9930
Loans Share	.0570	33.2854	5.0000	5.3564
Deposits Share	.2435	29.4880	5.0001	4.9253
HHI -Assets	.0707	.1481	.0934	.0270
HHI-Loans	.0704	.1623	.0993	.0317
HHI-Deposits	.0703	.1461	.0919	.0273
BIS	-10.65	32.16	10.8342	4.5113
NPL SHARE	.1000	24.6000	4.9732	4.1862
BRANCH	14	1185	229.87	198.113
Interest Margin	-1.88	3.54	1.6306	.7639
X-Inefficiency	.00	3.56	.2958	.5408
Labor Inefficiency	.2984	14.7542	4.7088	3.4952
Asset Inefficiency	.0232	.2341	.07819	.0374

Table 2 shows summary descriptive statistics for the major variables used in this study.

The BIS risk-adjusted ratio of equity capital to total assets (BIS) is used as a control variable for management risk or for the impact of leverage on efficiency. The BIS risk-adjusted capital ratio is calculated according to the Bank of International Settlements guidelines, which assign varying risk weights to different types of assets. The ratio of non-performing loans to total loans (NPL SHARE) is included to control for the risk effect. The number of branches (BRANCH) is included to account for the effect of bank networks. A dummy indicator variable is defined as 1 for regional banks and 0 for national banks to see the effect of being a regional bank. Market share is measured for three different types of assets or liabilities; assets share, loans share and deposits share are the bank's share of total industry assets, loans and deposits respectively. HHI that measures the degree of market concentration equals the sum of the squares of each bank's market share of total industry assets, loans or deposits. INTREST MARGIN, the net interest margin, is the difference between the interest rates on loans and securities and the interest rates on deposits and borrowings. This variable is estimated by the average earnings on assets minus the average interest expenses on assets. Two macroeconomic variables, economic growth rate and inflation rate, and one macroeconomic dummy variable indicating the financial crisis period are used to see macroeconomic effects. The period of 1997-1999 is regarded in this study as the crisis period. Even though the currency crisis was over in 1998, the bank crisis continued through 1999.

Table 3A and Table 3B present the estimated results of equation (A2). In the estimation of panel data, application of ordinary multiple regression techniques may result in omitted variable bias. Hsiao (1986) demonstrated that pooled OLS results in biased and inconsistent coefficient estimates because omitted cross-section-specific variables may be correlated with the explanatory variables. Use of either a fixed-effects model or a random-effects model can solve this problem. A fixed effects model is commonly used to control for omitted variables that differ between banks but are constant over time while a random effects model is used to control for some bank-variant omitted variables and other time-variant omitted variables. In the absence of prior knowledge about omitted variables, we estimate both models and run the Hausman test comparing fixed effects vs. random effects. Based on the Hausman test, we report the fixed effects model only in the following table. The fixed effects model is usually regarded as more appropriate than random effects model when population data instead of sample data are used as in our study.

Table 3A. Panel Regression Results of Equation (A2)

Dependent Variables: Labor Inefficiency and Asset Inefficiency, n = 285

Category	Variable	(1)	(2)	(3)	(4)	(5)	(6)
		Labor Inefficiency			Asset Inefficiency		
Bank Variables	BIS	-0.028 (-0.774)	-0.033 (-0.917)	-0.027 (-0.766)	0.001 (0.023)	-0.001 (-0.224)	0.001 (0.001)
	NPL SHARE	0.162** (4.296)	0.132** (3.468)	0.158** (4.299)	0.005** (12.971)	0.005** (12.144)	0.005** (12.974)
	BRANCH	0.002 (1.354)	0.003* (2.060)	0.002 (1.536)	0.001** (3.267)	0.001* (2.515)	0.001** (3.308)
	Regional Bank Dummy	-1.799** (-4.763)	-1.646** (-4.510)	-1.923** (-5.249)		0.010* (2.475)	0.005 (1.255)
Market Power Variables	Assets Share	-0.043** (-2.193)			-0.002** (-3.350)		
	HHI (assets)	66.146** (15.293)			0.378** (9.089)		
	Loans Share		-0.086 (-1.550)			-0.002** (-2.610)	
	HHI (loans)		58.786** (15.283)			0.333** (8.095)	
	Deposits Share			-0.73* (-2.009)			-0.002** (-3.474)
	HHI (deposits)			67.364** (16.000)			0.392** (8.274)
Macroeconomic Variables	GDP Growth Rate	-0.183** (-4.642)	-0.033 (-0.571)	-0.185** (-4.789)	-0.001 (-0.1770)	-0.001 (-1.890)	-0.001 (-1.780)
	Inflation Rate	0.222** (3.129)	0.442 (4.786)	0.157** (2.766)	0.003** (3.654)	0.001 (0.542)	0.003** (3.960)
	CRISIS	3.180** (6.619)	7.752** (7.512)	3.169** (6.753)	0.034** (6.554)	0.074** (6.888)	0.034** (6.610)
Adj. R ²		0.863	0.863	0.869	0.927	0.929	0.928
F		180.841	169.97	190.68	366.09	352.50	371.84

1. Estimation results of fixed effects model. The coefficients of the constant under the fixed effects model are not reported here

2. t values are shown in parentheses. * and ** indicate significance at the 5% and 1% levels respectively.

Table 3B. Panel Regression Results of Equation (A2)

Dependent Variable: X-Inefficiency, n = 285

Category	Variable	(7)	(8)	(9)
		X- Inefficiency		
Bank Variables	BIS	0.002 (1.018)	0.002 (1.146)	0.002 (1.092)
	NPL SHARE	-0.002** (-2.126)	-0.003** (-2.254)	-0.002** (-2.198)
	BRANCH	0.001** (5.338)	0.001** (5.407)	0.001** (5.561)
	Regional Bank Dummy	0.014 (0.740)	0.013 (0.671)	0.008 (0.409)
Market Power Variables	Assets Share	-0.001* (-2.011)		
	HHI (assets)	0.272** (4.387)		
	Loans Share		-0.002** (-2.867)	
	HHI (loans)		0.190** (4.654)	
	Deposits Share			-0.004 (-1.856)
	HHI (deposits)			0.271** (3.775)
Macroeconomic Variables	GDP Growth Rate	-0.006 (-1.833)	-0.005* (-2.080)	-0.006* (-2.016)
	Inflation Rate	0.010 (1.724)	0.010 (1.882)	0.009 (1.679)
	CRISIS	0.030** (2.907)	0.002** (2.222)	0.031** (2.769)
Adj. R ²		0.674	0.681	0.678
F		51.78	57.32	54.33

1. Estimation results of fixed effects model. The coefficients of the constant under the fixed effects model are not reported here

2. t values are shown in parentheses. * and ** indicate significance at the 5% and 1% levels respectively.

Market power variables show interesting results. An increase in market share by individual banks contributes to a decrease in X-inefficiency, labor inefficiency and asset inefficiency while an increase in market concentration causes greater inefficiency. However, when we add the square term of HHI in the regression equation, significant negative coefficients are obtained for all the models. Therefore, their relationship is not completely linear, but of an inverse U-shaped curve, indicating that economies of scale leading to operating efficiency kick off at a certain level of market concentration.

Among the bank specific variables, BIS turns out to be insignificant in influencing operating efficiency, asset efficiency or X-efficiency. NPL SHARE has definitely a positive effect on operating costs and thus inefficiency as expected. The more branches, the higher operating cost per worker or asset. Being a regional bank does not affect X-inefficiency or asset inefficiency, but it has a significant negative effect on labor inefficiency. Regional

banks are less prestigious and less competitive compared to national banks, and they tend to spend less on employee compensations and other overhead costs. However, lower labor cost does not necessarily imply higher labor productivity or higher profitability. Park and Weber (2006b) show that a dummy variable representing national banks has a positive and significant coefficient in explaining Korean bank profitability.

Among the macroeconomic variables, a dummy variable representing the crisis period stands out. In all nine different models, CRISIS has a positive significant effect on bank inefficiency. Both the GDP growth rate and the inflation rate show expected coefficient signs, a negative effect of the GDP growth rate on inefficiency and a positive effect of the inflation on inefficiency. However, significance of the coefficients varies among different model specifications. The explanatory power (Adjusted R²) of Models 1-6 is very high and that of Models 7-9 is acceptable. In summary, empirical results indicate that market concentration has not improved bank efficiency through taking advantage of scale economies or scope economies. Instead, recent mergers, acquisitions and consolidation of banks led to greater inefficiency in terms of X-inefficiency, labor inefficiency and asset inefficiency.

IV. Effects of Market Concentration on Competition

In this section we examine the effects of market concentration on the level of competition among banks. Following Panzar and Rosse (1987), the degree of competition can be measured as the H-statistic which is the sum of the elasticities of the revenue with respect to input prices.

$$H = \sum (\partial R / \partial w_i) (w_i / R) \quad (B1)$$

where w_i is i th input price. Panzar and Rosse (1987) show from the profit maximization condition that the H-statistic is equal to unity ($H=1$) in a perfectly competitive market, and less than or equal to zero ($H \leq 0$) under monopoly. Although the Panzar-Rosse article also shows that $0 < H < 1$ could be consistent with oligopolistic behavior, it is common to regard $0 < H < 1$ as the condition of Chamberlinian monopolistic competition. The H-statistic can be derived from the following reduced-form revenue equation.

$$\ln(R_{it}) = \alpha + \beta_1 \ln(w_{1,it}) + \beta_2 \ln(w_{2,it}) + \beta_3 \ln(w_{3,it}) + \gamma_k \sum z_k + \varepsilon_{it} \quad (B2)$$

where R_{it} is bank i 's revenue at time t , w_1 is the input price of labor, w_2 is the input price of capital, w_3 is the input price of funds, and z_k is a vector of control variables affecting the bank's revenue function.

The H-statistic is the sum of β_1 , β_2 and β_3 . $w_{1,it}$ (The unit labor cost) is measured by the ratio of personnel expenses to the number of employees, $w_{2,it}$ (the unit capital cost) is measured by the ratio of depreciation allowance and other maintenance costs to total fixed assets, and $w_{3,it}$ (the unit funding cost) is measured by the ratio of interest expenses to the sum of total deposits and borrowings. Several control variables are included in the model. Total assets (ASSET) are included to see the size effect. BRANCH is not included in the model because of its high correlation with ASSET. The ratio of non-performing loans to total loans (NPL SHARE) is included to control for the risk effect. The BIS risk-adjusted capital ratio (BIS) is alternatively used as a control variable for credit market and operational risk. There has been weakening of the financial intermediation function of banks in Korea over time. The ratio of non-interest revenue to total revenue (NINT) is included to reflect the effect of changing financial intermediation or diversification. Traditionally R_{it} (revenue) is typically measured by interest revenue or its ratio to total assets, presuming that the main function of banks is financial intermediation. However, with weakening of financial intermediation in recent years and diversification of bank assets, total revenue or its ratio to total assets is used in some studies. In this study we use both interest revenue (IR) in log and total revenue (TR) in log.

Park (2009) estimated the H-statistic with the data from Korean banks for the period of 1992-2004. This study extends Park (2009) further by adding data of two more recent years when bigger mergers occurred. In addition, we not only estimate the degree of competition, but also examine what are the major determinants of the degree of competition. Even though the fixed effects model is usually regarded as more appropriate than random effects model when population data instead of sample data are used as in our study, we use both fixed and random effects models for comparison purpose.

The estimation results of the tests of competitive condition (the H-statistic) are given in Table 4. The Wald test rejects the hypothesis of monopolistic market structure ($H=0$) at the 1% level. It also rejects the hypothesis of perfectly competitive market structure ($H=1$) at the 1% level. Bikker et al. (2006, 2009) reported that overestimation of H-statistic is possible in the Panzar-Rosse model when the regression includes a scale variable such as the asset size. However, the H values, with exclusion of ASSET from the model, show similar test results with no indication that inclusion of a scale explanatory variable causes a serious overestimation of the level of competition that would affect the test results. For example, the H-value with the fixed effect model changes from .776 to .745 for $\ln IR$ and from .753 to .736 for $\ln TR$. Instead, when the scale variable, ASSET, is excluded, the unit capital cost exerts significant positive effect on revenue. $w1_{it}$ and $w3_{it}$ are positive and statistically significant, indicating that an increase in unit costs of labor or funds leads to higher revenue. $w2_{it}$ is not statistically significant. All control variables have expected signs.

Table 4. Estimation Results of Equation (B2)

Dependent variables: $\ln IR$ and $\ln TR$, $n=285$

	Fixed Effects Model		Random Effects Model	
	$\ln IR$	$\ln TR$	$\ln IR$	$\ln TR$
Constant			-0.256** (-1.917)	-0.277** (-1.895)
$\ln W_1$	0.126*** (7.325)	0.127*** (7.053)	0.130*** (8.736)	0.123*** (8.462)
$\ln W_2$	-0.003 (-0.083)	0.005 (0.313)	0.022 (0.978)	0.028 (1.531)
$\ln W_3$	0.647*** (29.969)	0.648*** (28.121)	0.654*** (29.562)	0.656*** (28.934)
$\ln ASSET$	0.947*** (44.757)	0.942*** (43.151)	0.931*** (47.001)	0.929*** (46.082)
NINT	-0.365*** (-5.769)	1.276*** (21.737)	-0.389*** (-6.519)	1.205*** (20.542)
NPL SHARE	-0.002 (-1.306)	-0.001 (-0.848)	-0.001 (-0.775)	-0.000 (-0.412)
BIS	0.011*** (7.915)	0.012*** (8.231)	0.012*** (8.783)	0.014*** (8.812)
ADJ. R^2	.997	.997	0.997	.997
H statistic	0.776*** (24.192)	0.753*** (24.828)	0.812*** (26.553)	0.822*** (26.678)
Wald test: $H=0$ (p-value)	537.27*** (0.000)	551.35*** (0.000)	665.89*** (0.000)	636.29*** (0.000)
Wald test: $H=1$ (p-value)	62.34*** (0.000)	47.71*** (0.000)	42.63*** (0.000)	36.47*** (0.000)

1. The coefficients of the constant under the fixed effects model are not reported here.

2. t values are shown in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels respectively.

To see how the H values changed over time, the H-statistics are estimated for moving three-year time periods, that is, 1992-1994, 1993-1995, 1994-1996 and so on. The estimation results of the H values that are reported in Table 5 along with HHI indicate that market concentration did not affect the competition level in the Korean banking industry. The correlation coefficient between HHI and the H statistic for $\ln IR$ is -0.002 while correlation coefficient between HHI and the H statistic for $\ln TR$ is -0.196, which indicates no or very low correlation between market concentration and competition.

Table 5. Market Concentration and Competition Level of Korean Banks

Year	HHI – Total Loans	H-statistic with $\ln IR$	H-statistic with $\ln TR$
1992-1994	889.58	0.520	0.543
1993-1995	821.93	0.609	0.623
1994-1996	769.42	0.525	0.554
1995-1997	729.00	0.410	0.461
1996-1998	738.34	0.877	0.924
1997-1999	831.99	0.884	0.944
1998-2000	951.28	0.751	0.780
1999-2001	1235.49	0.690	0.675
2000-2002	1420.28	0.672	0.664
2001-2003	1565.64	0.636	0.642
2002-2004	1506.65	0.638	0.598
2003-2005	1443.90	0.627	0.608
2004-2006	1461.79	0.641	0.613

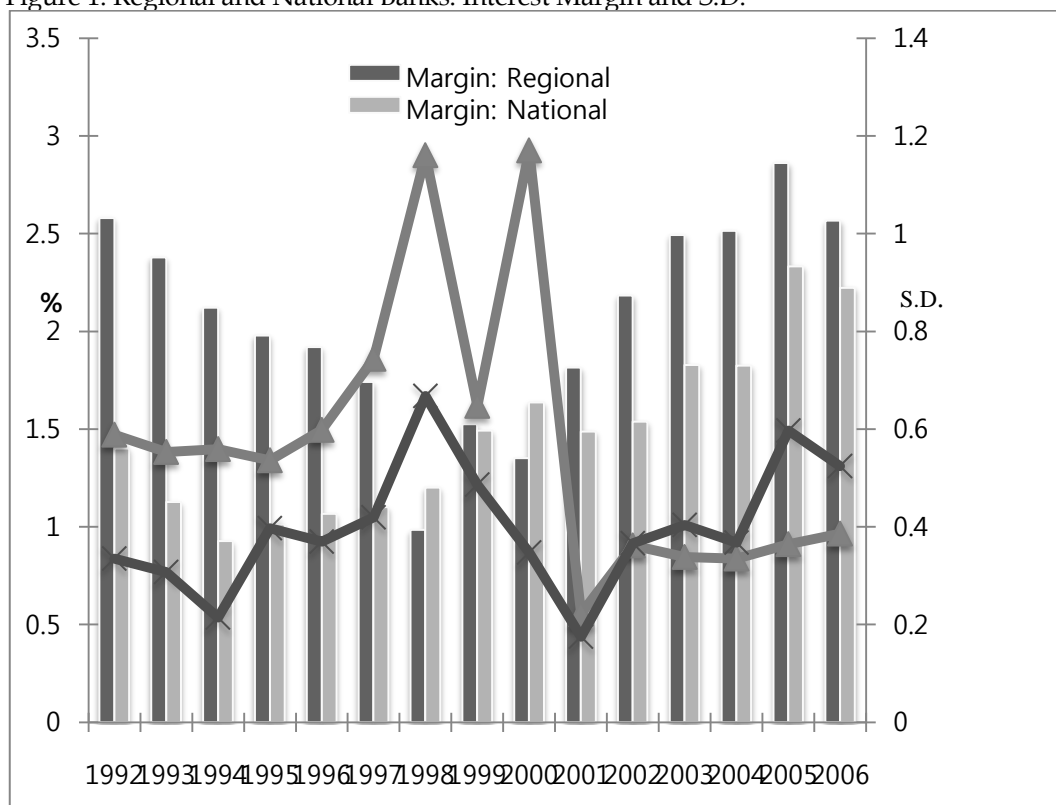
1. H-statistic is estimated from fixed effects models.

2. The correlation coefficient between HHI and the H statistic for $\ln IR$ is -0.002 while correlation coefficient between HHI and the H statistic for $\ln TR$ is -0.196.

For only the two periods, 1996-1998 and 1997-1999, the hypothesis of perfectly competitive market structure ($H=1$) cannot be rejected at the 1% level. It can be inferred from the empirical results that the Korean commercial banking market was monopolistically competitive during the pre-crisis period and the post-crisis period, while its level of competition increased to the level of perfect competition during the crisis period, which might be due to breakdown of old connections among banks, making collusion more difficult. However, these two periods could not pass the equilibrium condition test.

As an alternative way of examining the degree of competition, we now turn to the interest margin. The average interest margin tends to increase when the market power in the banking industry increases. With polarization of bank size, the standard deviation of the net interest margin may also increase, resulting in higher margins for dominant banks and lower margins for less dominant banks. The data show that the average net interest margin for all banks declined during the crisis period, particularly in 1998, but returned to the pre-crisis level of about 2% in 2003 and then a little higher since then as shown in Figure 1. The standard deviation declined mildly over the period even though there were jittery fluctuations during the crisis period (from 0.766 in 1992 to 0.496 in 2006). A similar trend in both variables is found for both regional and national banks. However, a steady increase in both the interest margin and its standard deviation in the last two years may suggest that the effect of increased market power through M&As and consolidation on the interest spread might have begun to be realized as some have expressed their concerns over increased market power.

Figure 1. Regional and National Banks: Interest Margin and S.D.



To further examine the effect of increased market concentration on the average net interest margin, we estimate the following regression equation.

$$Mit = \alpha + \beta_k \sum X_{k,it} + \gamma_k \sum Y_{k,it} + \delta_k \sum Z_{k,t} + \varepsilon_{it} \quad (B3)$$

where Mit = the average net interest margin of bank i at time t , $X_{k,it}$ = bank specific variables of bank i at time t , such as BIS equity ratio, NPL(non performing loans) SHARE, BRANCH, and a dummy variable for regional banks, $Y_{k,it}$ = market power variables of bank i at time t , such as the market share and HHI. $Z_{k,t}$ = macroeconomic variables such as economic growth rate, inflation rate and a dummy variable for the crisis period.

Table 6. Panel Regression Results of Equation (B3)

Dependent Variable: Interest Margin, n = 285

Category	Variable	(1)	(2)	(3)
Bank Variables	BIS	0.064** (8.880)	0.062** (8.420)	0.064** (9.001)
	NPL SHARE	-0.024** (-3.270)	-0.023** (-2.973)	-0.025** (-3.302)
	BRANCH	0.001** (4.788)	0.001** (4.427)	0.001** (4.478)
	Regional Bank Dummy	1.151** (15.343)	1.141** (15.267)	1.148** (15.512)
Market Power Variables	Assets Share	0.052** (7.211)		
	HHI (assets)	3.104** (3.772)		
	Loans Share		0.045** (6.770)	
	HHI (loans)		3.191** (4.354)	
	Deposits Share			0.053** (7.354)
	HHI (deposits)			3.064** (3.765)
Macro Variables	GDP Growth Rate	0.002 (0.238)	-0.003 (-0.241)	0.001 (0.183)
	Inflation Rate	0.009 (0.661)	0.022 (1.175)	0.010 (0.726)
	CRISIS	-0.087 (-0.912)	-0.189 (-0.928)	-0.091 (-0.953)
Adj. R ²		0.947	0.947	0.947
F		531.39	505.33	537.87

1. Estimation results of fixed effects model. The coefficients of the constant under the fixed effects model are not reported here

2. t values are shown in parentheses. * and ** indicate significance at the 5% and 1% levels respectively.

Table 6 shows the estimation results of equation (B3). As explained earlier, we report the fixed effects model only because the fixed effects model is usually regarded as more appropriate than random effects model when population data instead of sample data are used as in our study. Market share or market concentration is measured for three different types of assets or liabilities: total assets, total loans, and total deposits. Their estimation results are presented in Models 1-3. Two market power variables are used: market share of each bank and HHI indicating the overall degree of market concentration. The market share, whether it is measured in total assets, total loans or total deposits, has a positive and significant effect, and so does HHI.

All bank specific variables have significant effects on the average interest margin in all three models. BIS has a significant positive effect and is consistent with the signaling theory, which suggests that a higher equity ratio increases confidence among bank customers,

leading to higher interest spread. NPL SHARE has a significant negative effect as expected. Loans are the major income-earning asset of banks and higher percentage of non-performing loans negatively affect the interest spread. BRANCH shows a positive and significant influence on interest spread through bank network effect.

A dummy variable differentiating regional banks (Regional banks =1) from national banks is positive and significant. The average interest margin for regional banks is usually higher than that for national banks because interest rates for SMEs typically serviced by regional banks include larger costs and risk premiums than interest rates for corporate loans typically serviced by national banks. This is evident in Figure 1. On the other hand, all macroeconomic variables have no significant effects on the average interest margin. CRISIS that has a significant effect on bank inefficiency is not significant in explaining the interest spread. The explanatory power of Models 1-3 (Adjusted R²) is very high. It can be inferred from the empirical results that the bank mergers that have taken place so far have increased market concentration and that the increase in individual bank's market share and overall increase in market concentration is positively correlated with increased average interest margin.

V. Conclusions

While market concentration in the Korean banking industry decreased during the pre-crisis period due to financial deregulation, it has markedly increased since the crisis of 1997-1998 because of M&As, P&As of banks and consolidation of banks under financial holding company system. With this change, there has been a growing concern over market power in the Korean banking industry. In this study we examined the effects of the increase in market concentration on bank efficiency and competition.

The collusion theory suggests that mergers and consolidation might be initiated by banks in order to extract consumer surplus, and the result would be higher prices to consumers and socially inefficient allocation of resources. Empirical results indicate that market concentration has not improved bank efficiency through scale economies or scope economies. Instead, recent mergers and consolidation of banks resulted in an increase in inefficiency regardless of different indicators of inefficiency used: X-inefficiency, labor inefficiency or asset inefficiency. While an increase in market share of individual banks improved bank efficiency, the overall market concentration ratio measured by HHI resulted in lower efficiency. These findings come with comforting news that the relationship between market concentration and inefficiency is not completely linear, but of an inverse U-shaped curve.

The bank mergers and consolidation that have taken place so far have not realized scale economies by rationalizing their operations or scope economies by rationalizing their business activities. Market concentration has not contributed to efficiency through these scale and scope effects. Our study also finds that the Korean banking industry has been monopolistically competitive except for the crisis period. Although an increase in market concentration has not changed the overall level of competition measured by the H-statistic, market concentration has raised the average interest margin. Therefore, a growing concern over market power in the Korean banking industry is worth to note.

The findings in this study are tenuous, given the following constraints. First, the Korean banking industry experienced a sudden change from a non-concentrated market to a moderately concentrated market in a very short time period and it is still in a transitory period. Second, most mergers and consolidation, especially the big ones, occurred towards the end of the sample period, and we may need data of a few more additional years to analyze the full effects of these mergers and consolidation on efficiency and competition. Third, the inverse U-shaped curve relationship between market concentration and inefficiency deserves further investigation.

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Appendix 1: Directional Technology Distance Function

Let $y \in R_+^M$ denote a vector of desirable outputs, $b \in R_+^J$ denote a vector of undesirable outputs, and $x \in R_+^N$ denote a vector of inputs. Production takes place in $t=1, \dots, T$ periods by $k=1, \dots, K$ banks. Therefore, an observation on bank k in period t is represented by (y_k^t, b_k^t, x_k^t) .

The technology, T , is the set of desirable outputs, undesirable outputs, and inputs such that the inputs can produce the outputs and is represented by

$$T = \{(x, y, b) : x \text{ can produce } (y, b)\} \quad (C1)$$

We assume the technology is convex and compact, and satisfies the condition of no free lunch.

We use data envelopment analysis (DEA) to represent the technology. The piece-wise linear constant returns to scale DEA technology for period j is usually written as

$$T^j = \{(x, y, b) : \sum_{k=1}^K z_k^j x_k^j \leq x, \sum_{k=1}^K z_k^j y_k^j \geq y, \sum_{k=1}^K z_k^j b_k^j = b, z_k^j \geq 0, k = 1, \dots, K\} \quad (C2)$$

To address the concern of Kumar and Russell (2002) we modify the technology so that combinations of inputs that could produce the desirable and undesirable outputs in previous periods are feasible in the current period. The modified technology takes the form:

$$T^j = \{(x, y, b) : \sum_{t=1}^j \sum_{k=1}^K z_k^t x_k^t \leq x, \sum_{t=1}^j \sum_{k=1}^K z_k^t y_k^t \geq y, \sum_{t=1}^j \sum_{k=1}^K z_k^t b_k^t = b, z_k^t \geq 0, k = 1, \dots, K, t = 1, \dots, j\} \quad (C3)$$

The best-practice technology is constructed from observations on all K banks in the current period, j , and each of the preceding periods, $t \leq j$, and is such that no less input can be used to produce no more desirable output and an equal amount of the undesirable output than a linear combination of observed inputs, desirable outputs, and undesirable outputs. The intensity variables, z_k^t , serve to form linear combinations of observations from the current and past periods. Constant returns to scale are imposed by constraining the intensity variables to be non-negative.

So that we might illustrate the technology in two-dimensional diagrams, we introduce three other sets that are equivalent representations of the technology. Dropping the time superscript and holding undesirable outputs constant, the set $V(b)$ gives the set of inputs that can produce desirable outputs and is represented as

$$V(b) = \{(x, y) : (x, y, b) \in T\} \quad (C4)$$

An output possibility set $P(x)$, gives the set of desirable and undesirable outputs that can be produced from a given level of inputs:

$$P(x) = \{(y, b) : (x, y, b) \in T\}. \quad (C5)$$

Finally, the desirable output requirement set is the set of inputs and undesirable outputs that are feasible given desirable outputs:

$$L(y) = \{(x, b) : (x, y, b) \in T\}. \quad (C6)$$

The three technology sets are depicted in Figure A and Figure B. Each set is bounded. For the set $V(b)$, the horizontal extension to the east indicates that there is an upper bound on the amount of desirable output, y , that can be produced from input, x , given undesirable output b . For the output set $P(x)$, finite amounts of input can only yield finite amounts of desirable and undesirable outputs. For the set $L(y)$, there is a lower bound on the amount of undesirable output produced and input used given an amount of desirable output. We also note that the pseudo-isoquant for $V(y)$ can be backward bending because the undesirable output satisfies only weak disposability. Given the technology represented by the sets in Figure 1, suppose we observe a bank, represented by point A. Clearly bank A produces off the frontier of the technology set and is inefficient. That is, bank A should be able to use less input and produce more desirable output and less undesirable output given the technology. To measure inefficiency we use the directional technology distance function proposed by Chambers, Chung, and Färe (1996) as a generalization of the Luenberger (1992)

benefit function. Let $g = (g_x, g_y, g_b)$ represent a directional vector. The directional technology distance function seeks the maximum simultaneous expansion of desirable outputs, contraction of undesirable outputs, and contraction of inputs for the directional vector, g . This function takes the form:

$$\vec{D}_T(x, y, b; g_x, g_y, g_b) = \max\{\beta : (x - \beta g_x, y + \beta g_y, b - \beta g_b) \in T\} \quad (C7)$$

Adding back the time superscript, the directional technology distance function for bank A in period j is estimated via DEA as:

$$\vec{D}_T^j(x, y, b; g_x, g_y, g_b) = \max\{\beta : \sum_{t=1}^j \sum_{k=1}^K z_k^t x_k^t \leq x_A^j - \beta g_x, \sum_{t=1}^j \sum_{k=1}^K z_k^t y_k^t \geq y_A^j + \beta g_y, \sum_{t=1}^j \sum_{k=1}^K z_k^t b_k^t = b_A^j - \beta g_b, z_k^t \geq 0, k = 1, \dots, K, t = 1, \dots, j\}. \quad (C8)$$

Suppose we take the directional vector to be $g = (g_x, g_y, g_b) = (1, 1, 1)$. For this directional vector, the solution to (C8) gives the maximum unit expansion in desirable output and simultaneous unit contraction in undesirable outputs and inputs that is feasible given the technology. Other directional vectors can also be chosen. A directional vector such as $g = (x, 0, 0)$ would give the percentage contraction in inputs, holding outputs fixed. A direction such as $g = (0, y, b)$ would give the percentage expansion in desirable output and contraction in undesirable output, given inputs.

The directional technology distance function is a generalization of Shephard output or input distance functions. Shephard's input distance function is defined as

$$D_i(y, x, b) = \max\{\lambda : \frac{x}{\lambda} \in L(y)\} \quad (C9)$$

The Shephard input distance function seeks the maximum proportional contraction of inputs that can still produce the output vector (y, b) and can be derived from the directional distance function by setting $g = (x, 0, 0)$. That is,

$$\vec{D}_T(x, y, b; x, 0, 0) = 1 - \frac{1}{D_i(y, x, b)} \quad (C10)$$

Shephard's output distance function is defined as

$$D_o(x, y, b) = \min\left\{\delta : \frac{(y, b)}{\delta} \in P(x)\right\} \quad (C11)$$

The reciprocal of the output distance function yields the proportional expansion in desirable outputs and undesirable outputs that is feasible given inputs. The output distance function can be obtained from the directional distance function by setting $g = (0, y, -b)$:

$$\vec{D}_T(x, y, b; 0, y, -b) = \frac{1}{D_o(x, y, b)} - 1 \quad (C12)$$

We note that we take a negative direction for the undesirable output since our definition in (C7) subtracts βg_b in computing the directional distance function. While the Shephard output distance function can be used to measure bank efficiency, banks are generally not interested in maximizing desirable and undesirable outputs simultaneously. Instead, banks seek to expand desirable outputs and contract undesirable outputs, such as non-performing loans providing the rationale for our use of the directional distance function.

When all banks are evaluated for a common direction, Färe and Grosskopf (2004) show that an industry measure of inefficiency can be obtained as the sum of each firm's directional distance function. Here we note that although Shephard output or input distance functions can be derived from the directional distance function, these Shephard distance functions use directional vectors that are not common for all firms and thus cannot be aggregated to the industry level.

Figure A. The Bank Production Technology (T) and the Directional Distance Function without a byproduct (b), Assuming $g_x = -1$ and $g_y = 1$.

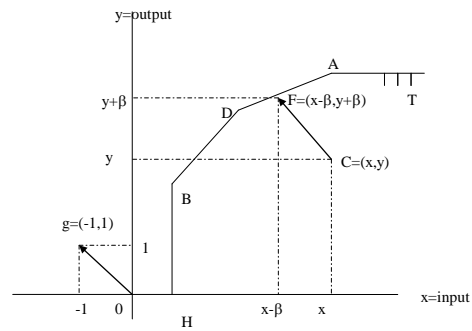
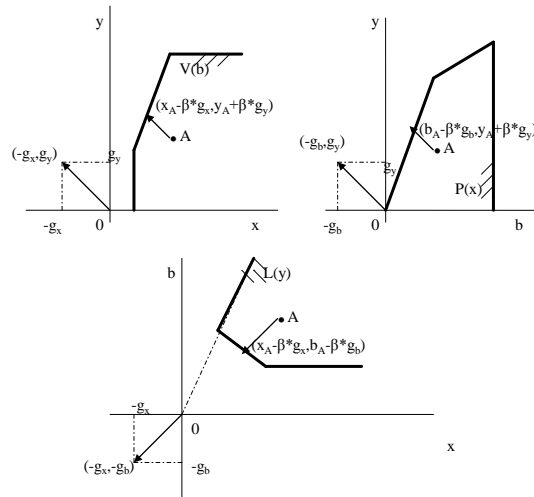


Figure B. The Directional Technology Distance Function



CHAPTER 9

Fundamental Asymmetries in US Monetary Policymaking: Evidence from a Nonlinear Autoregressive Distributed Lag Quantile Regression Model*

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Abstract

We identify three general forms of asymmetry that may characterise a wide range of economic processes: reaction asymmetry, adjustment asymmetry and locational asymmetry. The first relates to the possibility that the long-run response of one variable to another may be regime sensitive. The second refers to the case in which the pattern of dynamic adjustment to long-run equilibrium may be state-contingent. The third relates to the notion that an economic relationship may depend upon which conditional quantile of the dependent variable a given observation belongs. Based on a synthesis of the nonlinear ARDL (Autoregressive Distributed Lag) model developed by Shin, Yu and Greenwood-Nimmo (2009) and the quantile regression approach of Koenker and Bassett (1978), we develop a new empirical framework capable of coherently and simultaneously modelling these three asymmetries. The application of this model to US monetary policymaking over the period 1964q2-2008q2 reveals the following phenomena: (i) The Fed responds linearly to both output and inflation, and does not adhere to the Taylor principle in the lower quantiles of the interest rate, mainly due to the proximity of the zero lower nominal bound; (ii) Between the fortieth and eightieth quantiles, the Taylor principle is upheld for positive inflationary shocks only. Meanwhile, we note significant responses to both positive and negative output gap shocks, with a marked negative asymmetry, suggesting that the Fed acts as an inflation hawk while also displaying a marked tendency toward growth-fostering policies; (iii) Finally, for the uppermost quantiles, we find evidence of very aggressive policy responses to positive and negative inflation and output gap shocks in the context of profound response asymmetry. Hence, we conclude that the degree of policy aggression is a monotonically increasing function of the conditional quantile of the interest rate, and that the common practice of confining one's attention to the conditional mean of the dependent variable may obscure important underlying asymmetric effects.

Keywords: Nonlinear ARDL Model, Quantile Regression, Dynamic Multipliers, Reaction Adjustment and Locational Asymmetries, Asymmetric Central Bank Preferences.

JEL Classifications: C22, C51, E58.

I. Introduction

The analysis of non-linearities in the reaction function of the central bank is a young but vibrant science. We identify three general forms of asymmetry that may characterise monetary policy: reaction asymmetry, adjustment asymmetry and locational asymmetry. The first relates to differential interest rate long-run responses that may be elicited by heterogeneously positive or negative shocks to a given variable. The second describes the differential speed of interest rate to its equilibrium under various regimes. The third is associated with the notion that the reaction of the central bank to the inflation and output gaps may depend on the current location of the interest rate within its conditional distribution.

Our goal in this paper is to develop a general framework for asymmetric modelling that nests each of these three forms of nonlinearity as a special case. Essentially, this involves combining established approaches to short-run asymmetric modelling and long-run asymmetric modelling with the quantile regression approach popularised by Koenker and Bassett (1978). However, even ignoring the quantile extension, combining regime-switching short- and long-run models is likely to be non-trivial when the transition function is not common to both the short- and long run (Saikkonen, 2008). We approach this issue pragmatically following the asymmetric ARDL approach originated by Shin, Yu and Greenwood-Nimmo (2009, hereafter SYG) which combines adjustment asymmetry with reaction asymmetry subject to a common transition function (in this case we impose a common known threshold value of zero in the construction of partial sum processes). One of the principal benefits of this approach is that, quite unlike the popular Markov switching or smooth transition models, it is easily estimable by standard OLS. This simplicity renders it an ideal candidate for extension to the quantile case.

We apply both the standard nonlinear ARDL model estimated at the conditional mean of the interest rate distribution (the NARDL-M model) and its quantile extension (the NARDL-Q model) to the analysis of US monetary policy between 1964q2 and 2008q2. In the NARDL-M framework, we are unable to reject the null hypothesis of long-run reaction symmetry with respect to both inflation and output gaps. Furthermore, the null hypothesis of short-run symmetric adjustment cannot be rejected in relation to the output gap. This would typically lead us to conclude that the Federal Reserve has acted in a linear fashion in the long-run during this time but that its interest rate response to inflationary shocks has been more rapid than in the case of disinflationary shocks. However, the NARDL-Q specification estimated on a range of quantiles reveals pronounced locational asymmetry at higher levels of the interest rate. Our results indicate that the Fed has reacted very cautiously and in a linear fashion when the interest rate is low but that its policy response to both inflation and output gaps has been considerably more aggressive and markedly asymmetric when the interest rate is at higher levels. Hence, we conclude that the failure to account for locational asymmetry may mask other forms of asymmetry.

The paper proceeds in 5 sections. Section 2 reviews the existing literature on asymmetric central bank preferences, asymmetric policy adjustments and locational asymmetries in monetary policymaking. Section 3 introduces the asymmetric ARDL model and its quantile extension and offers a brief discussion of the different forms of asymmetry that can be modelled in this way. Section 4 presents the results of both the standard NARDL-M and NARDL-Q models of the reaction function of the Federal Reserve between 1964q2 and 2008q2. Section 5 concludes.

II. Asymmetric Monetary Policy

The ubiquitous Taylor (1993) rule models the central bank interest rate decision as a linear function of inflation relative to target (the inflation gap) and output relative to potential (the output gap). Underlying this framework is the assumption that the policymaker strives to minimise a quadratic loss function in the inflation and output gaps. Recently, however, a growing body of literature has promoted the notion that the policy rule may be non-linear and the loss function non-quadratic (Blinder, 1997; Granger and Pesaran, 2000; Cukierman and Muscatelli, 2008). Chief among the reasons for this non-linearity are the notion that correcting a negative output gap may be more difficult than closing a positive output gap (the 'pushing on a string' argument) and the possibility that inflation may have a tendency to rise more easily than it falls (the rationale for inflation-hawkism).

Nobay and Peel (2003) demonstrate that the optimal policy solution in a theoretical framework in which policymakers preferences are modelled asymmetrically involves both an inflation target and a linear Walsh (1995) contract. They conclude that asymmetric modelling adds realism to the analysis of monetary policy and that it may yield results distinctly inconsistent with the case of quadratic preferences. Furthermore, Siklos and Wohar (2005) extend the authors' work and argue that the careful construction of asymmetric error-correction models can potentially overcome the problems associated with breaks in the structure of the underlying data. The motivation for the development of asymmetric models is apparent.

An early and notable contribution to the empirical literature was made by Ruge-Murcia (2003). Based on a simple game-theoretic framework in which positive and negative inflationary gaps can be weighted differently by policymakers, the author finds that estimated asymmetric reactions functions for Canada, Sweden and the UK yield results that are quantitatively distinct from those of a symmetric specification. He concludes that asymmetric preferences may explain the negative mean of the inflation gap in these three countries.

Dolado, Mar'ia-Dolores and Naveira (2005) employ a novel approach in which the loss function of the central bank remains quadratic but the specification of the Phillips curve is nonlinear. They demonstrate that this framework also generates nonlinearity in the reaction function of the central bank. Using the Euler equation approach associated with Clarida, Gal'ı and Gertler (1998) as well as the ordered probit approach suggested by Dolado and Mar'ı-Dolores (2002), the authors find substantial evidence of nonlinearities in Germany, France and Spain but not in the USA. In particular, their results indicate that European central banks have systematically responded more strongly to positive than negative inflation and output gaps. They attribute this finding to labour market rigidities present only in the European countries.

Asymmetric preferences have been widely modelled as threshold effects. Bec, Salem and Collard (2000) use the lagged output gap to determine threshold transitions in a STAR framework and find that the interest rate response to inflation is stronger in a recessionary environment than a boom environment. Martin and Milas (2004) assume that regime transitions are governed by a quadratic logistic function in expected inflation. Using this approach, they find that the Bank of England has pursued an asymmetric policy in which positive inflation gaps attract a more aggressive response than negative gaps. Moreover, their results indicate that the Bank adopted a de facto target band of 1.4% - 2.6% between 1992 and 2000. Bunzel and Enders (2005) estimate a simple threshold model and find that the Greenspan Fed did not respond to inflation below a threshold of approximately 2.3% but that an inertial Taylor-type rule has characterised its behaviour at higher rates of inflation. Similarly, Petersen (2007) finds that the Fed followed a nonlinear Taylor rule

under both Volcker and Greenspan but that monetary policy was linear in the pre-Volcker era. More specifically, he finds that, since 1985, the Fed has reacted more aggressively to inflation when it is at higher levels than when the price-level is growing slowly, with the transition from low to high inflation occurring between 3.3% and 3.8% in his smooth transition framework. This leads him to conclude that nonlinearity is associated with enlightened policymaking.¹

A voluminous literature has grown around the notion of temporal change in the policy reaction function, perhaps driven by changes in the mandate of the central bank or in the nature of the macroeconomy. A recent example is provided by Raggi, Greco and Castelnovo (2008), in which the authors estimate a Taylor rule with time-varying trend inflation where transitions between active and passive monetary policy regimes are governed by an unobserved underlying Markov chain. In order to estimate their model, the authors employ the popular Gibbs sampler in a Bayesian MCMC approach. Their results strongly suggest that the inflation target in the USA has been time-varying. Moreover, their state probabilities indicate, to a first approximation, that US monetary policy was passive between 1968 and 1975 and 1980-85 but that a modified Taylor principle was upheld elsewhere.

Subject to the feasibility of an appropriate mapping between the time index and the covariates of the reaction function, such intertemporal regime-switching models can be related approximately to the asymmetric models discussed above. The general consensus to emerge from the regime-switching literature is that US monetary policy became increasingly anti-inflationary in the Volcker-Greenspan era². Moreover, a crude generalisation of the historical experience of US monetary policy may be that the Burns-Miller period was one of high inflation and a volatile output gap, the Greenspan-Bernanke era has been one of low inflation and greater economic stability (until recently at least) and the Volcker years account for the transition. Hence, it seems likely that results similar to those adduced by Raggi et al. could be achieved by a model in which state transitions are determined according to the behaviour of these core macroeconomic variables.

The papers surveyed above have dealt variously with what were termed reaction (long-run) and adjustment (short-run) asymmetries in the opening paragraph of this paper. However, it is possible that the response of the central bank to the inflation and output gaps may also depend upon the level of the interest rate itself. This natural means by which to investigate such locational asymmetry is by use of the quantile regression approach associated originally with Koenker and Bassett (1978) and subsequently with Koenker and Hallock (2001) and Koenker and Xiao (2006).

Symmetric quantile regression models have been widely used in a number of fields, notably the analysis of stock market returns (e.g. Barnes and Hughes, 2002) and in labour economics (e.g. Falaris, 2004; Martins and Pereira, 2004). However, at the time of writing, we are aware of only two papers that have applied quantile techniques to the analysis of monetary policy. Mizen, Kim and Thanaset (2009, hereafter MKT) consider the case of locational asymmetry at the Fed and the Bank of Japan in the context of an otherwise

¹ By contrast, Surico (2007) identifies non-linearity with respect to the output gap in the pre-Volcker period only, and concludes that this form of asymmetry generated an average positive inflationary bias of 1.5% in the monetary policy of the time.

² This consensus is not, however, absolute. Recently, Cukierman and Muscatelli (2008) have found that it was not inflation-avoidance but recession-avoidance that characterised the Greenspan years. Similarly, employing a novel approach to combining persistent and stationary series in a vector error correction model, Greenwood-Nimmo and Shin (2009) find that US monetary policy has been distinctly growth-oriented since the end of Volcker's tenure and that there is little evidence that the Taylor principle has been observed post-Volcker. A similar conclusion is reached by Petersen (op. cit.), who concludes that the Taylor principle is not required for effective monetary policy if the reaction function is non-linear.

symmetrical forward-looking monetary policy rule. Their results indicate that the Taylor principle is upheld at every conditional quantile and that degree of policy aggression measured by the magnitude of the coefficient on inflation is a monotonically increasing function of the conditional quantile of the interest rate.

More recently, Wolters (2009) has applied the quantile regression framework to the analysis of US monetary policy. His results suggest that the policy response to inflation increases over the conditional distribution of the Federal funds rate, while the reaction to output gap disequilibria decreases. In conjunction with the results of MKT, these results clearly indicate that the widespread convention of modelling the policy rule at the conditional mean of the interest rate distribution may provide misleading results. However, neither Wolters nor MKT are able to convincingly address issues relating to reaction or adjustment asymmetries in their empirical frameworks. The development of a synthetic approach to the analysis of these three forms of nonlinearity is the focus of this paper. We will propose a simple means of combining the asymmetric ARDL approach originated by SYG with the quantile regression model, thereby achieving a tractable framework capable of modelling fundamentally asymmetric processes in a coherent and intuitively appealing manner.

III. The Asymmetric ARDL Model

Shin, Yu and Greenwood-Nimmo (2009) advance a simple technique for modelling both long- and short-run asymmetries in a coherent manner. The model is essentially an asymmetric extension of the linear ARDL approach to modelling long-run (cointegrating) levels relationships originated by Pesaran and Shin (1998) and Pesaran, Shin and Smith (2001, PSS). Consider the asymmetric cointegrating relationship:

$$y_t = \beta^+ x_t^+ + \beta^- x_t^- + u_t, \quad (3.1)$$

where x_t is a $k \times 1$ vector of regressors decomposed as:

$$x_t = x_0 + x_t^+ + x_t^-, \quad (3.2)$$

where x_t^+ and x_t^- are partial sum processes of positive and negative changes in x_t defined by:

$$x_t^+ = \sum_{j=1}^t \Delta x_j^+ = \sum_{j=1}^t \max(\Delta x_j, 0), \quad x_t^- = \sum_{j=1}^t \Delta x_j^- = \sum_{j=1}^t \min(\Delta x_j, 0), \quad (3.3)$$

and β^+ and β^- are the associated asymmetric long-run parameters. The extension of (3.1) to the $ARDL(p, q)$ case is straightforward, yielding the following asymmetric error correction model:

$$\Delta y_t = \rho y_{t-1} + \theta^+ x_{t-1}^+ + \theta^- x_{t-1}^- + \sum_{j=1}^{p-1} \varphi_j \Delta y_{t-j} + \sum_{j=0}^q (\pi_j^+ \Delta x_{t-j}^+ + \pi_j^- \Delta x_{t-j}^-) + \varepsilon_t. \quad (3.4)$$

We refer to (3.4) as the asymmetric or non-linear ARDL (NARDL) model. This approach has a number of advantages over the existing class of regime-switching models.

Firstly, once the regressors, \mathbf{x}_t , are decomposed into \mathbf{x}_t^+ and \mathbf{x}_t^- , (3.4) can be estimated simply by standard OLS. Secondly, the null hypothesis of no long-run relationship between the levels of y_t , \mathbf{x}_t^+ and \mathbf{x}_t^- (i.e. $\rho = \theta^+ = \theta^- = 0$) can be easily tested using the bounds-testing procedure advanced by Pesaran, Shin and Smith (2001, PSS), which remains valid irrespective of whether the regressors are $I(0)$, $I(1)$ or mutually cointegrated. Thirdly, (3.4) nests the following two special cases: (i) long-run reaction symmetry where $\theta^+ = \theta^- = \theta$, and (ii) short-run adjustment symmetry in which $\pi_i^+ = \pi_i^-$ for all $i = 0, \dots, q$. Both types of restriction can be easily tested using standard Wald tests³. Only when these two restrictions are not rejected should the restricted linear ARDL(p, q) model be entertained:

$$\Delta y_t = \rho y_{t-1} + \theta x_{t-1} + \sum_{j=1}^{p-1} \varphi_j \Delta y_{t-j} + \sum_{j=0}^q \pi_j \Delta x_{t-j} + \varepsilon_t. \quad (3.5)$$

Finally, the asymmetric ARDL model, (3.4) can be used to derive the asymmetric cumulative dynamic multiplier effects of a unit change in \mathbf{x}_t^+ and \mathbf{x}_t^- respectively on y_t , defined by:

$$\mathbf{m}_h^+ = \sum_{j=0}^h \frac{\partial y_{t+j}}{\partial \mathbf{x}_t^+}, \quad \mathbf{m}_h^- = \sum_{j=0}^h \frac{\partial y_{t+j}}{\partial \mathbf{x}_t^-}, \quad h = 0, 1, 2, \dots \quad (3.6)$$

Notice that, by construction, as $h \rightarrow \infty$, \mathbf{m}_h^+ and \mathbf{m}_h^- tend to approach the respective asymmetric long-run coefficients. At present, we evaluate the differential effects of positive and negative shocks to the explanatory variables under the assumption of a single known threshold value. Indeed, the construction of positive and negative partial sum processes relies on the imposition of a zero threshold. However, this assumption can be easily relaxed to accommodate the more general case of multiple unknown threshold decompositions (Greenwood-Nimmo, Shin and Van Treeck, 2009). Similarly, we currently work under the implicit assumption that positive and negative shocks to the explanatory variables occur with equal probability. In the current context this is a largely innocuous simplification as the mean values of $\Delta \pi$ and Δy are relatively close to zero over our

³ SYG identify two different types of short-run symmetry restrictions: strong-form (pairwise) symmetry and weak-form (additive) symmetry. The former is a very strong restriction that is unlikely to be satisfied, particularly in the case of general-to-specific lag selection as this is likely to result in the inclusion of heterogeneous lags of the positive and negative partial sum process. While additive symmetry is a much weaker restriction, the power of the Wald test may be rather low in small samples, in which case the use of bootstrapped confidence intervals may be preferable.

sample, implying that $\Pr(\Delta x > 0) \approx \Pr(\Delta x < 0) \approx 0.5$. However, in the general case in which this condition is not satisfied, as with all regime-switching models, one must allow for the impact of the respective regime probabilities in the evaluation of the asymmetric dynamic multipliers.

The ability of the dynamic multipliers to illuminate the traverse between initial equilibrium, short-run disequilibrium following a shock, and a new long-run equilibrium makes them a powerful tool for the combined analysis of (short-run) adjustment asymmetry and (long-run) response asymmetry. This property is likely to prove particularly advantageous in the analysis of asymmetric central bank preferences.

1. The Quantile Extension of the NARDL Model

As MKT note, conventional regression techniques such as OLS, IV, or GMM evaluate the relationship between series at the mean of the conditional distribution of the dependent variable (p. 4). The implicit assumption is that the estimated relationship holds not only at the mean, but also in other parts of the conditional distribution of the dependent variable. In many cases, there is little reason to believe that this is an innocuous assumption. The relationship between the dependent variable and its covariates may differ depending on the location of the dependent variable over its own conditional distribution.

The quantile regression model corresponding to the NARDL-M model in (3.4) is given by

$$\begin{aligned}\Delta y_t &= \rho_{(\kappa)} y_{t-1} + \theta_{(\kappa)}^+ x_{t-1}^+ + \theta_{(\kappa)}^- x_{t-1}^- + \sum_{j=1}^{p-1} \varphi_{(\kappa)j} \Delta y_{t-j} + \sum_{j=0}^q \left(\pi_{(\kappa)j}^+ \Delta x_{t-j}^+ + \pi_{(\kappa)j}^- \Delta x_{t-j}^- \right) + \varepsilon_{(\kappa)t} \\ &= z_t' \alpha_{(\kappa)} + \varepsilon_{(\kappa)t}.\end{aligned}$$

where κ is a given quantile index in $(0, 1)$, z_t is the vector of all regressors in the quantile model and $\alpha_{(\kappa)}$ is the vector obtained by collecting all the coefficients in the model. We impose the usual assumption that the conditional quantile model is correctly specified; that is,

$$E(\psi_{\kappa}(\varepsilon_{(\kappa)t}) | z_t) = 0$$

where $\psi_{\kappa}(z) = \kappa - 1_{[z \leq 0]}$. This assumption is equivalent to the following:

$$\int_{-\infty}^{z_t' \alpha_{(\kappa)}} f_{\Delta y_t | z_t}(t | z_t) dt = \kappa$$

with the conditional density of $f_{\Delta y_t | z_t}(t | z_t)$ is the density of Δy_t conditional on z_t . Hence, it can be easily seen that the assumption implies that $z_t' \alpha_{(\kappa)}$ is the correct conditional quantile of Δy_t given z_t when the quantile index is given by $\kappa \in (0, 1)$. Our objective is to analyse how z_t affects Δy_t over the range of the conditional distribution. This can be achieved by estimating the conditional quantile for various values of κ over $(0, 1)$.

By admitting non-linearity of the form modelled by (3.4) into the conditional quantile function, we obtain the quantile-NARDL or NARDL-Q model. For a fixed value of κ , the single-step quantile regression estimates of the model parameters are those values that minimise the following expression:

$$\min_{\alpha(\kappa)} \sum_{t=1}^T \xi_{(\kappa)} \{ \Delta y_t - z_t' \alpha(\kappa) \} \quad (3.7)$$

where $\xi_{(\kappa)}(z)$ is the usual check function defined as $\xi_{(\kappa)}(z) = z(\kappa - 1_{[z \leq 0]})$

(c.f. Koenker and Hallock, 2001). The solution from this minimization denoted by $\hat{\alpha}(\kappa)$ will be consistent and asymptotically normal under the correct quantile specification assumption with a few more regularity conditions. Finally, the dynamic multipliers associated with the κ th conditional quantile of the dependent variable may be written as:

$$\mathbf{m}_{(\kappa)h}^+ = \sum_{j=0}^h \frac{\partial y_{(\kappa)t+j}}{\partial \mathbf{x}_t^+}, \quad \mathbf{m}_{(\kappa)h}^- = \sum_{j=0}^h \frac{\partial y_{(\kappa)t+j}}{\partial \mathbf{x}_t^-}, \quad h = 0, 1, 2, \dots \quad (3.8)$$

Kim and Muller (2005, 2010) demonstrate that the single-step quantile estimation routine outlined above is biased when there exists non-zero contemporaneous correlation between the explanatory variables and the residuals. This is likely to be particularly problematic for forwardlooking models incorporating expectational terms, such as that developed by MKT. In this case, either the two-stage estimation procedure advanced by Kim and Muller or the inverse quantile regression technique of Chernozhukov and Hansen (2005) could be used to achieve reliable estimation. While we do not consider forward-looking modelling and the ARDL model is known to correct perfectly for the endogeneity of $I(1)$ regressors (Pesaran and Shin, 1998), any contemporaneous correlation between the stationary output gap series and the regression residuals could be problematic.

The NARDL-Q framework is able to explicitly model the following three types of asymmetry:

- (i.) *Reaction asymmetry* - captured by the heterogeneous long-run parameters $\beta_{(\kappa)}^+$ and $\beta_{(\kappa)}^-$, this reflects the different long-run responses of the dependent variable to positive and negative changes in the explanatory variables.
- (ii.) *Adjustment asymmetry* - captured by the differences between the estimated short-run parameters, $\pi_{(\kappa)j}^+$ and $\pi_{(\kappa)j}^-$ for $j = 0, \dots, q$, this represents the differential impact effects of x^+ and x^- on y and the associated dynamic adjustment toward the respective long-run multipliers.
- (iii.) *Locational asymmetry* - captured by the differences between the short- and long-run parameters estimated at various quantiles of the dependent variable, this relates to the changing response of the dependent variable to the explanatory variables at different values of κ .

In order to statistically discriminate between the various forms of asymmetry, we propose the following array of hypothesis tests:

$$(i.) H_0: \beta_{(\kappa)}^+ = \beta_{(\kappa)}^- \text{ vs. } H_1: \beta_{(\kappa)}^+ \neq \beta_{(\kappa)}^-.$$

$$(ii-a.) H_0: \pi_{(\kappa)j}^+ = \pi_{(\kappa)j}^- \text{ vs. } H_1: \pi_{(\kappa)j}^+ \neq \pi_{(\kappa)j}^- \text{ for } j = 0, \dots, q.$$

$$(ii-b.) H_0: \sum_j \pi_{(\kappa)j}^+ = \sum_j \pi_{(\kappa)j}^- \text{ vs. } H_1: \sum_j \pi_{(\kappa)j}^+ \neq \sum_j \pi_{(\kappa)j}^- \text{ for } j = 0, \dots, q.$$

It follows from SYG that the Wald statistics testing the null hypothesis of reaction symmetry and of pairwise and additive adjustment symmetry in the κ th conditional quantile will follow an asymptotic χ^2 distribution, respectively.

Further, we consider the following hypotheses:

$$(iii.) H_0: \beta_{(h)}^+ = \beta_{(k)}^+, \beta_{(h)}^- = \beta_{(k)}^- \text{ vs. } H_1: \beta_{(h)}^+ \neq \beta_{(k)}^+, \beta_{(h)}^- \neq \beta_{(k)}^- \text{ for } h, k = \{0.1, \dots, 0.9\}, h \neq k.$$

The test for short-run locational symmetry follows an asymptotic χ^2 distribution.

$$(iv.) H_0: \pi_{(h)j}^+ = \pi_{(k)j}^+, \pi_{(h)j}^- = \pi_{(k)j}^- \text{ vs. } H_1: \pi_{(h)j}^+ \neq \pi_{(k)j}^+, \theta_{(h)}^- \neq \theta_{(k)}^- \text{ for } h, k = \{0.1, \dots, 0.9\}, h \neq k, j = 1, \dots, q.$$

The test for short-run locational symmetry follows an asymptotic χ^2 distribution.

While (i), (ii-a), (ii-b) focus on a given quantile index, (iii) and (iv) consider a range of quantile indices and test for a change or consistency of any model characteristics over the range. For example, one can investigate the issue of whether there exists the same short-run reaction asymmetry in the lower part (e.g. 10%) as well as in the upper tail (e.g. 90%) of the conditional distribution, which can be expressed as

$$H_0: \pi_{(0.1)}^+ = \pi_{(0.9)}^+ \text{ and } \pi_{(0.1)}^- = \pi_{(0.9)}^-.$$

For this test, it is necessary to estimate multiple quantiles simultaneously and the asymptotic normality of multiple quantiles have been derived in the literature, e.g. Koenker and Bassett (1978). For the above example, it can be shown that with

$$\kappa_i = 0.1 \text{ and } \kappa_j = 0.9,$$

$$T^{1/2} \begin{pmatrix} \hat{\pi}_{(\kappa_i)}^+ - \pi_{(\kappa_i)}^+ \\ \hat{\pi}_{(\kappa_j)}^+ - \pi_{(\kappa_j)}^+ \end{pmatrix} \Rightarrow N(\mathbf{0}_{2 \times 1}, \Omega \otimes Q)$$

where

$$\Omega = [\omega_{ij}], \quad \omega_{ij} = \frac{\kappa_i(1 - \kappa_j)}{f(F^{-1}(\kappa_i))f(F^{-1}(\kappa_j))}$$

Hence, the Wald statistics testing the null hypothesis of location symmetry between the κ_i and κ_j th conditional quantiles will follow an asymptotic χ^2 distribution. See Kim and Shin (2010) for further details.

IV. Estimation Results

We estimate the asymmetric Taylor rule for the US between 1964q2 and 2008q2 using both the standard asymmetric ARDL framework derived by SYG (henceforth the NARDL-M model) and the NARDL-Q model described above⁴. The NARDL-M model evaluates the relationship between the variates at the conditional mean of the interest rate, as has become common practice in the empirical literature. By contrast, using the NARDL-Q model, we obtain estimates of the relationship at a range of quantiles across the entire conditional distribution. In this way we can investigate the response of the Federal Reserve to inflation and output at various levels of the interest rate, thereby shedding light on potential locational asymmetries and the nature of policymaking in the neighborhood of the zero nominal lower bound.

1. The NARDL-M Model

Table 1 presents the results of NARDL-M estimation of the asymmetric Taylor rule where i_t denotes the short-term nominal interest rate, π_t the rate of consumer price inflation, and y_t the output gap⁵. The four columns of the table relate to the four general combinations of short- and long-run asymmetry identified by SYG. The PSS F-test identifies the existence of a long-run levels relationship at the 5% level in all cases. However, the long-run symmetry restrictions with respect to both inflation and the output gap cannot be rejected at the 5% confidence level regardless of the specification of the model dynamics. Furthermore, we find only weak support for additive adjustment asymmetry with respect to either inflationary shocks or output gap shocks. It is clear, however, that we observe pairwise asymmetric adjustment in columns 1 and 3 where short-run symmetry restrictions are not imposed during estimation⁶.

⁴ All data were retrieved from the IMF's International Financial Statistics. Potential output was calculated using the Hodrick-Prescott filter with the smoothing parameter selected by the Ravn-Uhlig (2002) frequency rule.

⁵ In all cases, general-to-specific lag selection was performed starting from an maximum lag length of 4 using a sequential 5% rule as implemented by Gretl version 1.8.2cvs.

⁶ Note that the consideration of a broader range of models representing other feasible combinations of reaction and adjustment asymmetry on a variable-by-variable basis still provided little evidence of reaction asymmetry. The results of this analysis are available upon request.

Table 1. Estimation Results for the NARDL-M Model

(A) Estimation Results								
Regressor	LR & SR asym		LR asym & SR sym		LR sym & SR asym		LR & SR sym	
	Coef.	St.Err.	Coef.	St.Err.	Coef.	St.Err.	Coef.	St.Err.
Constant	0.128	0.269	0.098	0.268	-0.019	0.142	-0.006	0.147
i_{t-1}	-0.076	0.031	-0.093	0.029	-0.073	0.030	-0.094	0.029
π_{t-1}					0.128	0.033	0.129	0.032
π_{t-1}^+	0.146	0.056	0.157	0.058				
π_{t-1}^-	0.086	0.039	0.117	0.039				
y_{t-1}					0.073	0.016	0.083	0.015
y_{t-1}^+	0.064	0.018	0.078	0.017				
y_{t-1}^-	0.078	0.017	0.087	0.017				
Δi_{t-2}	-0.305	0.075	-0.255	0.073	-0.289	0.074	-0.252	0.073
$\Delta \pi_t$			0.347	0.116			0.341	0.114
$\Delta \pi_{t-1}$			-0.355	0.118			-0.349	0.117
$\Delta \pi_t^+$	0.398	0.172						
$\Delta \pi_t^-$					0.422	0.190		
$\Delta \pi_{t-1}^-$	-0.699	0.187			-0.744	0.189		
$\Delta \pi_{t-2}^-$	0.503	0.194			0.450	0.193		
Δy_t			0.098	0.023			0.097	0.023
Δy_{t-1}			0.056	0.022			0.054	0.022
Δy_t^+	0.084	0.037			0.086	0.036		
Δy_{t-2}^+	0.085	0.035			0.079	0.033		
Δy_t^-	0.127	0.042			0.118	0.042		
Δy_{t-1}^-	0.130	0.040			0.119	0.039		
β_π					1.740	0.617	1.369	0.304
$\beta_{\pi+}$	1.926	0.896	1.688	0.668				
$\beta_{\pi-}$	1.140	0.503	1.264	0.358				
β_y					0.999	0.400	0.883	0.289
β_{y+}	0.851	0.357	0.844	0.291				
β_{y-}	1.037	0.420	0.941	0.325				

(B) Diagnostic and Inferential Test Statistics								
R^2	0.472		0.421		0.469		0.420	
Adj. R^2	0.429		0.386		0.433		0.392	
F_{PSS}	6.495		8.681		14.621		14.496	
χ_{SC}^2	2.221	0.329	0.704	0.703	2.108	0.349	0.567	0.753
χ_{HET}^2	47.190	0.000	47.302	0.000	60.147	0.000	50.747	0.000
$W_{LR,\pi}$	0.715	0.398	0.334	0.564				
$W_{LR,y}$	0.743	0.389	0.331	0.565				
$W_{SR,\pi}$	3.869	0.049			1.757	0.185		
$W_{SR,y}$	0.971	0.324			2.813	0.094		

Note: χ_{SC}^2 and χ_{HET}^2 denote the Breusch-Godfrey LM test for serial correlation and the White LM test for heteroscedasticity. $W_{LR,\pi}$ refers to the Wald test of the restriction $\beta_{\pi+} = \beta_{\pi-}$ while $W_{LR,y}$ refers to the Wald test of $\beta_{y+} = \beta_{y-}$. By analogy, $W_{SR,\pi}$ and $W_{SR,y}$ are the Wald tests for additive adjustment asymmetry. The relevant 5% critical value of the F_{PSS} test is 4.01 for $k = 4$ and 4.85 for $k = 2$.

Figures 1 and 2 plot the cumulative dynamic multipliers associated with unit shocks to inflation and the output gap, respectively (or the associated positive and negative partial sum processes). The dynamic response of the interest rate to the output gap is qualitatively similar under all specifications, suggesting that the response of the Federal Reserve to output gap disequilibrium is indeed linear at the conditional mean of the interest rate. By contrast, the dynamic multipliers obtained under the assumption of long-run symmetric responses to inflation gaps are quite different from those derived from the asymmetric case which indicates that the Fed has responded more aggressively to positive than to negative inflation gaps. The inability of the Wald test to reject the long-run symmetry restrictions in this case results from the presence of a non-negligible negative covariance. Hence, we are obliged to conclude that the NARDL-M model finds little evidence of asymmetry in the reaction function of the central bank. However, it remains to be seen whether this result may be safely generalised to the entire distribution of the interest rate.

Figure 1. Dynamic Multipliers for the NARDL-M Model: Inflation Shock

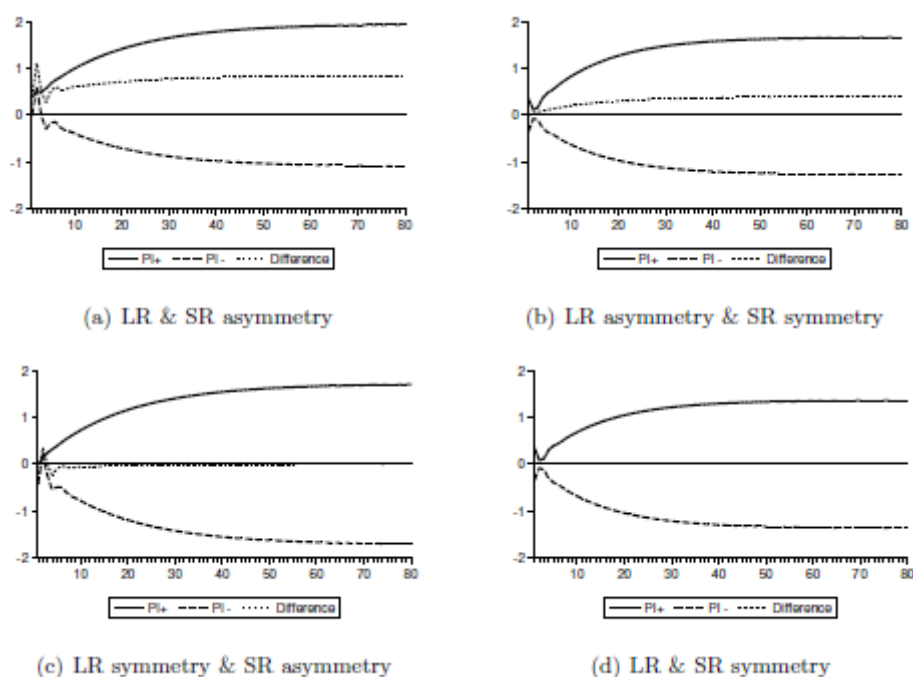
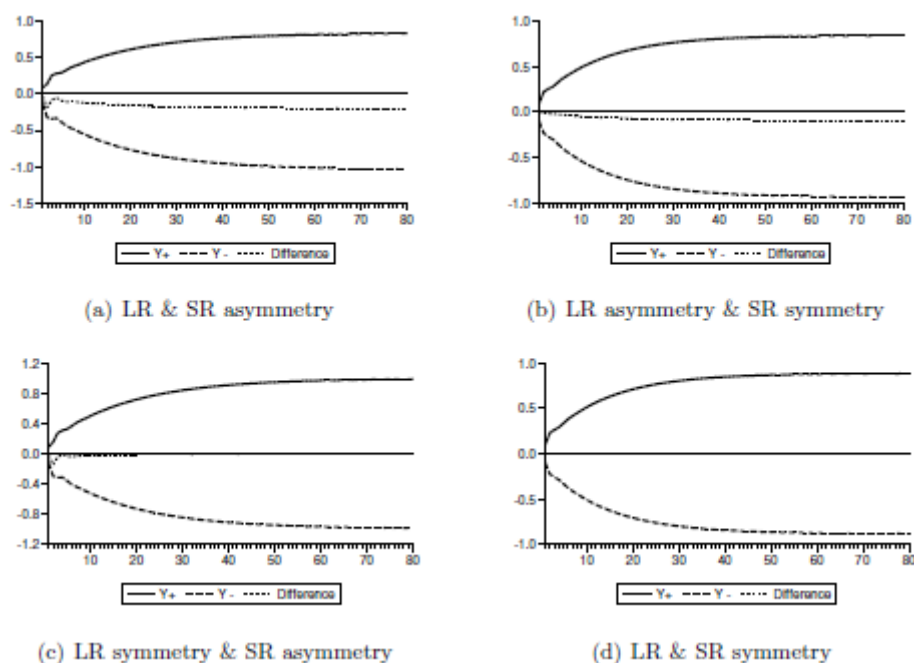


Figure 2. Dynamic Multipliers for the NARDL-M Model: Output Gap Shock



2. The NARDL-Q Model

We estimate the NARDL-Q model for

$\kappa = \{0.10, 0.20, 0.30, 0.40, 0.50, 0.60, 0.70, 0.80, 0.90\}$ under the assumption of joint long- and short-run asymmetry where the lag structure is selected based on that presented in Table 1. Figures 3 - 5 plot the asymmetric cumulative dynamic multipliers with respect to inflation and output gap shocks at each conditional quantile of the interest rate. A general trend toward increasingly aggressive monetary policy as κ increases is evident in the figures.

Figure 3. NARDL-Q Dynamic Multipliers of Positive Inflation and Output Gap Shocks

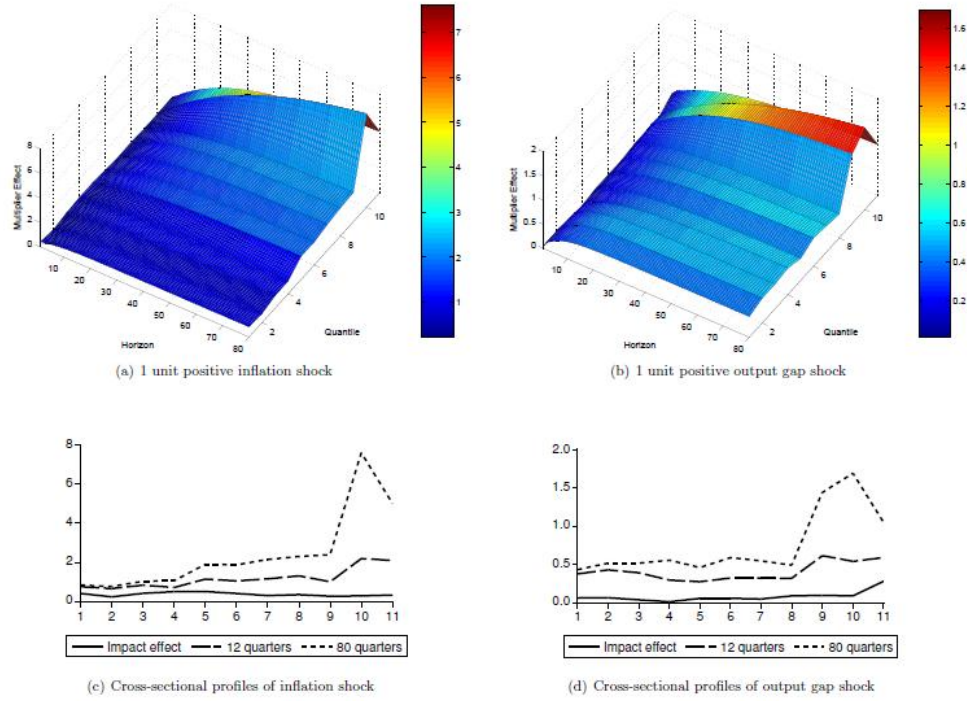


Figure 4. NARDL-Q Dynamic Multipliers of Negative Inflation and Output Gap Shocks

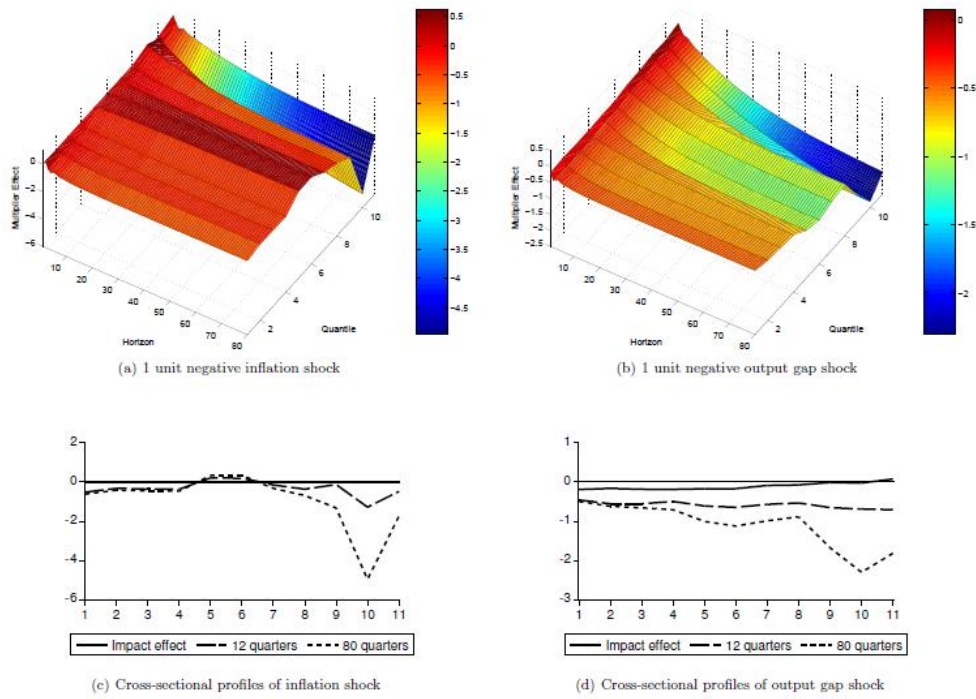
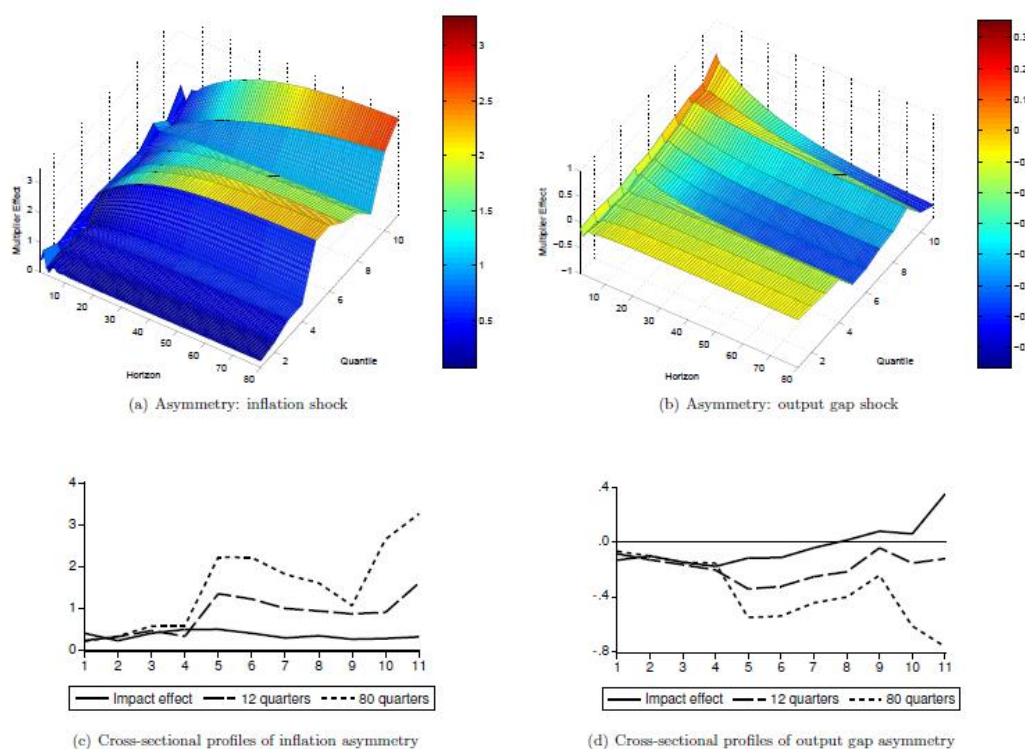


Figure 5. NARDL-Q Dynamic Multipliers - Asymmetry (i.e. the difference between Figures 3 and 4)



The finding that monetary policy has responded more robustly to inflation and the output gap when the interest rate is higher is comparable with the findings of MKT. However, in their paper, the authors find that the Fed's policy aggression, measured by the magnitude of the inflation and output gap coefficients, is monotone increasing in κ . Our results reveal a more complex relationship between the κ and the coefficients of the reaction function. We find little difference between the reaction functions associated with $0.05 \leq \kappa \leq 0.4$. In this region, our results provide little support for the operation of the Taylor principle in the USA and relatively little evidence of reaction or adjustment asymmetries in relation to either inflation or the output gap. For $0.4 \leq \kappa \leq 0.7$, we observe a strong policy response to both positive and negative movements of the output gap and to positive inflationary pressures, with the Taylor principle upheld. By contrast, over this range of the interest rate, we note no significant response to disinflationary pressure over any horizon. Within this region, we find clear evidence of pronounced reaction asymmetry, suggesting that the Fed has systematically responded more strongly to positive than negative inflation gaps, and to negative than positive output gaps. Finally, for $0.8 \leq \kappa \leq 0.95$, our results indicate very strong responses to both positive and

negative inflation and output gaps and very pronounced asymmetry acting in the same direction as before.

Our conjectures based on these results are twofold. Firstly, it appears that US monetary policymakers act on the basis that economic agents do not respond to the absolute magnitude of a policy innovation but to its size in relation to the current level of the interest rate. Hence, while a 25 basis point rate cut may be considered substantial when the interest rate is initially at just 2%, the same intervention would be considered mild when the starting value of the interest rate is 10%. This is an intuitively reasonable finding when one considers the effect of the rate change on the nominal cost-of-capital. In layman's terms, the former is equivalent to a 1/8 reduction in the cost-of-capital while the latter represents a reduction of just 1/40. When viewed in this way, it is unsurprising that a larger interest rate change is required to achieve a given objective at higher levels of the interest rate.

Secondly, the observation that policy is conducted in a symmetrical fashion at low values of π but asymmetrically at higher values suggests that policymakers become increasingly hawkish toward inflation and dovish toward the output gap at higher conditional quantiles of the interest rate. It is tempting at first to dismiss this finding as an artefact of our sample given that the higher quantiles of the interest rate mostly relate to the Volcker Fed, which was known for its tough stance on inflation. The observed pattern of output gap asymmetry in relation to π can be explained by the notion that cash flow constraints are more likely to be binding in the presence of high inflation rates and hence high nominal interest rates (Greenwald and Stiglitz, 2003, pp.38-9). Although the firm's investment is equally profitable in real terms, it faces a potential cash flow constraint as long as the lender is not committed to lend the difference between the return from the investment and the nominal interest obligations.⁷ Hence, borrowing even at the same real interest rates becomes less attractive at high rates of inflation. The degree of uncertainty about future borrowing opportunities will be typically higher as the economy goes into a slump in which situation the Fed is likely to react more strongly to negative output gap changes at high nominal interest rates.

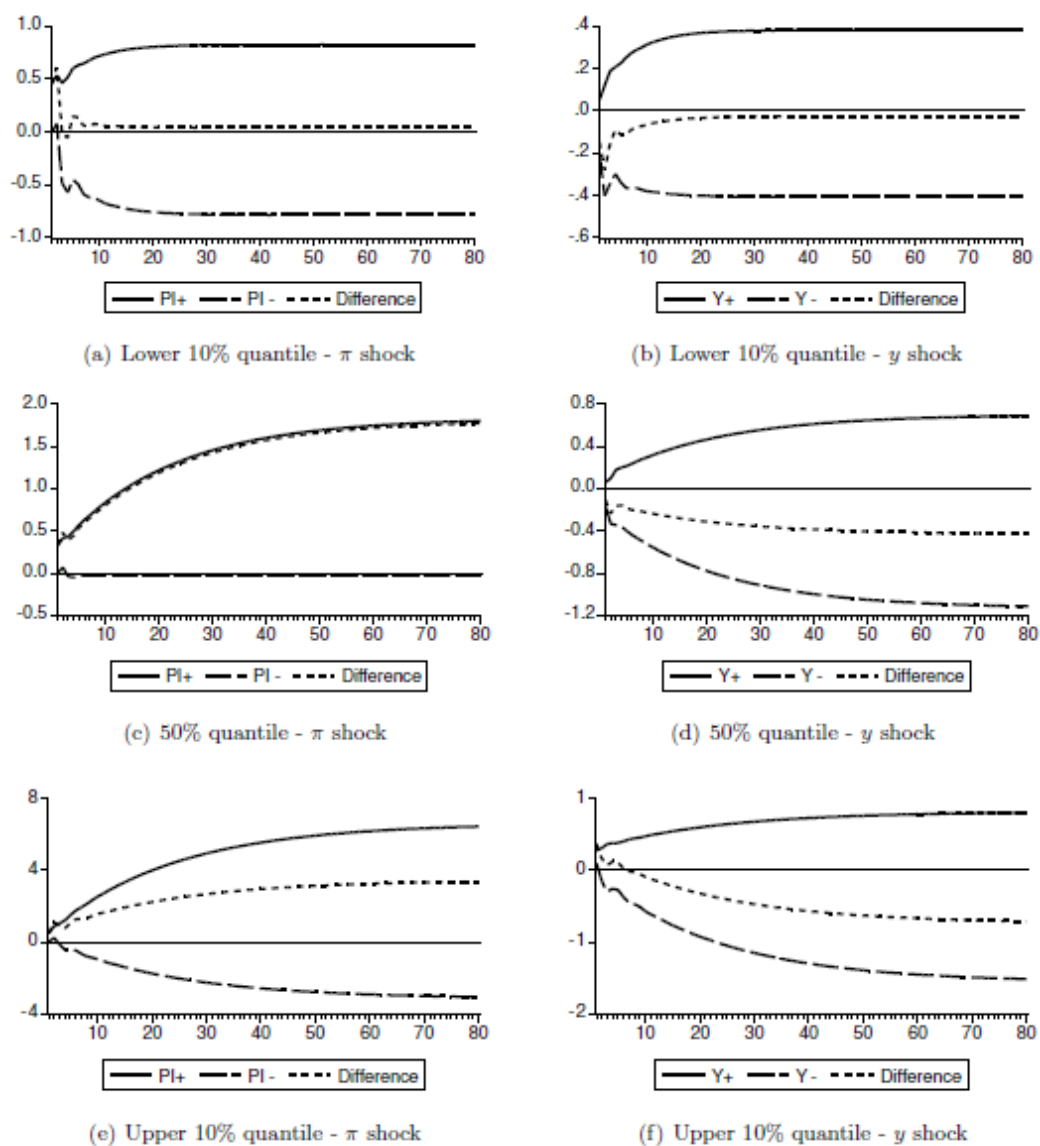
In the interests of clarity, we will now provide detailed results for the lower 10%, median, and upper 10% conditional quantiles. Table 2 summarises the parameter estimates at the three selected quantiles. Note that the pattern of significance does not change substantially between the quantiles, suggesting that our imposition of the lag structure derived from the NARDL-M model is generally appropriate.

⁷ Suppose that a firm borrows \$1,000 to buy an asset worth \$2,000. Assume that the real interest rate and the rate of return are 5 and 10 per cent, respectively. With zero inflation, the nominal interest rate will be 5 per cent. After one year, the firm has to pay \$50 in interests, which can be easily covered with the cash flow earned from the asset (\$200). Now, suppose that inflation increases to 20 per cent and hence the nominal interest rate is 25 per cent. Then, the same cash flow of \$200 is not enough to pay \$250 owed in interests.

Table 2. Estimation Results for the NARDL-Q Model

Regressor	Lower 10% Quantile		Median Quantile		Upper 10% Quantile	
	Coefficient	Std. Error	Coefficient	Std. Error	Coefficient	Std. Error
Constant	0.309		0.623		0.035	
i_{t-1}	-0.209	0.027	-0.057	0.022	-0.067	0.029
π_{t-1}^+	0.173	0.046	0.105	0.037	0.443	0.050
π_{t-1}^-	0.164	0.035	0.002	0.028	0.212	0.038
y_{t-1}^+	0.080	0.015	0.040	0.012	0.055	0.017
y_{t-1}^-	0.085	0.016	0.065	0.013	0.104	0.017
Δi_{t-2}	-0.291	0.067	-0.197	0.054	-0.490	0.073
$\Delta \pi_t^+$	0.458	0.157	0.327	0.125	0.469	0.169
$\Delta \pi_{t-1}^-$	-0.240	0.170	-0.067	0.135	-0.440	0.183
$\Delta \pi_{t-2}^-$	0.383	0.176	0.100	0.140	0.130	0.189
Δy_t^+	0.053	0.034	0.060	0.027	0.275	0.036
Δy_{t-2}^+	0.028	0.032	0.059	0.025	0.159	0.034
Δy_t^-	0.201	0.038	0.163	0.030	-0.099	0.041
Δy_{t-1}^-	0.158	0.036	0.114	0.029	0.142	0.039

Figure 6 plots the cumulative dynamic multipliers derived from the NARDL-Q model at the three selected quantiles. The patterns of dynamic adjustment to long-run equilibrium are quite striking and reveal the same pattern described by the three dimensional figures, but more clearly. The results show that monetary policy has been strictly symmetrical at the lower 10% quantile, with at most very mild adjustment asymmetry confined to the very short-run. By contrast, at the median, there is pronounced long-run asymmetry in relation to both inflation and output gap disequilibrium. The results indicate that the Taylor principle is satisfied in the case of positive inflationary pressure after a lag of approximately 10 quarters, reflecting inertial policymaking. By contrast, the interest rate response to disinflationary pressure is well below unity up to 40 quarters and barely approaches unity in the long-run. This is an interesting finding as it suggests that policymakers act as inflation hawks when the interest rate is within a 'normal' range, reacting more aggressively to rising inflation than to falling inflation. This reflects the common argument that, in normal times, inflation has a tendency to rise more readily than it falls (Bunzel and Enders, 2005). Similarly, we find that policymakers respond more strongly to negative than positive output gaps in this range, reflecting the accepted wisdom that it takes a substantial rate cut to close a negative output gap but only a relative small rate rise to eliminate a positive gap. In this sense, it is often argued that attempting to correct a negative gap using monetary policy is akin to pushing on a string. Finally, in the upper 10% quantile, we observe very strong responses to both output and inflation, and pronounced asymmetry in both cases. In fact, our results indicate that the long-run interest rate response to a unit positive inflation shock is approximately twice as large as the response to a unit negative shock. A similar pattern emerges in the case of output gap shocks. When we consider just these three quantiles, a clear pattern emerges that is consistent with MKT's argument that policy aggression is a monotonically increasing function of κ .

Figure 6. NARDL-Q Dynamic Multipliers: $\alpha = 0.1, 0.5, 0.9$.

Overall, our results have two important implications. Firstly, as noted by MKT, policy does not become increasingly aggressive as the zero lower bound is approached; in fact, we observe the opposite. Secondly, by broadening our focus to the entire conditional distribution of the dependent variable, we are able to observe asymmetry where none was apparent when estimation was focused on the conditional mean. This suggests that the common practice of estimating at the conditional mean may obscure important underlying asymmetries.

V. Concluding Remarks

This paper identifies three fundamental forms of asymmetry that may characterise a dynamic economic process. Reaction asymmetry relates to the notion that the long-run response of the dependent variable to different types of shock to the same explanatory variable may differ. Adjustment asymmetry obtains when the path of dynamic adjustment of the dependent variable differs according to the nature of a shock to a given explanatory variable. Finally, locational asymmetry occurs when the response of the dependent variable to a given shock depends upon the conditional quantile of the dependent variable.

It follows that an easily implemented approach to modelling these three forms of asymmetry simultaneously and in a coherent fashion could be put to an abundance of uses. To this end, we develop a quantile regression extension of the asymmetric ARDL framework advanced by Shin, Yu and Greenwood-Nimmo (2009). More specifically we specify a nonlinear conditional quantile function using the asymmetric ARDL functional form. Based on this structure, we can compute asymmetric cumulative dynamic multipliers with which to analyse response and adjustment asymmetries at the conditional quantile of interest. Moreover, we propose an array of hypothesis tests relating to each form of asymmetry in order to put the proposed modelling framework on a firm statistical footing.

Applying this technique to the analysis of US monetary policy, we find that the Federal Reserve responds linearly to both output and inflation in the lower quantiles of the interest rate. Moreover, in this range, the Fed does not adhere to the Taylor principle, indicating that monetary policy would not generally be considered stabilising in this region. We attribute this seemingly strange behaviour to the proximity of the zero lower nominal bound which seriously constrains the latitude enjoyed by policymakers in pursuit of their goals. Between the fortieth and eightieth quantiles, we find that the Taylor principle is upheld in the case of positive inflationary shocks but not in response to disinflationary shocks. Meanwhile, we note significant responses to both positive and negative output gap shocks, with a marked negative asymmetry. Hence, we conclude that the Fed acts as an inflation hawk in this region while also displaying a marked tendency toward growth-fostering policies. This combination of policies is potentially consistent with the opportunistic approach to monetary policy documented by Orphanides and Wilcox (2002). Finally, for the uppermost quantiles, we find evidence of very aggressive policy responses to positive and negative inflation and output gap shocks in the context of profound response asymmetry. Hence, our results support MKT's finding that the degree of policy aggression is an increasing function of π .

Our results have a number of important implications for the conduct of monetary policy. Firstly, the finding that policy is relatively passive in the lowest quantiles suggests that the Fed has failed to pursue an optimal policy in the neighborhood of the zero lower bound, presumably for fear of encountering a liquidity trap. While the downside movement of the interest rate may be constrained in this case, a weak response by the Fed to positive inflation or output gap shocks is also intuitively plausible. At very low nominal interest rates, inflation is typically low (below the target) and the output gap negative in which case higher inflation and increasing output gap can be tolerated without running the risk of accelerating inflationary pressures or overheating the economy.

Another more general implication of our results is that the actions of the Fed become increasingly asymmetric as the interest rate increases. This may be an artefact of our dataset given that the majority of the interest rate observations that fall in the uppermost quantiles are associated with the Volcker Fed which was renowned for its anti-inflationary stance. Furthermore, cash flow constraints, that become more binding at high nominal interest rates (typically associated with high inflation rates), can provide a positive explanation

why the Fed tends to react more strongly to negative output gap shocks (a strong aversion against recession) even at higher nominal interest rates.

Finally, we will close with a general observation regarding the combined modelling of various asymmetries. The failure of the NARDL-M model to reject the null hypotheses of reaction and adjustment symmetries leads us to believe that the common practice of confining one's attention to the mean of the conditional distribution of the dependent variable may obscure important underlying effects. Hence, it follows that combination of the NARDL technique with quantile estimation (the NARDL-Q model) may provide profound insights into a range of, as yet, poorly understood economic phenomena.

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CHAPTER 10

Estimation of Money Demand Function of South Korea Considering Regime Switching (국면전환을 고려한 한국의 화폐수요함수 추정)

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Abstract

The stability of money demand function is an important issue in macroeconomic policy implementation. In the spirit of Beyer(1998), we estimate money demand of Korean economy.

Cointegration test with time dummy variables results show that there is not only long-run equilibrium relationship between money demand and macroeconomic variables, but also structural breaks in this equilibrium relationships. And, least squares, state-space and Marcov switching methods shows that there also has been instability(or regime shifts) of parameters in money demand, especially over 1997 crisis and the early 2000s.

This fact implies that monetary policy for stabilization might encounter big problems due to change(instability) of money demand. In special, targeting for monetary aggregates may be misleading rather than targeting for the interest rate.

JEL Classification: E32, O30

Key Word: money demand function, cointegration, Marcov switching

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초록

화폐수요함수의 안정성은 거시경제정책 수행에 있어 중요하다. 본 연구에서는 Beyer(1998)를 따라 한국경제의 거시적 화폐수요함수를 추정하였다.

시간 더미변수를 고려한 공적분분석 결과는 화폐수요와 거시경제 변수간 장기균형관계가 있을뿐 아니라 구조적 전환이 존재함을 보여준다. 또한, OLS, 상태공간 및 마코프 전환모형 모두 특히 1997 년 금융위기 및 2000 년 초반 수요함수 파라미터에 국면전환 (regime shifts)이 있음을 보여준다.

이 같은 결과는 화폐금융정책을 통한 안정화 정책이 난관에 봉착할 수 있음을 보여준다. 특히, 화폐수요의 불안정성

JEL 분류기호: E32, O30

핵심어: 화폐수요함수, 공적분, Markov 국면전환

I. Introduction

The stability of money demand is a central issue of monetary policy. If it is unstable accompanying with the variation of economic variables, like interest rate, the central bank has no certainty about the effects of monetary expansion on output, especially in recession. Nominal income (or interest rate) is determined by the supply and demand in money. So, deep understanding of money demand in a macroeconomy is important to the appropriate implementation of monetary policy.

I. Fisher (1911) presented quantity theory of money showing that under some assumptions, inflation has one-to-one relationship with the quantity of money. He assumed that velocity is nearly constant.

Some economists at Cambridge like Marshall and Pigou presented similar conclusion with his. They gave attention to the utility of money as a store of value.

Monetarists (Friedman 1956, Phelps 1970) also argue that changing the amount of money can affect nominal output in short-run, due to the stability of velocity of money. This stability issue is also important to the inflation theory and policy. If it is stable, then there is close relationship between the money supply (or money growth) and inflation in the long-run. However, if demand responds sensitively to fluctuations of macroeconomic variables, the effect of money is dissipated into both inflation and output. Also, the endogeneity of money supply doubts the arguments of monetarists.

Monetarism or new quantity theory of money may be seen the determination theory of nominal income. This argument is possible since according to them, interest elasticity of money demand is almost zero, so income velocity of money is very stable.

It is incomplete in the sense that examination of aggregate supply side is need to decide how much share is imputed to real income from the change in aggregate demand. Main advantage of empirical study for money demand is that it allows to study the real effects of monetary policy.

The source of demand instability comes from speculative demand theory of Keynes (1936). If money was not veil, which was argued by classical economists, the change in money supply could affect real income. Keynes (1936) admitted the variability of money demand to interest rate, but did not like monetary expansion considering the possibility of liquidity trap.

The first systematically performed econometric study for money demand is Goldfeld (1973).

Beyer (1994, 1998) examined the structural change in money demand in Germany due to the 1990 reunification. He concluded that despite of dramatic change of 1990 in German economy, money demand seemed not to have structural change. He compares his previous results with new results with the addition of sample period including 1990 reunification of Germany. He considers (weak, strong and super-) exogeneity, parameter stability, nonstationarity, cointegration, dummy variables, error correction, stepwise simplified and reparameterized LS, steady state growth path of real money stock, seasonality of data, encompassing tests and the applicability of P-star for M3 in German money demand side. He concluded that from parameter stability tests and long-run steady state derived from ECM, German money demand is stable, in spite of 1990 reunification of Germany.

Lutkepohl et al. (1999), however, found the fact that extending sample period including monetary unification of 1990 revealed substantial instability of German money demand. They estimated nonlinear error correction with STR (smooth transition regression). They concluded that the creation of German Monetary Union did not cause break in money demand.

Sarno (1999) consider Italian money demand and added the concept of adjustment cost and nonlinear (cointegration) dynamics. He considers adjustment of short run money

demand in the nonlinear error correction form. As a specialist for nonlinear long-run dynamics of economic variables like cointegration, he applied this framework to the case of money and other economic variables like interest rates and production. He estimated ECM with TAR error terms. TAR(threshold autoregressive) model is used for testing regime changing.

Fleissig(1998) used the dynamic Laurent form for money demand. He derived asset demand by using direct utility function(DUF) and Mirishima elasticity of substitution, and compared the prediction errors between static and dynamic models.

For the case of South Korea, several authors have contributed to this area in empirical analyses.

Michell(2009) analyzed the tight monetary policy in 1979 of South Korea. Kim(2006) shows that velocity of Korean money has decreased and been unstable. He compares the predictive power for inflation using P-star-model and augmented Phillips curve. We extend this analysis in this study considering Beyer(1994)'s EC method.

In principle, the instability of money demand means that the Marshall's k is responsive(variable) to (the function of) the interest rate, but we consider the parameter instability in the regression equation of money demand on the interest rate in the sense of the second kind of instability in this study.

Main disagreement between real and Keynesian macroeconomists are in the question whether monetary policy can affect real sector like output. Our study focus on the answer for whether Marshall's k is stable in South Korea, if estimable.

This paper consists of the following sections. In section 2, we use ordinary LS for testing stability of money demand. In section 3, we consider the nonstationarity of variables and use cointegration method with structural dummy variables. In addition, we investigate Switching model for seeing structural breaks in money demand. In section 4, we give some summary and conclude.

II. Econometric Model: Linear Regression

1. Basic Model

Intertemporal utility maximizer uses two kinds of assets for saving superfluous income in the current period. Bonds have positive nominal rate of interest, but money has negative real rate of interest considering inflation for goods and services. The main reason that people choose money as their savings instrument is that it has acceptability. So, the demand for money is originally affected by the interest rate as well as the amount of transaction.

The (real) money demand(M/P) is expressed by the function of real income Y , real interest rate r , the inflation rate π and the price level. The main reason why we study money demand to see the relationship between money stock and nominal income is that we examine this issue in the framework of simultaneous equations. If money supply is exogenous, our observations for money and income is the intersections of supply and demand. So, we only need to know the structure of demand.

$$M/P = L(r + \pi, Y)$$

The platform of econometric model is:¹

$$\ln M_t - \ln P_t = \alpha + \beta_1 \ln Y_t + \beta_2 R_t + \varepsilon_t \quad (1)$$

$$\ln M_t - \ln P_t = \alpha + \beta_1 \ln Y_t + \beta_2 SR_t + \beta_3 LR_t + \varepsilon_t \quad (1')$$

We can impose a restriction on the coefficient of income.

$$\ln M_t - \ln P_t - \ln Y_t = \alpha + \beta_1 SR_t + \beta_2 LR_t + \varepsilon_t \quad (2)$$

We use the data of financial institution liquidity(Lf; M) as monetary aggregate. it includes M2 and long-term time deposit, reserve of nonbanking financial intermediaries(eg. insurance company), etc. Price level(P) is used by CPI. Also, daily call rate and the interest rate of corporate bond are used as short-run(SR) and long-run(LR) interest rates, respectively. Data come from BOK, and are monthly from 1965 to 2009 of Korea. We use industrial production index as an income variable(Y) instead of GDP.

We transform the level variable into log value denoting by lowercase letters:

$$m_t - p_t - y_t = \alpha + \beta_1 SR_t + \beta_2 LR_t + \varepsilon_t \quad (2')$$

The RHS can be viewed as the inverse of velocity, and <Figure 1> shows that it is unstable across sample periods. To confirm the logic of traditional Keynesian view that income velocity of money varies in response to the change of the interest rate, we performed causality(exogeneity) test. Unstability of velocity implies unstability of real money demand. Macroeconomists have different views on the stability of velocity. Our study may give a little insight on empirical evidence. Velocity is equal to the inverse of Marshall's k.

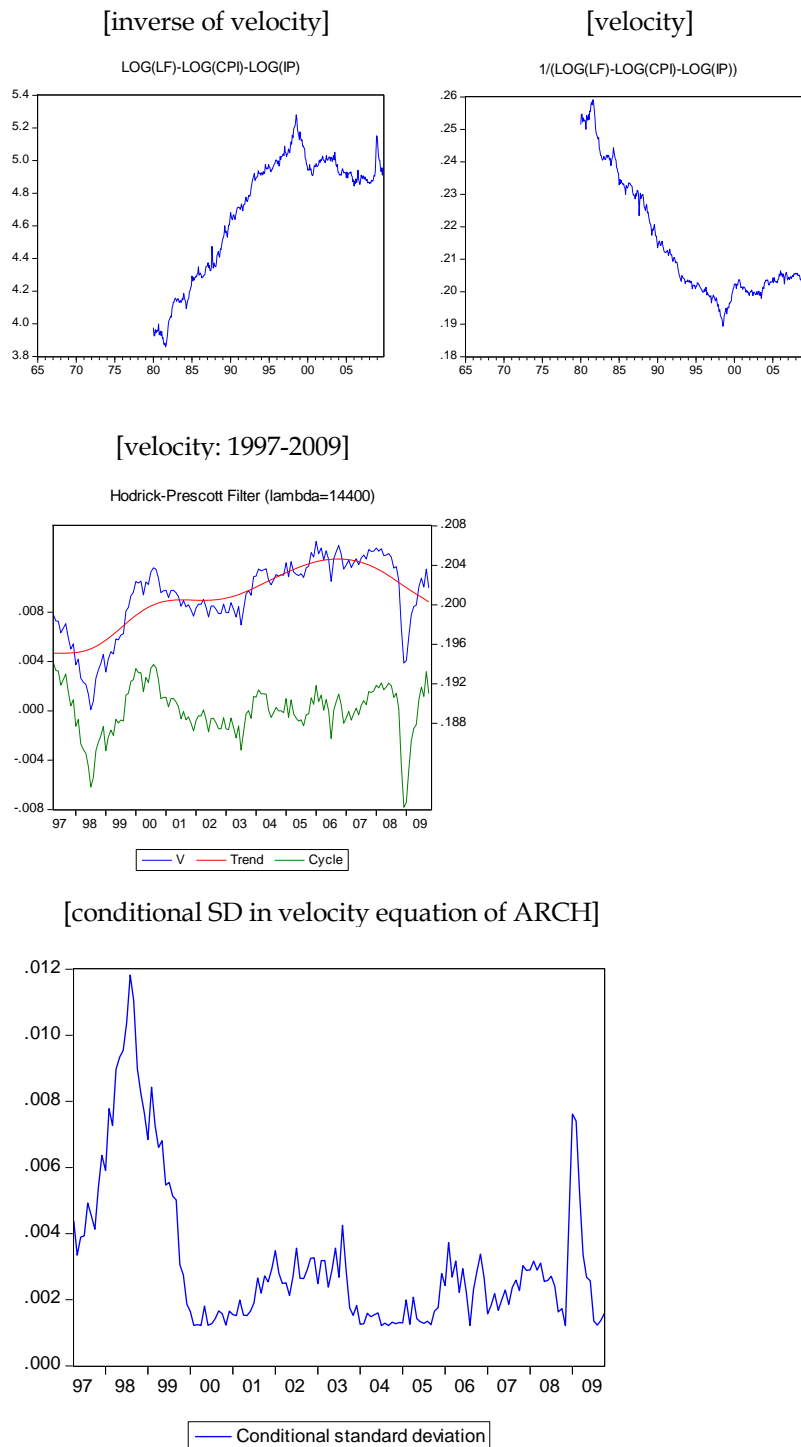
We can see the unstability of velocity across sample periods. Velocity had decreased until 1997 financial crisis, and after that showed slightly upward trend.

Instability in money demand may mean two different facts. First, velocity is the function of the interest rate. Second, the function may have structural change. We find that velocity has decreased until recently, and the volatility of velocity itself is high. We investigate these two implications in this study, and derive appropriate policy implications.

The volatility is measured by time-varying standard deviation(or variance) in ARCH equation for velocity.

¹ We omit the inflation variable in this analysis as explanatory variables, focusing only on the production and the interest rates.

Figure 1. Implied Income Velocity of Money, Conditional SD



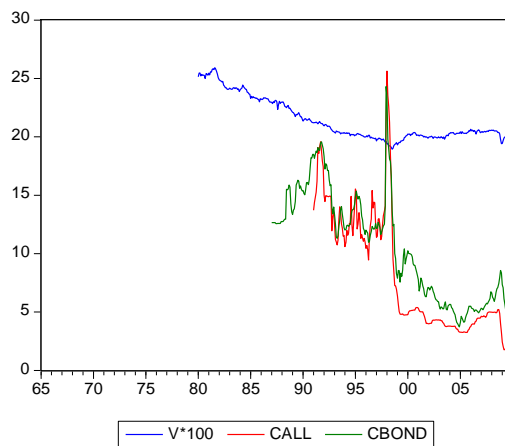
$$y_t = \beta_0 + e_t$$

	Coefficient	Std. Error	z-Statistic	Prob.
C	0.202	0.000	1099.105	0.000

$$h_t = \alpha_0 + \alpha_1 e_{t-1}^2, \quad \alpha_0 > 0, \quad 0 \leq \alpha_1 < 1$$

C	0.000	0.000	6.642	0.000
RESID(-1)^2	0.803	0.303	2.653	0.008

[velocity and LR,SR interest rates]



[growth rate of velocity]

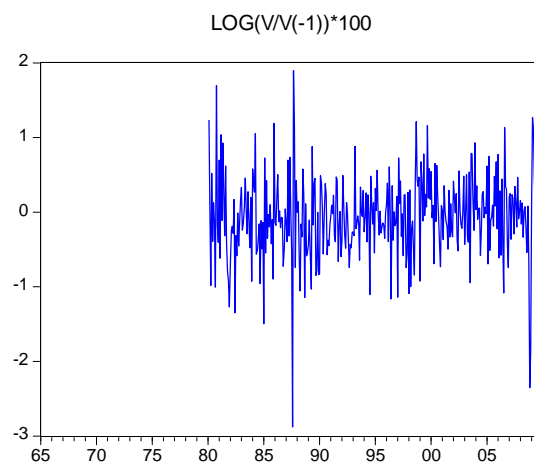


Table 1. Cointegration Test Results

Hypothesized	No. of CE(s)	$r \leq 1$
Eigenvalue		0.022
Trace	Statistic	6.027
0.05	Critical Value	3.841

Yielded cointegrating vector

$V = -0.005CALL$

(0.00134)

Cointegration test using trace test (trace test statistic is a function of canonical correlation in VAR variables or residuals) shows that there are two relationships, and normalized (for velocity) cointegration vector implies that velocity is well explained by the interest rate. But, in contrast to our intuition that velocity is increasing function of the interest rate, the sign of vector is minus. We discuss this issue in detail later.

2. Causality

Engle et al. (1993) consider the exogeneity of explanatory variable. Our interest is for the exogeneity of the interest rate. We performed pairwise Granger causality test. Generally, no existence of causality in reverse side and weak exogeneity lead to strong exogeneity. Test results show exogeneity of the short run (nominal) interest rate variable (CALL).

[Hereafter, we use the following abbreviation; money: LF, price level: CPI, short-run interest rate: CALL, long-run interest rate: CBOND, output: IP]

Table 2. Causality Tests

Null Hypothesis:	Obs	F-Statistic Prob.
$CALL \rightarrow LOG(LF)-LOG(CPI)-LOG(IP)$	224	3.92 0.0212**
$LOG(LF)-LOG(CPI)-LOG(IP) \rightarrow CBOND$		2.60 0.0758*

We also test the exogeneity of each RHS variable in unrestricted model.

$$\ln M_t - \ln P_t = \alpha + \beta_1 SR_t + \beta_2 LR_t + \beta_3 \ln Y_t + \varepsilon_t \quad (3)$$

Test results show no exogeneity in the interest rate variables. But, we do not consider this problem in unrestricted model seriously in this section.

3. OLS and Parameter Stability

OLS

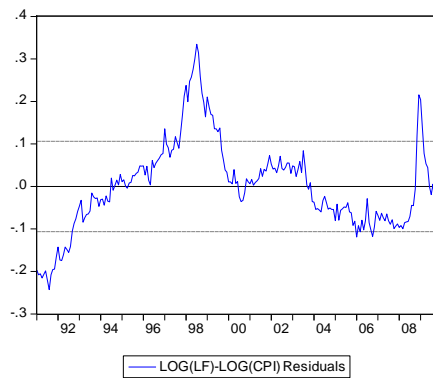
To test structural break, we firstly estimate the following equation by OLS:

$$\ln M_t - \ln P_t = \alpha + \beta_1 SR_t + \beta_2 LR_t + \beta_3 \ln Y_t + \varepsilon_t$$

The results are in <Table 3>. The coefficient for long-run interest rate is estimated negative significantly. Residual plot implies something missed in equation.

Table 3. OLS for Money Demand (LOG(LF)-LOG(CPI))

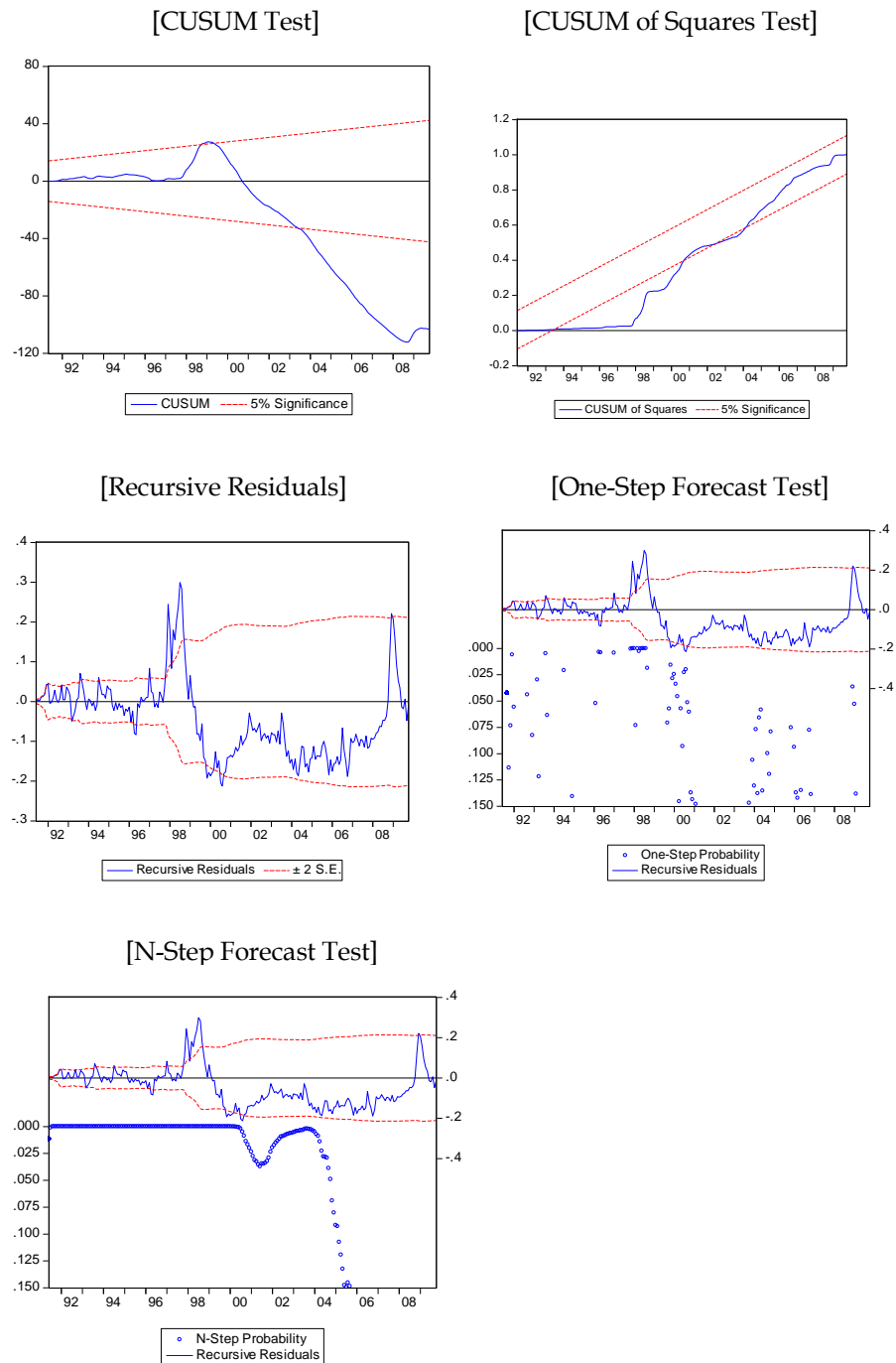
	Coefficient	Prob.
C	5.081	0.00
CALL	0.005	0.25
CBOND	-0.009	0.08*
LOG(IP)	0.981	0.00**



Parameter Stability: Recursive Residuals

We perform some stability tests for this OLS estimation model. These stability tests see whether some structural break in parameters occurred in the sample period. This investigates the second kind of instability, that is, V is not only the function of the interest rate but also its coefficient is not constant across periods.

Figure 2. Recursive Residuals Test for Parameter Stability



Recursive residual is defined in EViews 6.0 as:

$$w_t = (\text{OLS residual}) / (\text{Forecast error Variance})^{1/2}$$

Parameter stability tests are based on these residuals. All parameter stability tests show that in two sub-period, 1997 crisis and the late 2000s, significant deviations (instability) of parameters from normal value. (except for CUSUM of squares, Fig.2)

We use other recursive LSs: CUSUM of squares, one-step forecast, n-step forecast tests. From <Figure 2>, we can also see instability over 1997 crisis and the late 2000s.

The CUSUM test is used for stability of regression function. It is based on the recursive residuals. If these recursive residuals deviate from the SE bands, we can infer that there is parameter instability. The CUSUM of squares test uses the square of recursive residuals. One-step forecast test shows a plot of recursive residuals, SE and points whose probability is at or below 15%. N-step forecast test carry out a sequence of Chow forecast test. (EViews 6)

We also use Chow's breakpoint, Quandt-Andrews breakpoint, and Chow's forecast tests. Test results show that there was significant breakpoint. Chow's forecast test compares the results for two different models. These facts well contrast with those of Bayer(1998) showing no significant instability in Germany.

Table 4. Chow Test for Parameter Stability

Chow Breakpoint Test: 1997M04	
Prob. F(5,216)	0.0000**
Prob. Chi-Square(5)(LR)	0.0000**
Prob. Chi-Square(5)(Wald)	0.0000**

Chow Forecast Test: Forecast from 1997M04 to 2009M10	
Prob. F(151,70)	0.0000**
Prob. Chi-Square(151)	0.0000**

	1991M01 1997M03	1997M04 2009M10
C	3.862	5.992
CALL	0.003	-0.004
CBOND	-0.024	0.009
LOG(IP)	1.358	0.763
D(LOG(CPI))	-1.170	-2.209

Chow Breakpoint Test: 2000M01	
Prob. F(4,218)	0.0000**
Prob. Chi-Square(4) LR	0.0000**
Prob. Chi-Square(4) Wald	0.0000**

Chow Forecast Test: Forecast from 2000M01 to 2009M10	
Prob. F(118,104)	0.0000**
Prob. Chi-Square(118)	0.0000**

Quandt-Andrews Break test performs the test of breakpoint between two data points by summing different k statistics at all observations. This examine whether there is break point between two points. Test results are in <Table 5>, and shows rejection of hypothesis of no structural break. In contrasts with ours, Bayer(1998) performs Mean Wald(Mean F), Exponential Wald, and Hansen's L_C tests.

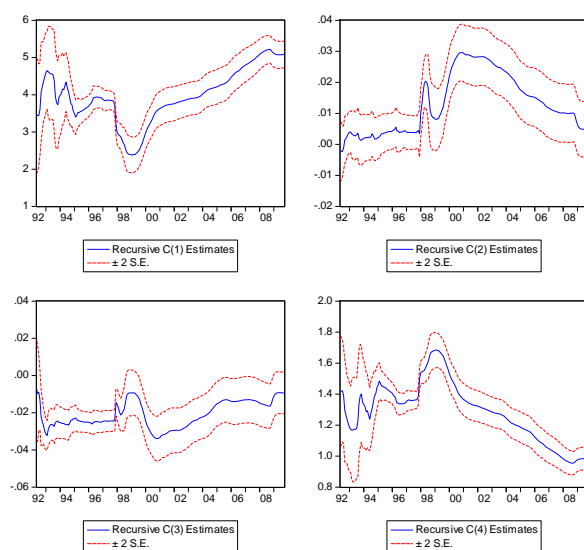
Table 5. QA Test for Parameter Stability

Quandt-Andrews unknown breakpoint test	
Statistic	Prob.
Maximum LR F-statistic (1997M10)	0.0000**
Exp LR F-statistic	0.0000**
Ave LR F-statistic	0.0000**

Parameter Stability: Recursive Coefficients

We also estimate recursive coefficients adding new samples iteratively. Strong variation implies parameter instability and the existence of structural- break.<Figure 3> Recursive coefficients shows probable break in parameter value at 1997 and 2000.

Figure 3. Recursive Coefficient Estimates



	Coefficient
C	C(1)
CALL	C(2)
CBOND	C(3)
LOG(IP)	C(4)

State Space: Time-Varying Coefficient

Finally, we estimate state-space model which make possible to estimate time-varying coefficient using Kalman-filter. That is, we estimate simple state-space model for time-varying coefficient of short interest rate. We also can use GLS for estimating coefficient, but implementing large matrices for parameters(states) and errors.

To model the time-varying coefficient, we use state-space model adopting the famous Kalman filter. Kalman filter uses two-step procedure: prediction and updating(smoothing). Prediction for dependent variable is need for the updating of parameter estimate. For that, it is necessary to calculate the estimate of parameter based on information up to the past period. Prediction stage gives information for prediction error. We can use this for updating the parameter estimate. In the first stage, we form an optimal forecast of dependent variable, conditioned on the all available information up to the past. For this, we need an optimal forecast of parameter, conditioned on the all available information up to the past.

$$\beta_{t|t-1} \rightarrow y_{t|t-1} \rightarrow \beta_{t|t}$$

This space model is useful for models with unobserved variables like: inflation expectation, natural rate of unemployment, permanent income, normal level of interest rate(Keynes) and reservation wage. For unknown value of parameters, in general, log-likelihood is used.

The coefficient for the short interest rate reveals strong time-varying properties and substantial variation. <Table 6>

Estimation results shows that in early 1990s, this coefficient(or marginal effect) has negative value, but has increased in its value into positive effect. This also seems to affect the stability of money demand. It is worth noting that this estimates are different from those of recursive residuals. In this model, the coefficient shows upward trending, but recursive case mixed. Notwithstanding, we can conclude that the response of money demand to the change in the interest rate is unstable. It's implication is important in that Bank of Korea performs monetary policy through affecting the (target) Call rate(eg. Target Federal Funds Rate in the US) in hope of transmitting the effects into the long-run (nominal) interest rate like Corporate bond rate. So, monetary policy focusing on the short rate may be misleading in South Korea, since the marginal effect(the value of coefficient) is unstable.

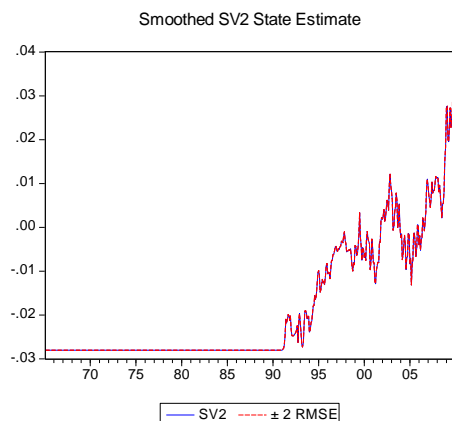
Table 6. Random Coefficient Model: State-space Model

$$\log(lf) = c(1) + sv \cdot call + c(2) \cdot \log(cpi) + c(3) \cdot \log(ip) + c(4) \cdot cbond + e$$

$$\text{state } sv = sv(-1) + u$$

	Coefficient	Prob.
C(1)	2.879	0.0000**
C(2)	2.394	0.0000**
C(3)	0.049	0.0351**
C(4)	-0.001	0.5236
C(5)	-11.85	0.0000**
	Final State	Prob.
SV	0.033	0.0000**

[Estimated time-varying coefficient for short run interest rate]



III. Long-Run Relationship: Cointegration and Error Correction

As proceeds in this section, all variables in the money demand are nonstationary. This fact may invalidate the analysis of the previous section using OLS. But, if there are cointegration relationships between variables, it is known OLS estimators are superconsistent. (Davidson and MacKinnon, 1993) Stock and Watson (1988) argue that cointegrated series have a common trend of some sort. We can interpret that linear combination of two cointegrated series is stationary, since this series do not have something that must be present in original nonstationary series.

In this cointegration analysis, we add dummy variables denoting structural breaks in the long-run equilibrium relationship.

From these bases, we can compromise the cointegration analyses with those of LS methods of the previous section.

1. KPSS Test for Stationarity

As a first step, we perform unit-root test using Kwiatkowski et al. (1992) (KPSS) method, which is recently widely used. This method reverses the strategy of ADF, that is, the null hypothesis is stationarity of variable. Test results show that all variables are nonstationary, $I(1)$ variables.

Table 7. KPSS Test

Null Hypothesis: LOG(LF/CPI) is stationary	LM-Stat
Kwiatkowski-Phillips-Schmidt-Shin test statistic	2.239
Asymptotic critical values*:	5% level
	0.4630
Null Hypothesis: LOG(LF) is stationary	2.2750
Null Hypothesis: LOG(CPI) is stationary	2.748
Null Hypothesis: CALL is stationary	1.570
Null Hypothesis: CBOND is stationary	1.576
Null Hypothesis: LOG(IP) is stationary	2.298

2. Cointegration and Error Correction

The form of econometric model analyzing long-run relation is:

$$\ln M_t - \ln P_t = \alpha + \beta_1 \ln Y_t + \beta_2 R_t + \varepsilon_t$$

Estimated cointegrated vector(long-run relationship) is:

$$\ln M_t - \ln P_t = 0.87 \ln Y_t - 0.04 SR_t - 0.02 LR_t \quad (1)'$$

Adding restriction to the coefficient of income reduces:

$$\ln M_t - \ln P_t - \ln Y_t = 0.32 SR_t - 0.11 LR_t \quad (2)$$

The estimates for cointegrating vector in equation (2) show that the income velocity of money(the inverse of LHS) is positively related with long-run interest rate. Our estimation for cointegration vector assures that a single-equation model for the long run money demand is appropriate and a valid way to proceed.(Greene, 2008)

BOK(2002) reports that the elasticity of money demand to income and interest rate as 1.16 and 1.5, respectively(2004).(compared to ours, 0.87 and 0.11) Conventional estimates (for the US) reports the elasticities as 1 and 0.2.(Goldfeld and Sichel, 1990)

Table 8. Cointegration Vector Estimates and Test Results

Specification (1)'

Normalized cointegrating coefficients (standard error in parentheses)			
LOG(LF)-LOG(CPI)	CALL	CBOND	LOG(IP)
1.000	-0.044	0.017	-0.869
	(-0.026)	(-0.032)	(-0.214)

Unrestricted Cointegration Rank Test (Trace)			
Hypothesized		Trace	
No. of CE(s)	Eigenvalue	Statistic	Prob.**
$r \leq 0^*$	0.116	61.084	0.002
$r \leq 1^*$	0.085	33.927	0.016
$r \leq 2$	0.043	14.350	0.074
$r \leq 3^*$	0.021	4.709	0.030
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)			
Hypothesized		Max-Eigen	
No. of CE(s)	Eigenvalue	Statistic	Prob.**
$r \leq 0$	0.116	27.158	0.057
$r \leq 1$	0.085	19.576	0.081
$r \leq 2$	0.043	9.641	0.237
$r \leq 3^*$	0.021	4.709	0.030

Specification (2)

Normalized cointegrating coefficients (standard error in parentheses)		
LOG(LF)-LOG(CPI)-LOG(IP)	CALL	CBOND
1.000	-0.320	0.112
	(-0.105)	(-0.126)

Unrestricted Cointegration Rank Test (Trace) Specification (2)			
Hypothesized		Trace	
No. of CE(s)	Eigenvalue	Statistic	Prob.**
$r \leq 0^*$	0.086	37.259	0.028
$r \leq 1$	0.044	17.398	0.069
$r \leq 2$	0.033	7.347	0.007
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)			
Hypothesized		Max-Eigen	
No. of CE(s)	Eigenvalue	Statistic	Prob.**
$r \leq 0$	0.086	19.862	0.172
$r \leq 1$	0.044	10.051	0.393
$r \leq 2$	0.033	7.347	0.007

Specification (3)²

Restricted cointegrating coefficients (standard error in parentheses)				
LOG(LF)	LOG(CPI)	CALL	CBOND	LOG(IP)
1.0	-1.0	-0.087	0.049	-0.736
(0.00)	(0.00)	(0.01)	(0.02)	(0.14)

[across sample periods]

Sample (adjusted): 1991M06 1996M12					Sample (adjusted): 1997M01 2009M10				
LOG(LF)-LOG(CPI)	CALL	CBOND	LOG(IP)	C	LOG(LF)-LOG(CPI)	CALL	CBOND	LOG(IP)	C
1.000	0.463	-0.349	-0.947	-8.564	1.000	0.671	-0.080	3.143	-19.374

Sample: 1997M01 1999M12					Sample (adjusted): 2000M01 2009M10			
LOG(LF)-LOG(CPI)	CALL	CBOND	LOG(IP)	C	LOG(LF)-LOG(CPI)	CALL	CBOND	LOG(IP)
1.000	0.075	-0.040	0.623	-12.208	1.000	-0.507	0.256	-1.537

[GDP Deflator and GDP]

Normalized cointegrating coefficients (standard error in parentheses)			
LOG(LF)-LOG(CPI)	CALL	CBOND	LOG(IP)
1	-0.044	0.017	-0.869
LOG(LF)-LOG(DEFLATOR)	CALL	CBOND	LOG(GDP)
1	0.06	-0.11	-1.79

Normalized cointegrating coefficients (standard error in parentheses)		
LOG(LF)-LOG(CPI)-LOG(IP)	CALL	CBOND
1.00	-0.32	0.11
LOG(LF)-LOG(DEFLATOR)-LOG(GDP)	CALL	CBOND
1.00	0.14	-0.13

The bottom of <Table 8> shows two separate cointegrating vector estimates. It reveals that after crisis, regime changed into high-demand (higher constant term) in South Korea. In two separate cointegration, the elasticity of short-run interest rate has minus sign, in contrast with full sample cointegration. The sign for production (or income) change into minus. This may be due to development in financial instruments like evolution of payment system (e-money or electronic payments).

It is worth noting that if we use GDP and GDP deflator instead of Industrial Production and CPI, cointegration relationships themselves also exist, but, the sign and magnitude do not coincide with original estimation. The main reason is that CPI only considers the basket of consumption goods and IP index only have about (1/3) share of GDP.

We also construct VEC (vector error correction) model considering short-run money demand change. VEC model has an advantage that it represent not only long-run response

² This restricted specification need not yield cointegration test result.

(cointegrating part), but also the speed at which it responds to change in equilibrium error.(EC part) Lag exclusion Wald test result shows that optimal lags in VEC are 4. VEC is a special case of VAR when the variables are nonstationary[I(1)] and cointegrated.

Estimation results show the coefficient of cointegrating error is significantly negative. This means that if demand is unusually high relative to cointegrated explanatory variables, demand change may decrease. Exogeneity test results show no significant casality.

Table 9. Exogeneity Tests and Cointegration Vector, Error Correction Estimates

VEC Granger Causality/Block Exogeneity Wald Tests			
Dependent variable: D(LOG(LF)-LOG(CPI))			
Excluded	Chi-sq	df	Prob.
D(CALL)	1.160	4	0.88
D(CBOND)	7.288	4	0.12
D(LOG(IP))		4	0.93
All	16.87	12	0.15

Specification 1 (D denotes change)

Cointegrating Eq:	CointEq1
LOG(LF(-1))-LOG(CPI(-1))	1.000
CALL(-1)	-0.043
CBOND(-1)	0.017
LOG(IP(-1))	-0.868
C	-5.322
Error Correction:	D(LOG(LF)-LOG(CPI))
CointEq1	-0.0144**

VAR(Vector Autoregression) model is useful in estimating impulse response function and deriving variance decomposition. The former is the function of the parameter coefficients in reduced form system and the latter the share of the error explained by the variance of specific explanatory variable.

Variance decomposition result shows the contribution of each type of shock to the variance of forecast error. Excluding its own contribution, the shock of long-run interest rate has the largest contribution. That is, its explanation power for money demand is highest. We can infer this share of contribution as "speculative money demand(Keynes-Tobin)", which decreases as the interest rate increase. The innovation in IP may be the effect from "transactions motive(Baumol-Tobin)".³ This can be captured more accurately using the data of GDP.

Our previous results of having significantly negative coefficient for the long-run interest rate and having large explanatory power in explaining the forecast error variance in money demand reveal that Korea's money demand is unstable in the first sense of instability, which means velocity is the function of long-run interest rate.

³ People receive income regularly. They contemplate between changing into cash incurring opportunity cost(interest rate) and retaining in the savings account. This decision is affected by the amount of income. Later, Miller and Orr(1966) provide new version of transaction demand.

Figure 4. Variance Decomposition

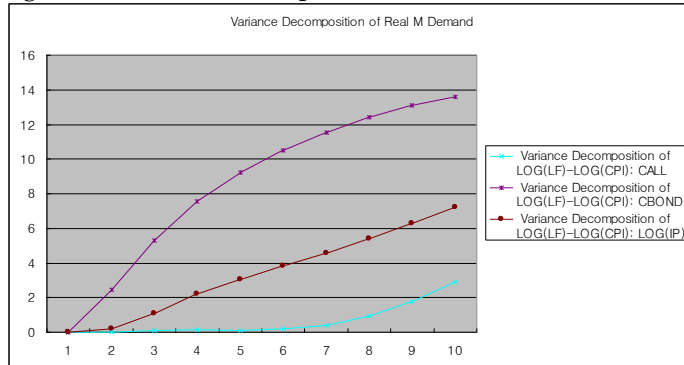
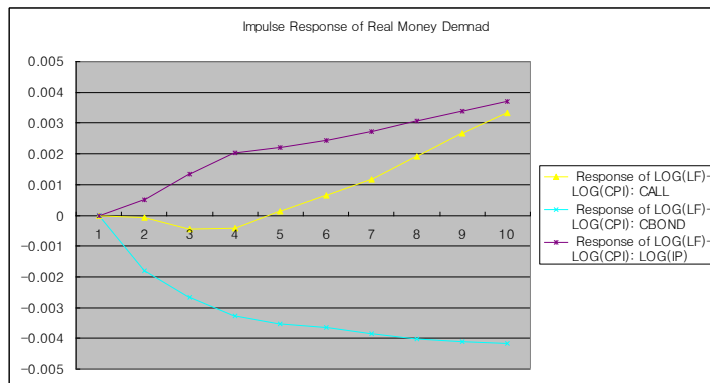
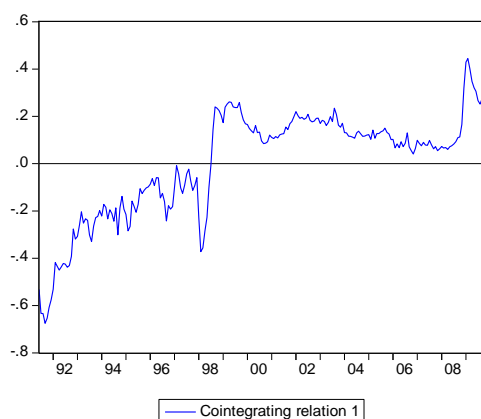


Figure 5. Impulse Response



Estimation for impulse response function shows that the shocks in production have the largest impact on real money demand. <Figure 6> shows the equilibrium error in cointegration equation. It shows that before 1997, the error has negative sign, and short-run money demand had increased in response to this deviation from long-run relationship, and vice versa, after that. This implies that there was structural break of money demand in 1997 in that before that actual money demand was lower than that of long-run equilibrium value suggested by cointegration vector estimate.

Figure 6. Equilibrium Error



Finally, we use dummy variables applied to suspected break points. We have to note that first dummy is different from that of the previous section.

Dummy1: 1 after 2003M01, 0 otherwise

Dummy2: 1 after 1997M01, 0 otherwise

These variables enter both into cointegration part and error correction part. Estimation results show that both dummies are significant and reduce both the level and change of money demand than otherwise. Two kinds of dummy are important, since the former implies the change(break) in the cointegration relationships, the latter the change in speed at which short run error correction occurs. Error correction model with two dummies shows that in the equations of real money demand and production(IP), the error correction coefficients are statistically significant. In contrast with Bayer(1994, 1998), we included dummy variables into the cointegration relation. All these dummies are significant in both short and long run relationships.

Table 10. Cointegration Vector and Error Correction Estimates with Dummy Variables

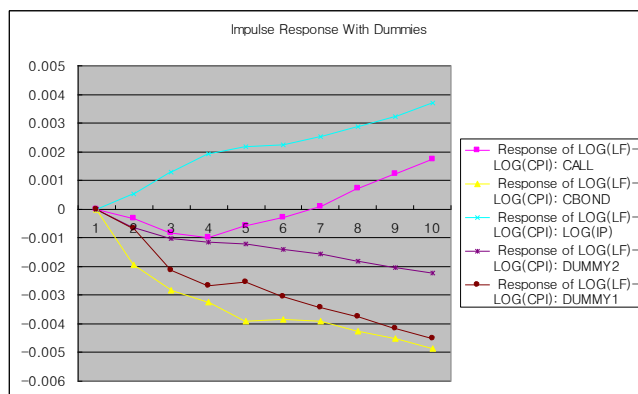
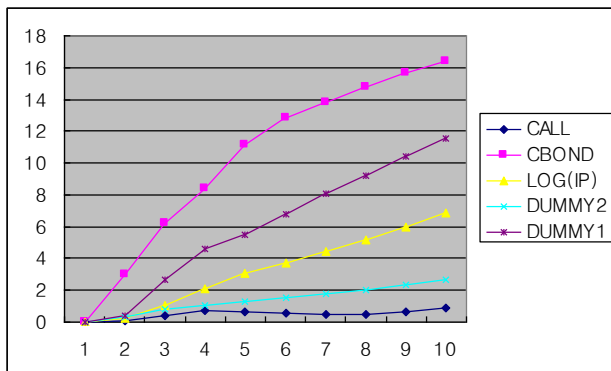
Normalized **cointegrating coefficients** (standard error in parentheses)

LOG(LF)- LOG(CPI)	LOG(IP)	CALL	CBOND	DUMMY2 (low money demand)	DUMMY1 (lower money demand change)
1.0	-1.85	-0.10	0.08	0.48	0.57
	(0.328)**	(0.029)**	(0.034)**	(0.158)**	(0.156)**

Error Correction:	D(LOG(LF)- LOG(CPI))	D(CALL L)	D(CB OND)	D(LO G(IP))	D(DUMMY2) (low money demand)	D(DUMMY1) (lower money demand change)
CointEq1	-0.012**	0.1707	0.3420	0.018**	-0.040**	-0.000
t-ratio	[-5.146]	[0.607]	[1.292]	[2.606]	[-1.981]	[-0.039]

Variance decomposition and impulse response show that long run rate has the highest explanatory power, and production(IP) has the highest effects on money demand, which are similar to those without dummies.

[Variance Decomposition with Dummies]



3. Marcov Switching

Marcov switching model is extension of the simple F-test of model stability of Chow(1960). Goldfelt and Quandt(1973) introduce Marcov switching model where the time of switching is endogenous in the model. For simplicity, we introduce in this section the case of independent switching only considering constant terms. The probability to state 2(S_2 : low money demand) is expressed as logistic distribution. Main intuition of this estimation is: Chow test is only applied when transition point is known. But, in many cases, it is unknown due to imperfect information in data. So, turning point is estimated as well as parameters. Estimation is performed by ML. Main difference between normal estimation is that marginal distribution of dependent variable has component of the probability of the state. This probability is expressed by logistic distribution with an unknown parameter.

For estimating parameters, we set the following log-likelihood function.

$$\ln L = \sum \ln \sum f(y_t | S_t, I_{t-1}) \Pr[S_t | I_{t-1}]$$

The simple econometric model is:⁴

$$(\ln M_t - \ln P_t)_1 = \alpha_1 + \varepsilon_{1t}, \quad \varepsilon_{1t} \sim N(0, \sigma^2_1) : \text{high money demand}$$

$$(\ln M_t - \ln P_t)_2 = \alpha_2 + \varepsilon_{2t}, \quad \varepsilon_{2t} \sim N(0, \sigma^2_2) : \text{low money demand}$$

$$P(s=2)=p$$

$$P(s=1)=1-p$$

Table 11-1. Estimation of Marcov (Independent) Switching Model

MAXIMIZE - Estimation by BFGS

Variable	Coeff	Std Error	T-Stat	Signif
P	0.426	0.065	6.506	0.000**
A10	9.375	0.049	189.3	0.000**
A20	7.724	0.158	48.704	0.000**
SIGMA1	0.243	0.039	6.09	0.000**
SIGMA2	0.901	0.097	9.27	0.000**

The simple econometric model is:

$$(\ln M_t - \ln P_t)_1 = \alpha_1 + \beta_1 \ln Y + \varepsilon_{1t}, \quad \varepsilon_{1t} \sim N(0, \sigma^2_1) : \text{high money demand}$$

$$(\ln M_t - \ln P_t)_2 = \alpha_2 + \beta_2 \ln Y + \varepsilon_{2t}, \quad \varepsilon_{2t} \sim N(0, \sigma^2_2) : \text{low money demand}$$

$$P(s=2)=p$$

$$P(s=1)=1-p$$

⁴ This switching model may have some problem, since we mix stationary variable(constant) with nonstationary dependent variable. This problem should be considered in general view of ML in that whether variables with unit root can be used in likelihood function.

Table 11-2. Estimation of Marcov (Independent) Switching Model

Variable	Coeff	Std Error	T-Stat	Signif
P	0.70	0.05	12.18	0.00
A10	2.71	0.11	24.21	0.00
A20	3.16	0.06	51.22	0.00
A11	1.55	0.03	49.85	0.00
A21	1.37	0.01	92.42	0.00
SIGMA1	0.14	0.01	10.54	0.00
SIGMA2	0.05	0.00	6.15	0.00

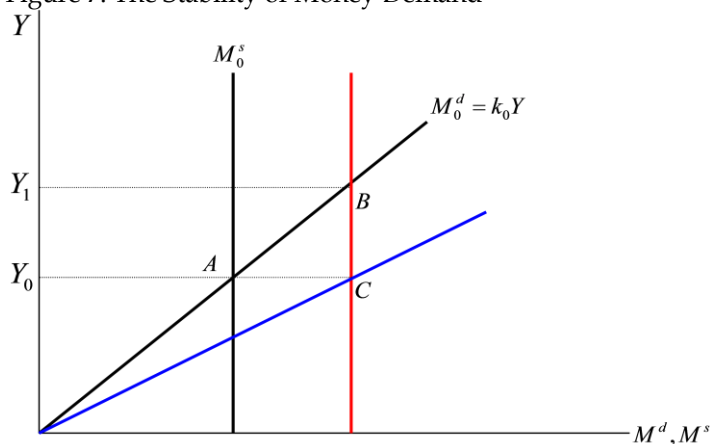
The main difference between Chow test is that regime switching is alternate in whole sample in this Marcov Switching model. In contrast, in F test model for structural break, switching occurs only once.

There are both high money demand regime and low demand regime. The probability to transition to low regime is 0.426. The implication of this outcome is that our demand equation with just constant reveals regime switching.

For simplicity, we only consider independent switching, and more rigorous analysis of (endogeneous) Marcov switching considering explanatory variables is needed in future research.

4. Monetary Policy Implications

Figure 7. The Stability of Money Demand



Basic intuition for this diagram comes from monetarist's.

Money demand M^d

$= k \times P \times Y$

Money supply $M^s = M^*$

Market Equilibrium $k \times P \times Y = M^*$

If the supply of money increases, people use this surplus of money as spending goods and services. So, the price or real output increases, and nominal income also increases. This idea comes from Cambridge economists, like Pigou and Marshall. They thought that

people hold money as medium of exchange or store of value. Interest rate does not affect money demand.

The implication of the stability in money demand is understood well by using <Figure 7>. Government(BOK) wants to increase the nominal income by expanding money supply. It hopes to increase nominal income(to B), then, affect real income that is important to resource allocation only if inflation is stable. But, only if money demand(M_d) is stable, it can attain its initial goal. If money demand also moves(to OC) responding accompanying corresponding change in the interest rate, it's policy cannot affect the real economy. Until now, almost all of empirical evidences reveal unstable money demand. So, they imply monetary policy focusing on changing monetary aggregate may fail due to undesirably unstable money demand.

Meanwhile, it is worth noting that Cambridge school consider the transmission mechanism of money supply increase as follows: if money increases in excess of demand, then the difference between supply and demand is spent on goods and services. This leads to inflation. It is important to note that this effect occurs clearly only if money demand is stable.

If we express money demand as:

$$M_d = k(R) P_y = 1/V(R) [P_y]$$

R: nominal interest rate

In macroeconomics, the first kind of instability in money demand means that the Marshall's k is the function of (nominal) interest rate, not the fact that the relation between R and M is unstable. We need to recollect the Goodheart's law and Lucas critique(1976). In addition, financial innovation(eg. innovation of new product of banks) made the money demand respond more to the rates of return in diverse assets. The effects of money growth on the interest rate in conventional short-run analysis is normally called liquidity effect. Permanent increase in money growth affects output by reducing real rate of interest.

In the above figure, we denote nominal income in y-axis. For policy perspective, both inflation(or the level of price) and real income are important. So, we can use inflation for y-axis variable.

Baumol and Blinder(2006) summarize the determinants of income velocity as follows: First, the frequency with which paychecks are received. Second, the efficiency of payments mechanism like the use of credit cards, third, the rate of interest, fourth, the expected rate of inflation.

Cheong and Kim(2007) presents the factors that prevent economists from forecasting demand accurately. First, they point out aggregate supply shocks like the second oil shock in 1979. Second, many countries adopted monetary targeting, and set the amount of monetary aggregate as intermediate target. But, as soon as government controlled the money stock, the behavior of the index of money was changed.(Goodhart's law) Third, financial deregulation, liberalization, globalization have made money demand unstable. Technical progress in financial management, spread of universal banking(from 2008), financial innovation and deregulation in the determination of the rate of interest in deposit account. In special, the development of alternative assets substitutable for money exacerbated the problem of instability in money demand. Finally, introduction of inflation targeting increased the volatility of interest rate, and contributed to the instability of money demand.

From our empirical evidences, we can infer the following facts about the causes of unstable money demand;

Big depression due to financial crisis(currency + banking) caused large parameter instability in demand, in the view of instability means changing the relationship between V and LR .

Government transformed currency market into (managed) floating in Dec. 1997.

Overnight interbank loan market was liberalized and the determination of the call rate in this market outcome was deregulated.

In the mid- and late 1990s, overuse of credit card became social problem in South Korea, and this led to instability(increase) of velocity and liquidity constraints for borrowers with low credit.

In July, 1997, part of the rates of interest in deposit accounts were deregulated. These rates were the costs of banks in financing loan to private firms.

In 1998, BOK introduced inflation targeting policy. This focused on short run interest rate(call rate) as operational target of inflation targeting.

The following shows important change in payments mechanism, financial market and financial innovation, which seem to have affected the structure in money demand.

[Recession or Depression]
97-98
[Deregulation]
97. 12 floating
98. 5 stock market liberalize
99.5 call rate
02.4 foreign exchange market reform
04. 2 interest rate liberalization
[Monetary Policy]
98.4 Inflation targeting

Table 12. Deregulation for Interest Rates (BOK)

	Lending	Deposit	Bond
Stage 1 (1991. 11)	Short run loan	Long run savings deposit &(CD, RP so on)	Corporate bond
Stage 3 (94. 7~95. 11)	Discount Rate	Demand deposit	-
Stage 4 (1997. 7)	-	(7 days- 3 months) savings account	-
Current	Subsidy	Demand deposit	

Figure 8. The amount of credit card used(BOK, mil. Won)

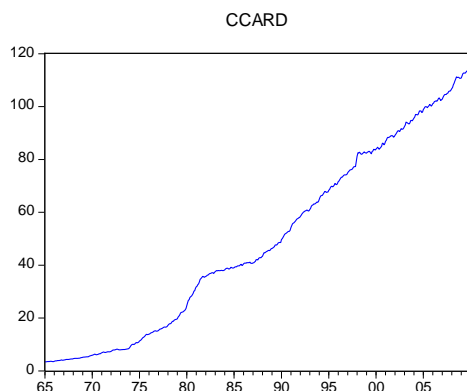


Table 13. Cointegration between V and the amount of credit card used(CCARD)

Normalized cointegrating coefficients (standard error in parentheses)			
LOG(V)	LOG(CCARD)	CBOND	CALL
1.00	0.36	0.00	0.03
	(-0.11)	(-0.01)	(-0.01)

Total amount of credit card has increased steadily until recently. Cointegration with V means our equation is sufficient for imputing money demand instability to innovation in payment system. It is worth noting that V is decreasing with the amount in contrast with the intuition that card use generally increase the income velocity.

5. Monetary Policy: Interest Rate as Operational Target

We decompose the variance of forecast error of economic variables to see how much effects in monetary aggregates go to real output and inflation. As a theoretical model, we give that of Poole(1970).

IS equation: $y = c - ai + \varepsilon$

Money market equilibrium: $m - p = hy - ki + v$

y: real output, m: money, p: price level, i: interest rate

We can show that interest rate targeting have desirable effect in stabilizing output rather than monetary targeting in the case of unstable money market.

Meanwhile, it is important to note that (unexpected) monetary (supply) shock affects both prices and output. How much the effects are in each case can be analyzed by the Lucas(1972) imperfect information model.

The aggregate demand equation is

$$y_t = m_t - p_t$$

The Lucas supply curve is

$$y_t = b(p_t - E p_t)$$

We assume that money supply follows the random walk with drift

$$m_t = c + m_{t-1} + u_t$$

(u_t) : white noise

Then aggregate demand is

$$y_t = c + m_{t-1} - p_t + u_t$$

Hence, the aggregate price and output are determined by unexpected money growth

$$p_t = c + m_{t-1} + [1/(1+b)]u_t$$

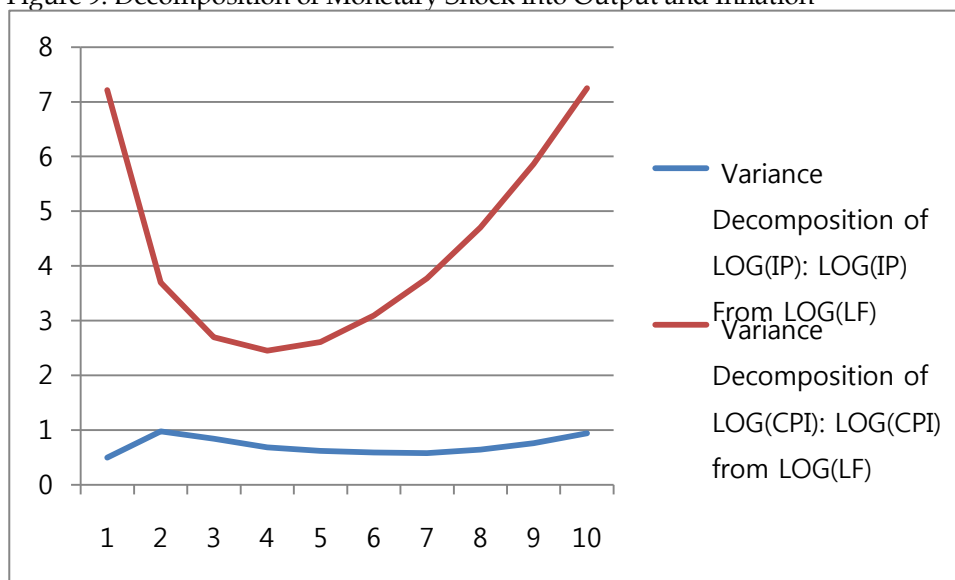
$$y_t = [b/(1+b)]u_t$$

In this study, specifying and estimating 3 variable VAR model gives the answers for variance decomposition related with variation of money.

Much of change in inflation rather than industrial production is due to increase of money. We can infer that aggregate AS curve is almost vertical in South Korea. Also, AD curve is unstable due to the shocks in monetary sector.

Figure 9. illustrates the case where monetary policy have no effect on nominal income ($Y=P \times y$). But, VAR results show that if any, the change in nominal income have higher share in the case of inflation.

Figure 9. Decomposition of Monetary Shock into Output and Inflation



Finally, Korea discarded monetary targeting in 1997, and then adopted inflation targeting policy instead. In this policy framework, call rate is an operational target, so inflation targeting has similar effect with interest targeting. We can conclude BOK's inflation targeting is appropriate in that money demand is so volatile, so (operationally) targeting for call rate may reduce volatility in output (as well as in inflation). In contrast, if real sector (IS curve) is unstable, monetary targeting previously adopted by BOK is more appropriate.

Whether the instability in demand is the result of regime changing in policy framework is not certain. So, more research is needed for checking causality between instability of money demand and the change in monetary, financial or foreign exchange policies.

IV. Summary and Conclusion

One candidate of the answer for our finding of the instability may be buffer stock theory of money demand. People show buffer stock behavior when they encounter (unexpected) money supply shocks, then adjust money demand.

In viewpoint of empirical analyses, Goldfield(1973) estimated the US money demand, and revealed high predictive power. But, his estimate did not have goodness of fit over and after 1970s. In this paper, we find 1) money demand function was instable over 1965-2009 period. And, 2) also structural breaks occurred about in 1997 and in 2000.

We can infer that the 1997 structural break in 1997 came due to Asian crisis, change in monetary policy regime and that of 2000 due to financial innovation. This paper's main contribution is that Korea's money demand not only is responsive to the interest rate but also shows regime switching or parameter change. So, using L_f (liquidity of financial intermediaries) may not be used any index or target for monetary policy.

So, insofar as the ratio of money holding k is concerned, Keynesian money theory may be correct in South Korea. Not only k is function of the rate of interest, but also the function itself changes.

But, more sophisticated analysis is needed for checking the implication for stabilization policy, and we postpone this for future research.

Recently, macroeconomists deviates from simple Keynesian money demand or quantity theory of money. They developed overlapping generations model(OLG; Samuelson, 1958), cash-in-advance model(Rotemberg, 1987) and money-in-the utility-model(Sidrauski, 1967). All these models are based maximization principles of agents and micro-foundation. They may solve the problem of instability of macroeconomic money demand.

Money(storable and divisible commodity) in OLG model play the role of reaching golden rule level of storage for the good.

Cash in advance model considers demand for cash goods in the next period as the determinant of money demand in the current period. Meanwhile, demand for credit goods need not retain money balance, since they can be settled other payment instrument like credit cards.

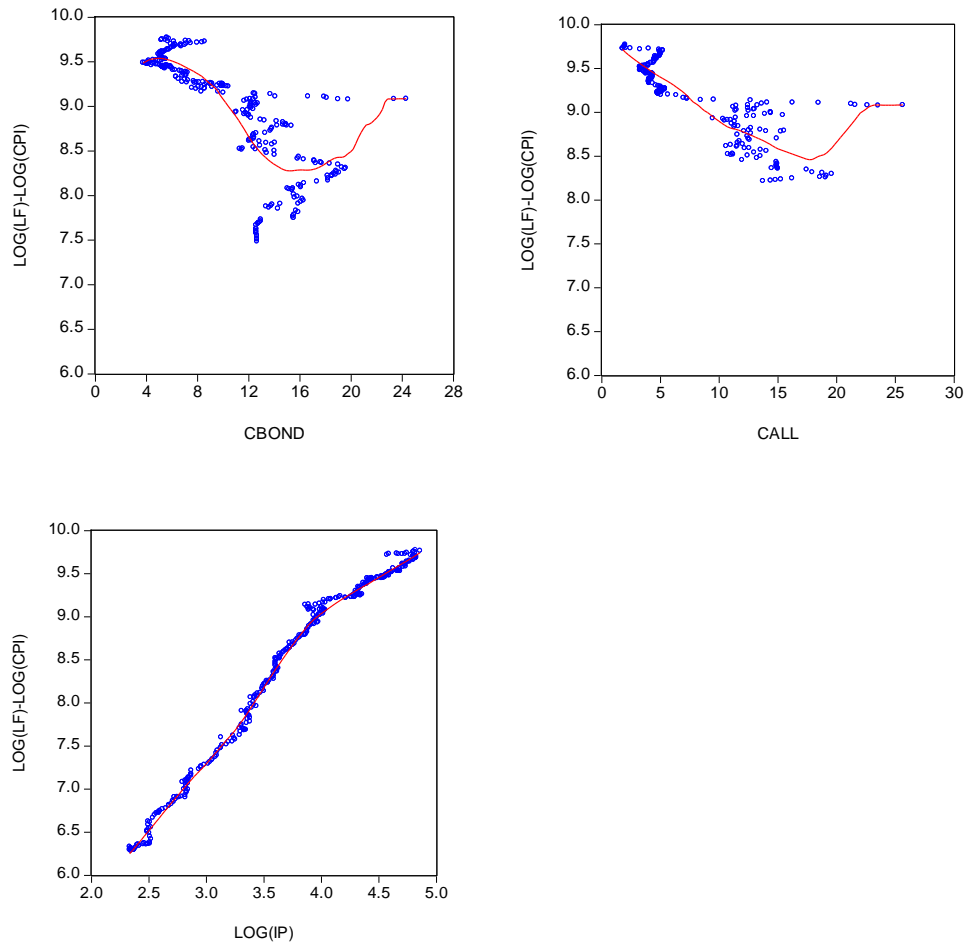
We need to develop these microeconomic money demand theory. It enables us to check the instability of demand at the micro-econometric level.

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Appendix

Instead of recursive coefficient or time-varying coefficient instate space model, we use nonparametric estimation (Kernal fit) for coefficient for the rates of interest as well. Figures imply parameter instability(or structural break).



글로벌 금융위기와 물가안정목표제 평가:
근원인플레이션을 중심으로

**Measures of Underlying Inflation and Evaluation of Inflation
Targeting with Global Crisis in Korea**

Key Word: 근원인플레이션(Underlying Inflation), 글로벌 금융위기(Global Financial Crisis), 물가안정목표제(Inflation Targeting System), 구조적 벡터자기회귀모형 (Structural VAR Model)

JEL code: E31, E32, E58

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ABSTRACT

The global financial crisis has exerted enormous impacts on the attainment of inflation target in Korea. The annual average CPI inflation was 3.3% during the targeting period of 2007-2009 and the target was $3.0 \pm 0.5\%$. Thus Korea has succeeded in keeping annual average CPI inflation just below the upper limit of the 2007-2009 target under the global crisis.

This paper intends to evaluate the performance of the inflation targeting system in Korea. First, it estimates the conventional call rate reaction equation under the global crisis and finds that the policy interest rates never reacted to expected inflation, output gap, and won/dollar exchange rate, as expected by theory. Second, it identifies the shock of global financial crisis into core and non-core, applying the structural VAR model. The core shock was defined to have no (medium- to) long-run impact on real output.

The core shock was identified to have the character of the demand shock, since it has the positive impact on the inflation and output in the short run. The structural core inflation due to core shock was an attractor of headline inflation, not vice versa. Therefore, the structural core inflation that reflects the demand-side shock would be the better intermediate target for the final headline inflation target than the official core inflation that exclude the volatile inflation of agricultural and oil-related products.

During the inflation targeting period of 2007-2009, the structural core inflation was more volatile than the official core inflation, because the global crisis has very large negative impacts on the domestic demand as well as the prices of agricultural and oil-related products. This paper shows that the negative core shock during the fourth quarter of 2008 was larger than that in the financial crisis in 1998. But the core shock turned into positive very quickly in 2009, as the Korean economy recovered very quickly from crisis.

The volatile changes in structural core inflation suggests that the Bank of Korea barely managed to attain the 2007-2009 inflation target, owing to the very large negative impacts of the global financial crisis on the domestic demand. It also suggests that the rapid rise in core inflation with the rapid recovery of the Korean economy will lead to rapid rise in headline inflation.

본 고에서는 글로벌 금융위기의 충격을 산출량에 장기적 중립성을 가지는 근원적 충격과 장기적 중립성을 가지지 않는 비근원적 충격으로 나누어 글로벌 금융위기 기간 중 근원적 충격이 물가안정목표 달성에 미친 영향을 분석하였다.

본 고에서 보인 바와 같이 글로벌 금융위기가 수요에 미친 영향과 이로 인해 물가가 안정된 효과를 제대로 파악하지 못하면 향후 물가안정이 어려워질 수 있다. 농산물과 석유류 제품의 일시적 공급충격을 제거한 통상적 근원인플레이션을 기준으로 평가하면 2007-2009 년 중 물가안정목표는 안정적으로 달성된 것처럼 보이고 목표달성도 무난해 보인다.

그러나 중앙은행의 통제 대상인 구조적 근원인플레이션을 기준으로 평가하면 매우 달라진다. 글로벌 금융위기를 전후한 수요충격으로 근원인플레이션이 크게 변동하였으며 2007-2009 년 중 물가안정목표 달성은 글로벌 금융위기에 따른 마이너스 성장에 기인한 바가 크다. 또한 글로벌 금융위기 이후 각종 경기확대정책에 힘입어 경기가 빠르게 회복되면서 근원인플레이션이 급격하게 상승하고 있으므로 향후 적절한 출구전략을 마련해야 한다.

I. 서 론

우리나라는 1998 년 4 월 새로운 한국은행법이 시행되면서 종래의 통화량 목표제에서 물가안정목표제로 이행하였으며, 인플레이션 기준지표로는 소비자물가지수에서 일부 불규칙한 변동을 보이는 품목을 제외한 근원인플레이션(*underlying inflation*)을 목표지표로 삼았다. 또한 2004 년부터는 연간물가목표는 설정하지 않고 향후 3 년 동안 달성하려는 물가목표 수준을 공표하는 방식의 중기 물가목표제도를 운영하고 있다. 그러나 2007 년부터는 소비자물가지수가 국민들의 실생활에 가장 친숙한 물가지표인 점 등을 감안하여 소비자물가상승률로 목표지표를 변경하였다. 2006 년 8 월 금융통화위원회에서는 2007-2009 년 중 물가안정목표를 소비자물가상승률 기준의 연평균 물가상승률 $3.0 \pm 0.5\%$ 로 설정하였다.

물가안정목표기간인 2007-2009 년 중 소비자물가는 연평균 3.3% 상승하여 물가안정목표의 상한선인 연평균 3.5%를 간신히 밀돌았다. 연도별로 보면, 2007 년에는 소비자물가가 2.5% 상승하였으나 2008 년에는 국제유가 급등으로 4.7% 상승하였다. 그러나 2009 년 들어서는 원/달러 환율의 급등에도 불구하고 국제유가가 크게 안정되면서 소비자물가는 다시 2.8% 상승에 그쳤다.

한국은행은 물가안정목표제 운영을 평가하면서 “2007~2009 년 중에는 국제유가 및 원/달러 환율의 급등락으로 인한 공급충격이 소비자물가의 흐름을 좌우” 하면서 소비자물가 변동성이 크게 확대됐다고 보았다.¹ 이렇게 소비자물가 변동폭이 확대되자 한국은행은 2010-2012 년중 중기 물가안정목표를 $3.0 \pm 1\%$ 로 변동폭을 확대하였다.²

과연 2007-2009 년 중에는 국제유가 및 원/달러 환율의 급등락으로 인한 공급충격이 소비자물가의 흐름을 좌우하였을까? 유가와 환율의 급변이 없었다면 과연 물가안정목표를 달성할 수 있었을까? 유가와 환율의 급변은 공급충격을 반영한 것일까 아니면 수요충격을 반영한 것일까?

본 고에서는 이와 같은 문제들에 대해서 살펴보고자 한다. 본 고의 제 II 장에서는 물가안정목표를 달성하기 위한 전형적 기준금리식을 추정함으로써 글로벌 금융위기가 통화정책 운용에 어떤 영향을 미쳤는가를 살펴본다. 제 III 장에서는 유가와 환율의 급등락과 같은 단기적이고 불규칙적인 요인을 공급충격으로 간주하고 이를 제외시켜서 통상적으로 작성하는 근원적 인플레이션의 문제점에 대하여 논의한다. 아울러 보다 이론적으로 타당하게 수요충격을 반영한 구조적 근원인플레이션을 추정한다. 제 IV 장에서는 여러 가지 방법으로 산출된 각종 근원인플레이션의 유용성을 평가하고, 가장 적합한 근원인플레이션에 근거하여 물가안정목표제 운영을 평가하며, 시사점을 도출한다. 마지막으로 제 V 장은 결론을 담고 있다.

II. 글로벌 금융위기와 통화정책

2007-2009 년의 물가안정목표는 2008 년 상반기까지만 하더라도 달성하기가 어려웠었다. 유가 및 원자재 가격이 급등하면서 2008 년 6 월의 소비자물가상승률은 물가안정목표의 상한선인 3.5%를 훨씬 넘는 5.5%에 달했다. 이에 따라 새로운 인플레이션 시대의 도래를 걱정하면서 기준금리를 상향조정하였다. 이때만 하더라도 우리나라

¹ 한국은행(2010) 3 쪽 참조.

² 한국은행(2009) 참조.

를 비롯하여 물가안정목표제를 채택한 거의 모든 나라에서 목표달성이 어려워보였다. 당시 물가안정목표제를 채택한 해외 중앙은행에서도 물가상승률이 일시적으로 물가안정목표를 상회하는 것은 고용에 도움을 준다는 견해를 피력하였다.³

그러나 2008 년 9 월 글로벌 금융위기 발생으로 경기가 급랭하면서 국제유가가 급락하고 이번에는 공황의 도래를 걱정하기 시작하면서 기준금리를 빠른 속도로 하향조정하고 유동성을 크게 늘렸다. 한국은행이 평가한대로 2008 년 4 분기 중 글로벌 금융위기의 발생으로 국제유가가 급락하지 않았다면 중기 물가안정목표를 달성하지 못했을 수도 있다. 물가안정목표 달성은 글로벌 위기 발생에 의한 행운일 수도 있다.

물가안정목표제를 채택하는 국가는 통상적으로 기준금리의 변경을 통하여 물가안정을 도모하며 우리나라도 예외가 아니다. 이때 기준금리가 어떤 변수에 반응하여 변화하는 지는 국가마다 다르고, 같은 국가 내에서도 시기에 따라 다를 수 있다. 본 절에서는 가장 전형적인 기준금리 반응식을 추정하여 글로벌 금융위기로 통화정책이 어떻게 변화했는지 살펴보기로 한다.

1. 기준금리 반응식

물가안정목표제 하에서 기준금리는 전형적으로 (예상)인플레이, 산출량 갭, 환율 등에 반응한다. 또한 정책당국은 정책금리 목표를 세우고, 경제에 충격을 주지 않도록 점진적으로 금리를 변경한다. 이 경우 개방경제하에서 물가안정목표제의 콜금리 반응식은 다음과 같이 정리할 수 있다.⁴

$$i_t = \delta_0 + \delta_1 \pi_{t+n} + \delta_2 x_t + \delta_3 e_t + \delta_4 e_{t-1} + \rho i_{t-1} + \epsilon_t \quad (1)$$

단, i_t : 콜금리, π_{t+n} : t 와 t+n 기 사이의 물가상승률, x_t : 산출량 갭, e_t : 실질환율.

(1)식에서 실질환율을 설명변수로 하면 종속변수도 실질금리가 되어야 하나 (1)식은 실질금리 반응식을 명목금리 반응식으로 바꾼 것이다. 금리가 당기의 실질환율뿐만 전기의 실질환율에도 반응한다면 금리반응이 다양하게 나타나게 된다. e_t 의 상승이 자국통화의 절상을 나타낸다고 할 때 이론적으로 $\delta_1, \delta_2 > 0, \delta_3 < 0$ 이고, δ_4 의 부호는 미정이다. 만약 $\delta_4 > 0$ 이라면 금기와 전기의 환율에 대한 반응이 다르다. 정책당국은 금기의 자국통화 절상에 대해서는 금리를 내려서 반응하나 전기의 자국통화 절상에 대해서는 금리를 올린다. 절상된 통화는 향후 다시 절하되는 경향이 있으므로 전기의 환율에 대해서는 금리를 올리는 쪽으로 반응하게 된다. 이렇게 정책당국이 금기와 전기의 환율에 대하여 다르게 반응함은 정책당국이 환율의 수준보다는 환율의 변화에 반응함을 의미한다. 그러나 환율이 향후 절하되지 않고 절상충격이 지속될 것으로 예상된다면 중앙은행은 환율안정에 주력하게 되고 다음 기에도 금리를 올리지 않게 된다. 따라서 이 경우에는 중앙은행이 환율안정에 무게를 두게 되고 δ_3 와 δ_4

³ Wall Street Journal, July 21, 2009

⁴ 자세한 도출 과정은 박원암(2008) 참조.

가 모두 음의 부호를 가지게 된다.⁵ (1)식에서는 국제유가를 추가적으로 고려하지 않았는데, 이는 설명변수에 포함되는 (기대)인플레이가 국제유가의 변화를 반영하고 있기 때문이다.

(1)식은 동태적 콜금리 반응식이며, 특정한 형태의 손실함수를 최소화하는 최적 통화정책준칙이 아니다. 최적 통화정책준칙은 보다 이론적이나 최적 통화정책준칙이 손실함수에 따라 달라지는 등의 문제를 안고 있다.⁶ 예를 들면, 통상적인 2 차 손실함수를 가정할 때 정책당국의 목표는 장기적 목표로부터의 절대적 편차를 최소화하는 것이므로 유가가 상승하면 금리를 올려야 하고, 최근 경험한 바와 같이 유가가 상승 후 폭락하더라도 금리를 쉽게 내려서는 안 된다 (Batini and Tereanu, 2009). 즉 글로벌 금융위기 기간 중 급격한 기준금리의 변경이 2 차 손실함수를 가정할 때 최적일 수 있다. 한편, 김근영(2008)은 해외공급충격 하에서 우리나라의 최적금리준칙을 도출하고 인플레이션과 산출량 갭을 함께 고려하되 인플레이션에 보다 중점을 두는 정책이 최적이며, 공급충격의 지속성이 커지거나 불확실성이 확대될수록 인플레이션에 대한 대응을 강화하는 것이 사회후생 측면에서 바람직함을 보였다. 본 절에서는 이와 같이 지난 물가안정목표 기간 중의 금리변화가 최적이었는지를 분석하는 것이 아니라 글로벌 금융위기를 맞아 기준금리 반응식이 어떻게 변화했는지 분석하고자 한다.

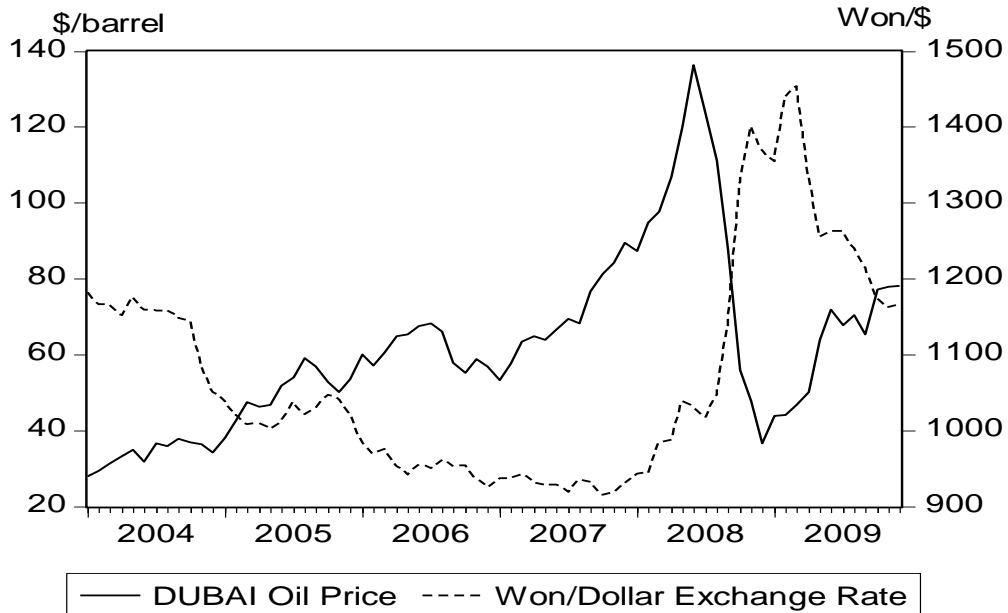
2. 글로벌 금융위기와 반응 변수

글로벌 금융위기로 기준금리 변경에 크게 영향을 미치는 유가, 산출량 갭 및 환율이 크게 변화하였다. [Figure 1]은 최근의 국제유가 및 원/달러 환율의 급등락을 보이고 있다. 두바이유 현물가격은 2007 년 중 약 60% 상승하였으며, 2008 년 들어서도 6 월까지 배럴 당 136 달러로 약 50% 상승하였다. 이후 하락세로 반전하여 2008 년 말에는 2004 년 수준인 배럴 당 36 달러로 하락하였다. 그러나 2009 년 들어서는 다시 상승하기 시작하여 연말까지 배럴 당 78 달러로 2 배 이상 상승하였다. 원/달러 환율은 2007 년 말까지 하락추세를 보였으나 2008 년 들어 상승하기 시작하였으며, 글로벌 금융위기가 발생한 2008 년 9 월 이후 2009 년 2 월까지 달러당 1,000 원 수준에서 달러당 1,500 원을 상회하는 수준까지 급등하였다. 이후 다시 환율이 안정되기 시작하여 작년 말에는 1,100 원대를 유지하였다.

⁵ 정책당국이 실질환율수준보다는 실질환율변화에 반응한다고 할 때 (1)식에서 실질환율을 실질환율의 차분으로 변형할 수 있다. Mohanty and Klau(2004)는 실질환율 차분의 시차변수를 이용하여 통화정책준칙을 추정하였다. 그러나 실질환율을 차분의 시차변수로 하였을 때 2006 년까지 시차변수가 유의하지 않았으므로 추정결과를 제시하지 않았다.

⁶ 최적 통화정책준칙에 대한 일반적 논의는 Gianini and Woodford (2003) 참조.

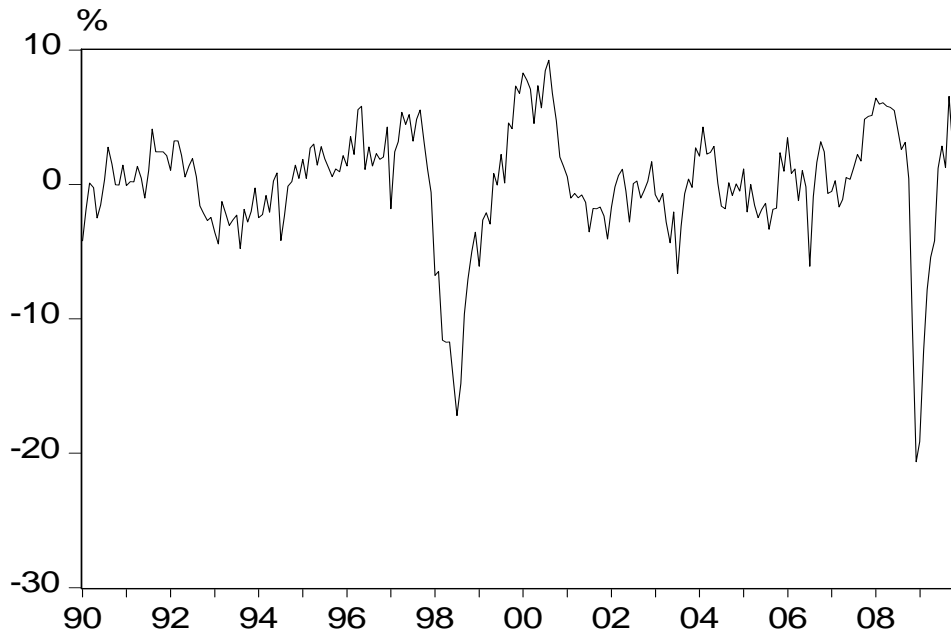
Figure 1. Trends in Dubai Oil Price and Won/Dollar Exchange Rate



한편, [Figure 2]는 1990-2009 년간의 계절조정된 산업생산지수의 로그치 자료에 Hodrick-Prescott 필터를 사용하여 추정한 산출량 갭의 추이를 보인다. 예상대로 글로벌 금융위기로 2008 년 4/4 분기 이후 2008 년 11 월과 12 월 및 2009 년 1 월의 산출량은 추세치보다 각각 10%, 20% 및 19% 감소하였다. 한편 산출량의 회복속도는 1998 년의 외환위기에 비해 더 빠르다.

이와 같이 국제유가, 환율 및 산출량 갭이 급변하면서 기준금리도 급변하였다. 한국은행은 2007 년 중 유가가 상승하기 시작하자 두 차례에 걸쳐서 기준금리를 연 4.5%에서 연 5.0%로 인상하였으며, 2008 년 들어서도 유가와 환율 상승이 지속되자 동년 8 월에는 5.25%로 소폭 인상하였다. 그러나 동년 9 월 글로벌 금융위기의 발생으로 유가가 급락하고 환율이 급등하는 등 경제가 불안해지자 기준금리가 지속적으로 하향 조정되어 2009 년 2 월에는 연 2%로 낮아졌다. 글로벌 금융위기의 발생으로 급격하게 감소한 생산이 2009 년 들어 다시 급격하게 회복되고 유가도 다시 상승하였으나 기준금리는 불확실한 대내외 경제여건을 반영하여 연 2%에서 유지되고 있다.

Figure 2. Trends in Output Gap



3. 글로벌 금융위기와 기준금리 변화

이제 (1)식을 추정하여 글로벌 금융위기를 전후하여 기준금리 반응식이 어떻게 변화했는지 살펴보기로 한다. 물가안정목표제는 1998 년에 도입되었지만 실제로는 금융통화위원회가 1999 년 5 월부터 매월 콜금리 목표치를 시장에 공표하고, 콜금리를 정책수단변수로 활용하게 되었으므로 추정기간을 1999 년 이후로 잡았으며, 무담보콜금리, 산업생산지수, 소비자물가의 전년동월대비 상승률, JP Morgan 의 실질실효환율(상승은 절상을 의미)의 월간자료를 사용하였다. 산출량 갭은 Hodrick-Prescott 필터를 사용한 [Figure 2]의 자료를 사용하였다.

(1)식의 ϵ_t 는 기준금리에 대한 외생적 충격에 인플레이, 산출량, 환율 등 목표 기준금리 결정변수 예측오차의 선형결합을 더한 것이므로 정보변수와 직교해야 한다. 이러한 직교조건을 만족시키기 위하여 GMM (Generalized Method of Moment) 방식으로 추정하였으며, 정보변수 또는 수단변수로는 콜금리, 인플레이션, 산출량 갭, 실질실효환율 전기대비 변화율의 과거치를 사용하였다.⁷

또한 추정하기 이전에 1999-2009 년의 기간에 걸쳐 단위근 검정을 한 결과 콜금리와 실질실효환율은 단위근을 가지고, 산출량 갭과 소비자물가상승률은 단위근을 가지지 않는 것으로 나타났다.⁸ 따라서 단위근을 가지는 변수에 대해서 시차변수를 고려하는 (1)식의 형태는 적절하다고 하겠다.

⁷ Bartlett Kernal 과 Newey-West 의 고정 bandwidth 방법을 사용하여 HAC 을 구하였다. 또한 수단변수의 과거치로는 1 에서 6 기 전 값과 9 기 및 12 기 전 값을 사용하였다.

⁸ 소비자물가상승률의 단위근 여부에 대해서는 다음 절에서 자세히 논의한다.

Table 1. Estimation of Call Rate Reaction Function (GMM Estimation)

Sample Period	Constant	Π_{t+12}	x_t	i_{t-1}	e_t	e_{t-1}	Adjusted R ²	Overidentification P-value
99-06	-0.13 (-1.14)	0.048 (3.37)	0.021 (9.06)	0.88 (161.6)	-0.043 (-6.47)	0.048 (7.29)	0.96	0.96
99-08	-0.29 (-2.52)	0.020 (2.20)	0.023 (13.31)	0.88 (136.9)	-0.023 (-4.12)	0.030 (5.52)	0.96	0.93
99-09	0.03 (0.39)	-0.010 (-1.37)	-0.001 (-0.62)	0.99 (137.2)	-0.004 (-0.92)	0.004 (1.16)	0.95	0.96

Note: t-values are in parenthesis.

<Table 1>은 콜금리 반응식을 추정한 결과이다. 1999-2006 년 중 정책금리는 예상 소비자물가상승률, 산출량 갭 및 실질환율변화에 이론적인 예상과 일치하는 방향으로 반응하였다. 조정된 R² 값은 매우 높았고, 과도식별제약의 적합성을 검정하는 χ^2 통계량의 p 값도 매우 크게 나타나 과도식별 제약이 적합한 것으로 나타났다.

추정결과를 요약하면, 우리나라의 물가안정목표제는 물가뿐만 아니라 산출량의 안정을 도모하고 환율에 직접적으로 반응하는 매우 유연한 형태로 운용되었다. 정책당국은 실질실효환율의 수준에 반응하기 보다는 실질실효환율의 변화에 반응하였다. 또한 <Table 1>에서 콜금리의 기대 인플레이션에 대한 장기반응계수는 1999-2006 년간 0.4 수준이어서 우리나라는 인플레이션에 순응하는(accommodate) 방향으로 통화정책을 운용하고 있는 것으로 나타났다. 그러나 Clarida et al (1998)이 보인 바와 같이 선진국의 경우 콜금리의 인플레이션에 대한 (장기)반응도가 1 보다 크게 추정되고 있어서 우리나라와 대비된다.

이제 글로벌 금융위기를 전후한 경제여건 변화로 기준금리 반응행태가 어떻게 변화했는지를 살펴보기 위하여 표본기간을 각각 2008 년과 2009 년으로 연장하게 되면 예상인플레이션, 산출량 갭 및 실질환율변화에 대한 추정계수의 크기 및 유의도가 급격하게 낮아지고 콜금리 시차변수의 평활화 계수가 커지고 있음을 볼 수 있다.⁹ 주목할 점은 표본기간을 2009 년으로 1 년만 연장해도 그 이전 10 년간에 안정적으로 유지되어온 콜금리 반응계수가 모두 유의하지 않게 되었으며, 심지어 부호까지 변한다는 사실이다. 이는 글로벌 금융위기에 비정통적인 방법으로 대처하면서 그 이전의 기준금리 결정방식이 전혀 작동하지 않았음을 단적으로 보여주고 있다. 한국은행은 글로벌 금융위기를 맞아 유가는 하락하고, 환율이 급등하며, 산출량은 급감하는 등 물가정보변수가 혼란스럽게 변화하는 가운데 기준금리를 소폭 올렸다가 연 2% 수준으로 대폭 하향조정하고, 2009 년 2 월 이후 기준금리를 연 2%수준에서 1 년 이상 유지하였는데, 이러한 통화정책은 그 이전과는 분명히 다르고 평상시의 정책과는 크게 다른 것이었다.

위기 국면에서 통화정책은 평상시와는 다르게 운용될 수밖에 없다. 우선 경기급랭에 대처하기 위하여 정책금리를 급격하게 내리고, 이후에는 경제상황이 불확실하므로 정책금리를 그 수준에서 유지하게 된다. 그 결과가 정책금리가 예상인플레이션, 산

⁹ 2009 년의 1 년 후 예상인플레이션은 작년말 한국은행의 2010 년 소비자물가상승률 전망치인 상반기 2.7%, 하반기 2.9%를 적용하였다.

출량 갭 및 실질환율변화에 이론적으로 예상되는 방향으로 반응하지 못한 것으로 나타나고 있는 것이다.

이렇게 글로벌 금융위기 이후 통화정책의 주안점이 경기급랭의 억제나 경기회복에 두어졌다면 물가안정목표의 달성은 다른 요인의 도움을 받았을 수 있다. 즉 유가와 환율의 급변동 등 일시적 요인에 의해 물가안정목표를 달성했을 수 있다. 이렇게 원자재 가격이 급변할 때는 농산물 가격과 유가 등의 불규칙 변동을 제거한 근원인플레이션이 물가안정목표달성의 평가나 전망에 중요할 수 있다. 다음 절에서는 근원인플레이션에 대해서 논의하고자 한다.

III. 근원인플레이션 추정

우리나라는 소비자물가작성 품목에서 곡물이외의 농산물과 석유류(도시가스 포함)를 제외하여 근원인플레이션 (underlying inflation)을 작성하고 있다. 국제유가나 원자재 가격 상승 등 비용인상 요인으로 물가가 상승하는 경우 물가안정목표를 달성하기 위해 무리하게 금리를 인상하면 과도하게 경기를 위축시키는 결과를 낳기 때문에 해외충격에 따른 농산물 및 석유류 가격 변동을 제외한 근원 인플레이션을 중시하게 된다. 또한 농산물이나 석유류 제품의 가격 변화가 일시적이라면 일시적 변화에 대응하기 보다는 영구적 변화에 대응하는 것이 바람직하므로 근원인플레이션을 참조하게 된다. 이런 이유로 정책당국은 소비자물가상승률 기준의 물가안정목표를 달성하기 위한 중간목표로 근원인플레이션을 보게 되는데, 우리나라도 2008 년 상반기 중 유가급등으로 소비자물가가 크게 상승할 때 정책당국이 물가안정목표인 소비자물가상승률보다는 근원인플레이션의 안정을 강조하기도 했다.¹⁰

근원인플레이션을 작성하려고 하는 근본 이유는 소비자물가가 생계비용을 측정하는 수단으로 작성되었고 따라서 통화정책의 대상지표가 되기에 적절하지 않기 때문이다. 예를 들면, 일시적이고 계절적인 요인으로 소비자물가가 변화할 경우 통화정책의 시차를 감안할 때 통화정책이 소비자물가의 단기적 변화에 반응하기가 어렵다. 따라서 일시적이고 단기적인 요인을 제거하고 향후 소비자물가변화의 선행지표가 될 수 있는 근원인플레이션을 추정하게 된다.

우리나라는 1998 년 물가안정목표제를 채택하면서 2007 년 소비자물가상승률을 물가안정지표로 채택하기 전까지는 근원인플레이션율을 기준으로 물가안정목표제를 운용하였으므로 근원인플레이션 작성방법에 대한 많은 논의가 있었다.¹¹ 근원인플레이션을 추정방법은 크게 물가결정요인에 대한 이론적 모형식을 이용한 이론적 추정방법과 소비자물가상승률에서 단기적, 일시적 요인에 의한 물가변동분을 차감하는 실무적 측정방법으로 구분할 수 있다. 이론적 추정방법으로는 통화론자 모형, 케인지언 모형 및 미 연준의 P* 모형 등이 있으며, 실무적 측정방법으로는 특정요인조정, 특정품목조정, 조정평균, 가중중위수 방식 등이 활용되고 있다. 이종건, 권승혁(1998), 오정근(1998), 이승용, 박정민(2008)은 이 방법에 따라 우리나라 근원인플레이션을 작성하고 물가안정목표 대상지표로서의 유용성을 평가한 바 있다. 해외의 경우 McCauley (2007)

¹⁰ 유가가 급등했던 2008 년 상반기 중 통화당국이 근원인플레이션의 안정을 강조할 때 향후 유가나 원자재 가격이 실제로 나타난 것처럼 크게 떨어질 것으로는 예상하지 않았다면 물가안정목표달성의 달성은 행운이 될 것이다.

¹¹ 이에 대해서는 한국은행(1999) 참조

와 Gupta and Saxegaard (2009)가 각각 태국과 스리랑카를 대상으로 근원인플레이션을 지표로 하는 물가안정목표제에 대해 논의한 바 있다.

지금까지의 연구를 개관하면 어떤 방식의 근원인플레이션이 좋은지 합의를 이루지 못하였으며, 여러 가지 방법으로 작성된 근원인플레이션이 평가 기준에 따라 유용성이 달라진다는 결과를 얻었다. 본 절의 목적은 실무적으로 사용할 수 있는 근원인플레이션을 추정하려는 데 있지 않다. 그 보다는 소비자물가상승률을 일시적 및 영구적 변화로 나누고 기준금리 변경을 통한 통제대상인 수요충격을 반영한 근원인플레이션을 추정하고자 함에 목적이 있다.

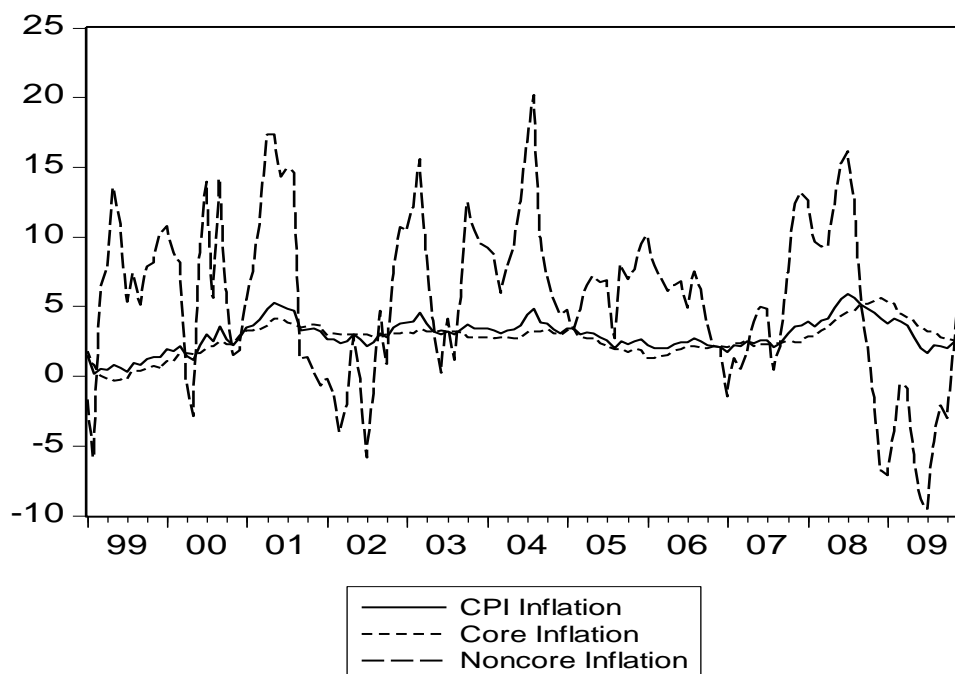
1. 소비자물가상승률과 근원인플레이션

우리나라는 소비자물가작성 품목에서 곡물이외의 농산물과 석유류(도시가스 포함)를 제외하여 근원인플레이션 (underlying inflation)을 작성하고 있다. [Figure 3]은 소비자물가상승률과 근원인플레이션을 및 근원인플레이션 작성 시 제외되는 품목에 대한 비근원인플레이션 추이를 보이고 있다. 우선 비근원물가상승률의 변동 폭이 매우 크나 변화가 일시적이고 단기적인 모습을 보인다. 비근원 품목의 비중은 2005 년 기준으로 10.8% 이고 변동폭도 매우 크므로 평균적으로 중요하지 않을 수 있으나 비근원인플레이션율이 대체로 매우 높은 수준이므로 소비자물가상승률이 대체로 근원인플레이션을 상회하고 있다.

그러나 변동 폭이 매우 큰 비근원인플레이션을 제외한 근원인플레이션이 소비자물가상승률에 비하여 반드시 더 안정적인 것은 아니다. [Figure 3]에서 1999-2009 년 중 소비자물가상승률과 근원인플레이션율의 표준편차를 계산해 보면 각각 1.14% 및 1.16%로 큰 차이가 없었다. 물론 기간에 따라서 다소 다른 결과를 얻기도 한다. 다만 유가의 급등락이 비석유류제품에 시차를 두고 영향을 미치는 가운데 2007-2009 년 중과 같이 글로벌 금융위기의 발생으로 경제여건이 크게 변하면 특정한 기간 중 농산물과 석유류 가격 변화가 일시적이고 따라서 근원인플레이션율의 변동 폭이 작게 나타날 수 있다.

우리나라 물가안정목표 달성에 있어서 2007-2009 년은 매우 특별한 기간이었다. 이는 2008 년 10 월 이후 2009 년 11 월까지 1 년 이상 소비자물가상승률이 근원인플레이션율을 하회하고 있다는 사실에서 찾을 수 있다. 소비자물가상승률이 근원인플레이션을 1 년 이상 하회한 것은 2001 년 9 월부터 2002 년 10 월까지 기간에 이어 처음인데, 한국은행(2010)은 국제유가 급등락이 비석유류제품에 시차를 두고 영향을 미치는 가운데 석유류 가격이 급등 후 큰 폭으로 하락하면서 소비자물가 오름세가 빠른 속도로 안정되었기 때문이라고 보고 있다. 2008 년 상반기까지 급등했던 유가가 글로벌 금융위기의 발생으로 4 분기 들어 급락하지 않았다면 소비자물가상승률이 근원인플레이션을 하회하기 어렵고 중기 물가안정목표의 달성도 상당히 어려웠을 것임을 의미한다. 2004 년에는 유가가 크게 상승하면서 소비자물가상승률이 근원인플레이션을 상회하였으나 2005 년 이후 유가하락이나 소비자물가상승률 하락으로 이어지지 않았음을 볼 때 더욱 그러하다.

Figure 3. CPI and Core Inflation (Year over Year, %)



2. 근원인플레이션의 영구성

근원인플레이션은 소비자물가 품목에서 농산물과 석유류 가격의 일시적이고 단기적인 변동 요인을 제거하고 측정된 물가상승률로 정의되고 있다. 과연 농산물과 석유류 가격의 변화가 일시적이고, 근원인플레이션이 지속성을 갖는지 살펴보기 위하여 단위근 검정을 해보기로 한다.

Table 2. Unit Root Tests on Year-over-Year Inflation

Sample Period	CPI Inflation		Core Inflation		Non-core Inflation	
	PP test	KPSS test	PP test	KPSS test	PP test	KPSS test
90-09	O	O	O	O	X	X
99-09	X	X	O	X	X	X

(O if it has unit root)

Note: Tests at a 5% significance including constant.

우리나라 물가에 대한 단위근 검정 결과는 미국 등 선진국과 상당히 다른 모습을 보이고 있다. 잘 알려진 대로 물가수준에 대한 단위근 검정 결과와 전년동월대비로

측정되는 인플레이션에 대한 단위근 검정 결과가 상충되고 있다.¹² 우선 소비자물가, 근원적물가 및 비근원적물가에 대하여 단위근 검정을 하면 어떤 검정방법을 채택하든지 단위근을 하나만 갖는다는 결과를 얻는다.¹³ 그러나 전년동월대비로 측정하면 인플레이션이 단위근을 갖는다는 결과를 얻기도 하는데 <Table 2>는 전년동월대비 인플레이션에 대한 단위근 검정 결과를 보이고 있다.

<Table 2>에서 전년동월대비 비근원인플레이션은 단위근을 갖지 않는다. 비근원물가도 단위근을 하나만 가지므로 비근원인플레이션의 경우 전월대비로 보나 전년동월대비로 보나 단위근을 가지지 않고 안정적이라고 하겠다. 즉 비근원인플레이션의 변화는 일시적이고 단기적이라고 하겠다. 그러나 원화로 표시한 우리나라 비근원인플레이션이 안정적이라고 해서 농산물과 석유류 가격 및 원화 환율 변화가 안정적이라고 생각해서는 안 된다. 석유류 가격과 원화 환율은 임의보행(random walk)을 하는 시계열이라고 알려져 있다 (Hamilton, 2008). 그럼에도 불구하고 비근원인플레이션이 안정적인 것은 [Figure 1]에서 유가가 상승하는 기간에 원화 환율은 하락하는 등 원자재 가격과 환율의 상호작용 때문이라고 여겨진다.

한편, <Table 2>에서 표본기간을 1990년 이후로 하면 (전년동월대비) 소비자물가 상승률과 근원인플레이션이 모두 단위근을 가지고 있어서 소비자물가와 근원적물가가 단위근을 하나만 가진다는 결과와 상충되는 측면이 있다. 물론 표본기간에 따라 전년동월대비 소비자물가상승률이나 근원인플레이션을 단위근을 가지지 않을 수 있다. <Table 2>에서 표본기간을 1999년 이후로 하면 대체로 단위근을 가지지 않는다.

3. 소비자물가상승률의 추세와 순환 분리

이렇게 비근원인플레이션이 단위근을 가지지 않고, (전년동월대비) 근원인플레이션이 단위근을 갖는다면 시계열 기법을 사용하여 소비자물가상승률을 추세와 순환으로 분리하고 추세 인플레이션을 근원적 인플레이션으로 간주할 수 있다.

추세와 순환을 분리하는 간단한 기법은 Hodrick-Prescott 필터 기법이다. 그러나 동 기법은 단위근에 따른 확률적 추세를 반영하지 못하므로 비관측요인(unobserved components) 기법을 사용하여 추세와 순환을 분리하고자 한다.

추세 (또는 순환)은 관측되지 않기 때문에 비관측 요인 모형에서는 관측된 변수와 관측되지 않은 변수간의 관계를 상태 공간 (state space) 형태로 모형화한다. 상태공간 모형은 관측변수를 비관측변수의 함수로 나타낸 관측방정식과 비관측변수들의 자기회귀식인 전이 방정식으로 구성된다. 비관측변수는 매기 예측오차를 교정하는 칼만필터를 사용하여 추정된다.

소비자물가상승률 π 를 확률적 추세부분 π^* 와 순환변동부분 c 로 나누고, 확률적 추세 π^* 는 μ 의 편류 (drift)를 갖고, c 는 AR(2) 과정을 따른다고 가정하면 단일변수 모형은 다음과 같다.¹⁴

$$\begin{aligned}\pi_t &= \pi_t^* + c_t \\ \pi_t^* &= \mu + \pi_{t-1}^* + \eta_t\end{aligned}\quad (2)$$

¹² 월별자료를 사용할 때 통상적으로 전월대비 연율로 인플레이션을 측정하지 않고, 전년동월대비로 측정하므로 전년동월대비 인플레이션에 대한 단위근 검정을 따로 한다.

¹³ 잘 알려진 사실이므로 단위근 검정결과를 따로 보고하지 않는다.

¹⁴ 순환변동을 AR(2)라고 가정한 것은 임의적이다.

$$c_t = \phi_1 c_{t-1} + \phi_2 c_{t-2} + \varepsilon_t$$

$$\text{단 } \eta \sim N(0, \sigma_\eta^2), \varepsilon \sim N(0, \sigma_\varepsilon^2).$$

추세부분 π_t^* 와 순환부분 c_t 를 상태변수로 하여 식(2)를 상태공간모형으로 변형하면 다음과 같다.

$$y_t = \begin{bmatrix} 1 & 1 & 0 \end{bmatrix} \begin{bmatrix} y_t^* \\ c_t \\ c_{t-1} \end{bmatrix} \quad (3)$$

$$\begin{bmatrix} y_t^* \\ c_t \\ c_{t-1} \end{bmatrix} = \begin{bmatrix} \mu \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 1 & 0 & 0 \\ 0 & \Phi_1 & \Phi_2 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} y_{t-1}^* \\ c_{t-1} \\ c_{t-2} \end{bmatrix} + \begin{bmatrix} \eta_t \\ \varepsilon_t \\ 0 \end{bmatrix} \quad (4)$$

위 상태공간모형에서 식(3)은 관측방정식이고 식(4)는 상태변수의 전이방정식이다.

비관측 요인 모형에서 유의해야 할 사항은 추세부분 충격 η_t 과 순환부분 충격 ε_t 간의 상관관계이다. 통상적인 비관측요인 모형에서는 두 충격간의 상관관계가 없다고 가정하고 있다. 일반적으로 추세부분과 순환부분의 상관관계를 인정하면 경기순환이 불규칙적이고 진폭도 작아지게 된다. 즉 Beveridge-Nelson 의 추세/순환 분리방법을 따르면 확률적 추세가 경기변동의 대부분을 설명하게 되고, 추세부분과 순환부분의 비상관을 가정하는 통상적인 비관측요인 모형에서는 경기변동이 순환변동에 의해 주로 영향을 받게 된다. 따라서 비관측요인 모형을 사용하여 추세와 순환을 분리하려면 추세 충격과 순환 충격간의 상관관계 여부가 중요하다.

Table 3. Separation of Trend and Cycle in CPI Inflation

Using Unobserved Component Model

	CPI Inflation	CPI ¹⁾	
Sample Period	1990.1~2009.12	1999.1~2009.12	
Shock Correlation	Yes	No	Yes
μ	-0.022	0.261**	0.262*
Φ_1	0.143	-16.06	1.093**
Φ_2	0.000	0.924**	-0.093
σ_η	0.532**	1.00	0.221
σ_ε	0.432	0.078**	1.149
$\text{Cov}(\eta, \varepsilon)$	-0.4918		-0.608
우도	-197.93	-33.22	-75.08

Notes: ** denotes 1% significance. * denotes 5% significance.

1) $100 \cdot \log(\text{CPI})$.

비관측요인 모형 추정은 칼만필터를 이용하며, 일반적으로 비관측요인 분석의 해는 불안정한 경우가 많고 초기 모수치 가정에 따라 해가 매우 민감하게 변화하는 단점이 있다. <Table 3>은 추정 결과를 보이고 있다. 우리나라의 경우 소비자물가상승률의 단위근 여부가 표본기간에 따라 달라진다는 점을 감안하여 1990-2009 년 기간에는 (전년동월대비) 소비자물가상승률에 대하여 추세와 순환을 분리하고, 1999-2009 년 기간에는 소비자물가에 대하여 추세를 분리하였다.¹⁵ 그러나 두 경우 모두 확률적 추세와 순환으로 나누기가 용이하지 않았다. 산출량의 경우 우리나라를 비롯하여 많은 나라들에서 비관측요인분석을 통하여 경기순환이 AR(2) 과정임을 보였으나 소비자물가나 소비자물가상승률의 경우 <Table 3>에서 보듯 AR(2)의 계수가 유의하지 않았으며, 추세와 순환부분의 분산도 매우 불안정하게 추정되었다. (2)식에 MA 항을 추가하면 AR(2)의 계수가 모두 유의하게 나타나나 이 경우 추세와 순환의 분산이 모두 유의하지 않았다.

이는 우리나라뿐만 아니라 다른 나라에서도 나타나는 현상이라고 하겠다. 만약 소비자물가상승률을 추세와 순환으로 나누기가 용이했다면 순환부분을 제외한 확률적 추세를 근원인플레이션으로 추정했을 것이다. 인플레이션 순환에 관한 많은 연구들은 비확률적 방법으로 추세를 순환을 분리한 후 순환부분을 예측하는 선행지표를 만들고 있다 (Artis et al., 1995, Bikker and Kennedy, 1999).

이렇게 소비자물가상승률의 단일 시계열을 가지고 추세와 순환으로 나누기가 어려우므로 다음에서는 산출량과 인플레이션을 모두 고려하는 벡터자기회귀모형을 작성하여 근원인플레이션을 식별하고자 한다.¹⁶

4. 구조적 근원인플레이션 추정

본 절에서는 소비자물가상승률을 추세와 순환으로 나누기보다는 단위근을 가지는 소비자물가상승률을 이론적으로 수요와 공급충격 부분 또는 근원적 및 비근원적 충격 부분으로 나누고 수요 충격 또는 근원적 충격에 의한 인플레이션을 근원인플레이션으로 간주하고자 한다. 소비자물가 품목에서 농산물과 석유류 제품 등 비근원 물가품목을 제외하여 근원인플레이션을 구하는 방법도 비근원 물가가 공급충격을 반영한 것이라면 결국 공급충격을 제외시키고 수요충격을 고려하는 것이다.

그러나 유가와 환율변화에 따른 농산물과 석유류 제품 등의 가격 변화를 공급충격이라고 볼 수 있을까? 수요와 공급충격 또는 근원적과 비근원적 충격을 식별하기 위하여 Quah and Vahey (1995)와 같이 인플레이션뿐만 아니라 산출량을 포함하는 구조적 벡터자기회귀 모형을 구성하고, 보다 이론적인 방법으로 근원인플레이션을 추정한다. 이론에 근거한 구조적 모형을 채택하여 근원인플레이션을 추정하면 근원인플레이션이 이론적 의미를 가지게 되며, 근원인플레이션 추정과정에서 다른 변수와의 상관관계도 고려하게 되는 장점이 있다. 그러나 이론 모형을 구성하는 경우 통화론자 모형, 케인지언 모형, 미 연준의 P* 모형 등 특정 모형에 합의가 이루어지기 어렵다는 단점이 있다. 그런데 구조적 벡터자기회귀모형의 경우 통화의 장기중립성 제약 등 매우 간단한 제약만으로 근원적 및 비근원적 충격을 식별하게 된다. 다만 이론모형에

¹⁵ (2)식에서 π 대신 소비자물가의 로그치를 넣었다.

¹⁶ Lee and Nelson (2007)은 산출량과 인플레이션의 필립스 곡선식을 이용하여 인플레이션의 순환을 추정하고자 하였다.

의해 근원인플레이션을 측정하게 되면 새로운 자료가 나올 때마다 과거의 근원인플레이션을 수정해야 하므로 실무적으로 쓰이기에는 어려움이 있다.

산출량 (Y)과 소비자물가상승률 (π)이 단위근을 가진다고 할 때 각각의 차분에 대해 다음과 같은 모형을 구성한다.

$$X(t) = D(0)\eta(t) + D(1)\eta(t-1) + \dots = \sum_{k=0}^{\infty} D(k)\eta(t-k). \quad (5)$$

$$\text{단, } X = (\Delta Y, \Delta \pi)', \eta = (\eta_1, \eta_2)', \text{Var}(\eta) = I.$$

위 식에서 η_1 과 η_2 는 서로 직교하는 교란항이며, 분산은 1 이라고 가정한다. 또한 η_1 은 중장기적으로 산출량에 영향을 미치지 못하는 중립적 교란항으로 가정한다. $D_{ij}(k)$ 를 j 번째 교란항이 k 기간 후에 i 번째 변수에 미치는 영향이라고 할 때,

$$\sum_{k=0}^{\infty} d_{11}(k) = 0 \quad \text{이 된다. 또한 인플레이션은 다음과 같이 표시된다.}$$

$$\Delta \pi(t) = \sum_k d_{21}(k)\eta_1(t-k) + \sum_k d_{22}(k)\eta_2(t-k) \quad (6)$$

위 식에서 $\sum_k d_{21}(k)\eta_1(t-k)$ 가 바로 우리가 얻고자 하는 근원인플레이션의 변화가 된다.

(5)식의 관계를 자료로부터 얻기 위하여 벡터자기회귀(VAR) 모형을 추정하며, 이를 다음과 같이 Wold 이동평균식으로 전환한다.

$$X(t) = e(t) + C(1)e(t-1) + \dots = \sum_{k=0}^{\infty} C(k)e(t-k). \quad (7)$$

$$\text{단, } \text{Var}(e) = \Omega.$$

(5)식과 (7)식을 비교하면 다음의 관계를 얻는다

$$e = D(0)\eta. \quad (8)$$

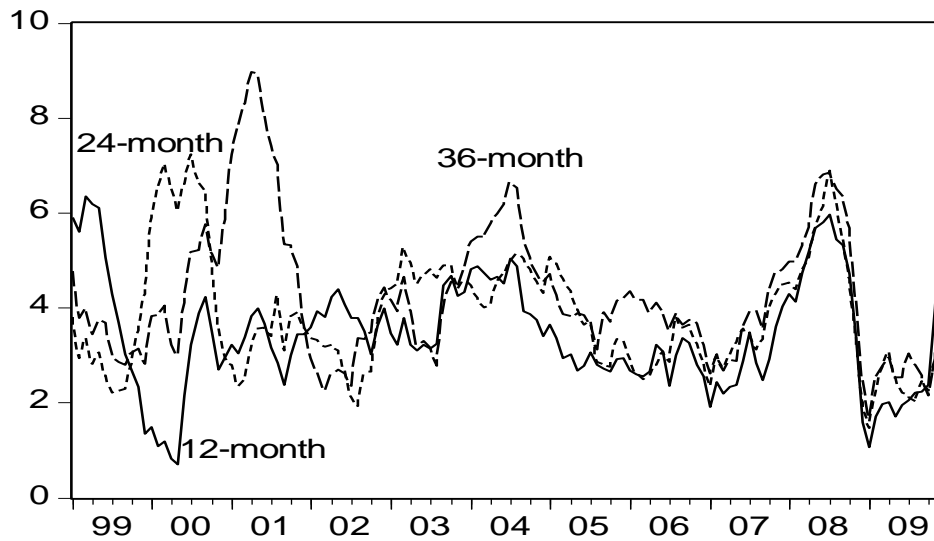
$$D(k) = C(k)D(0). \quad (9)$$

(8)식에서 구조적 교란항 η 는 Wold 교란항 e 의 선형결합으로 나타나며, 식별조건을 주었을 때 유일하게 구조적 교란항을 복원할 수 있다. 2행 2열인 $D(0)$ 을 식별

하기 위한 네 가지 조건 중 세 조건은 $D(0)D(0)' = \Omega$ 에서 얻어지며, 나머지 한 조건은 장기중립성 가정에서 얻어진다.¹⁷

구조적 근원인플레이션을 구하기 위하여 1990년 1월부터 2009년 12월까지의 (계절조정)산업생산지수와 소비자물가상승률 자료를 이용하여 벡터자기회귀모형을 추정하였다. 산업생산지수는 로그치에 100을 곱하였다. 또한 벡터자기회귀모형의 시차를 11기로 하고, 상수를 포함하였다.¹⁸

Figure 4. Structural Core Inflation



(6)식에서는 소비자물가상승률의 변화를 장기적 중립성을 충족시키는 근원적 충격에 의하여 설명되는 부분과 장기적 중립성을 충족시키지 않는 비근원적 충격에 의하여 설명되는 부분으로 나누었는데, 근원인플레이션을 구하려면 특정한 기간(horizon)을 두고 근원적 충격을 합해가야 한다. 즉 어떤 시점에 소비자물가상승률이 그 시점까지의 근원적 충격과 비근원적 충격에 의해 주어졌다고 할 때 (6)식에 의해 특정한 기간 중의 근원적 충격을 반영한 소비자물가상승률의 변화를 추정할 수 있다. [Figure 4]는 기간을 각각 12개월, 24개월, 36개월로 하고 이러한 방법으로 산출한 근원인플레이션의 추이를 보인다.¹⁹

¹⁷ Wold 교란항 e 의 분산/공분산인 Ω 를 Cholesky 분해했을 때 하방삼각행렬을 S 라고 하면 $DD' = SS'$ 이므로 세 식별조건을 얻고, 나머지 한 조건은 통화중립성 가정으로부터 얻는다.

¹⁸ 시차의 선정에는 Akaike information criteria와 Schwartz criteria를 적용하였다.

¹⁹ 물론 산출기간의 시점을 표본의 초기로 하여 근원인플레이션을 산출할 수 있으나 horizon이 길어질수록 그 기간 중 근원적 충격을 반영하여 측정된 근원인플레이션의 측정오차가 커지게 된다. 반대로 horizon을 12개월보다 작게 하면 전년동월대비로 측정된 인플레이션에 반영된 지난 12개월간 충격도 모두 고려하지 않게 된다.

앞에서 우리나라 전년동월대비 소비자물가상승률은 장기간에 걸쳐서 단위근을 가 지나 소비자물가는 단위근을 하나만 가진다고 했으므로 (5)식에서 산출량 변화와 소비자물가상승률 변화 대신 산출량 변화와 소비자물가 변화에 대하여 벡터자기회귀모형을 추정할 수 있다. 이 경우에는 전년동월대비 근원인플레이션을 산출하기 위하여 산출기간을 정할 필요가 없다. (5)식에서 종속변수는 전기대비 산업생산증가율(%)과 전기 대비 소비자물가상승률(%)이므로 전년동월대비로 소비자물가상승률을 구하려면 12 개월에 걸쳐서 근원적 충격을 합해야 한다.

다음 절에서는 지금까지 소개된 여러 가지 근원인플레이션 중 어느 것이 소비자물가상승률 목표 달성을 위한 중간목표로서 가장 적합한지 논의하고, 선택한 근원인플레이션에 근거하여 2007-2009 년 중 물가안정목표제 운영을 평가하며, 향후 정책운용에 대한 시사점을 찾고자 한다.

IV. 근원인플레이션과 물가안정목표제 평가

물가안정목표는 소비자물가상승률로 설정되어 있으며 목표기간 중 연평균 소비자물가상승률이 목표 범위 내에 있으면 물가안정목표를 달성하게 된다. 그러나 2007-2009 년 중과 같이 글로벌 금융위기 충격이 있었을 때에는 표제 인플레이션(headline inflation)보다 근원적 인플레이션(underlying inflation 또는 core inflation)을 기준으로 물가안정목표 달성을 평가할 필요가 있다.

1. 물가안정목표기간 중 근원인플레이션

<Table 4>는 전절에서 제시된 5 가지 근원인플레이션의 2007-2009 년 중 수치를 보이고 있는데, 구조적 근원인플레이션 추정 시 충격 합산의 기간(horizon)을 길게 잡으면 근원인플레이션이 높아지는 것으로 나타난다. 기간(horizon)을 24 개월보다 길게 잡으면 물가안정목표기간 중 연평균 근원인플레이션이 물가안정목표의 상한선 3.5%를 상회함으로써 물가안정목표를 달성하지 못한 것으로 평가하게 된다.

Table 4. Measures of Core Inflation during 2007-2009 (%)

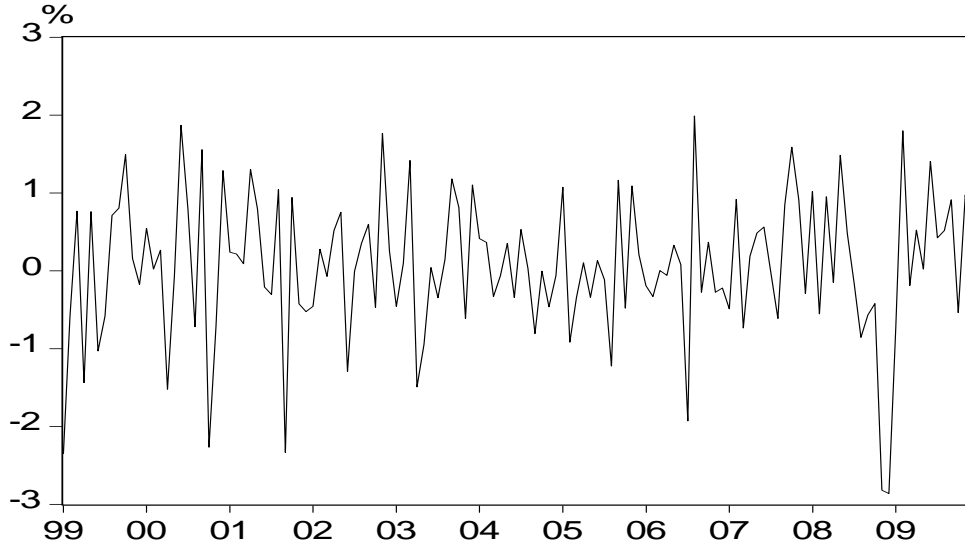
		2007	2008	2009	Average
CPI Inflation		2.5	4.7	2.8	3.3
Core Inflation ¹⁾		2.4	4.2	3.6	3.4
Structural Core Inflation ²⁾	12-Month	2.8	4.7	2.4	3.3
	24-Month	3.4	4.9	2.4	3.6
	36-Month	3.6	5.5	2.7	3.9
Structural Core Inflation (stationary) ³⁾		3.0	4.6	2.5	3.3

Note: 1) Official.

2) Obtained from the structural VAR model, applying 12, 24, and 36-month horizon.

3) Obtained from the structural VAR model, when CPI has one unit root. 12-month horizon is applied.

Figure 5. Trends in Structural Core Shock



이렇게 horizon 을 길게 잡을수록 연평균 근원인플레이션이 높아지는 것은 2008 년 4/4 분기 중 발생한 글로벌 금융위기와 밀접한 관련이 있다. [Figure 5]는 식별된 근원적 충격 (η)의 추이를 보이고 있다. 주목할 점은 [Figure 1]에서 보는 바와 같이 국제유가가 2008 년 상반기까지 급등하였지만 2008 년 들어 산업생산의 성장세가 둔화되면서 이를 반영한 근원적 충격은 2008 년 초부터 근원인플레이션을 안정시키는 힘으로 작용하고 있음을 알 수 있다. 특히 2008 년 11 월과 12 월에는 글로벌 금융위기의 발생으로 근원적 충격이 10 년 전 외환위기 발생 시와 거의 같은 크기로 작용하였다. 따라서 합산 기간이 길어질수록 글로벌 금융위기 충격의 물가안정효과가 희석되면서 물가안정목표기간 (2007-2009 년) 중 근원인플레이션이 높아지게 된다.

장기적 중립성을 가지는 근원적 충격을 구조적으로 식별해서 측정한 근원인플레이션은 농산물 및 석유류 제품 등 특정제품을 제외하여 발표되는 통상적 근원인플레이션과 연도별로 어떻게 다른지도 주목할 필요가 있다. 2007 년과 2008 년의 구조적 근원인플레이션은 2008 년 4/4 분기의 근원적 충격을 반영하지 않으므로 통상적으로 작성되는 근원인플레이션보다 높다. 반대로 2009 년의 구조적 근원인플레이션은 2008 년 4/4 분기 중의 마이너스 충격이 시차를 두고 작용하면서 통상적인 근원인플레이션보다 낮다.

한편 <Table 4>에서 산출량과 소비자물가의 전기대비 변화를 종속변수로 하여 얻어진 구조적/안정적 근원인플레이션을 12 개월에 걸쳐 합산한 근원인플레이션은 산출량과 (전년동월대비) 소비자물가상승률의 전기대비 변화를 12 개월에 걸쳐 합산한 '구조적 근원인플레이션(12 개월)' 과 비슷하므로 따로 논의하지 않는다.

그렇다면 <Table 4>에서 horizon 을 길게 잡고 근원인플레이션을 추정하고 2007-2009 년 중 물가안정목표를 달성하지 못했다고 해야 할 것인가? horizon 을 길게 잡으면 근원인플레이션 추정 시 보다 많은 과거의 근원적 충격을 반영할 수 있는 장점이 있으나 이로 인해 오차가 커지는 단점이 있다. 따라서 horizon 을 달리하여 측정되는 근원인플레이션의 중간지표로서의 유용성을 점검할 필요가 있다.

2. 근원인플레이션의 유용성

측정된 근원인플레이션이 널리 쓰이려면 우선 작성하기 쉽고, 일반인들이 이해하기 쉬우며, 소비자물가상승률과의 연관성이 높아야 하는 등의 조건을 갖추어야 한다. 현재 공식적으로 쓰이고 있는 근원인플레이션은 작성하기 쉽고 일반인들이 이해하기 쉽다는 장점이 있다. 그러나 근원인플레이션이 물가안정목표의 중간지표가 될 수 있으려면 장기적으로 소비자물가상승률이 근원인플레이션에 수렴해야 하며, 반대가 돼서는 안 되므로 이와 같은 기준에 입각하여 근원인플레이션의 유용성을 평가하고자 한다.

전년동월대비 소비자물가상승률(π)의 근원인플레이션(π^*)에 대한 수렴 여부를 판단하기 위해서 흔히 다음과 같은 식을 추정한다.

$$\pi_{t+h} - \pi_t = \alpha_h + \beta_h (\pi_t - \pi_t^*) \quad (10)$$

여기서 h 는 예측 구간을 의미하며, 귀무가설 $\alpha_h = 0$, $\beta_h = -1$ 을 검정하게 된다. 귀무가설이 성립하게 되면 h 기간 후의 소비자물가상승률이 현재의 근원인플레이션에 수렴하게 된다 (McCauley, 2007). 그러나 이와 같은 방식은 소비자물가상승률과 근원인플레이션이 단위근을 가질 때는 성립하지 않게 되므로 다음과 같은 방식으로 근원인플레이션의 유용성을 검증하기로 한다 (Marques et al, 2000; Gupta and Saxegaard, 2009).

전년동월대비 소비자물가상승률(π)과 근원인플레이션(π^*)이 단위근을 가질 때 장기적으로 소비자물가상승률이 근원인플레이션에 수렴하며, 반대가 되지 않기 위해서는 우선 소비자물가상승률과 근원인플레이션이 1의 계수를 가지고 공적분되어 있어서 근원인플레이션이 소비자물가상승률의 모든 지속적 변화를 설명할 수 있어야 한다. 이러한 제약을 검정하기 위하여 요한센 공적분 검정 기법을 사용하며, 제약에 대한 우도비율 검정을 시행한다.

공적분 계수가 1이라는 제약에 더하여 소비자물가상승률과 근원인플레이션의 편류(drift) 크기가 같은 지를 검증할 수 있다. 요한센 공적분 검정 시 두 제약을 모두 적용하여 상수를 포함하지 않으면 어떤 근원인플레이션 자료를 사용하여도 모두 제약이 기각되므로 $y_t = \pi_t - \pi_t^*$ 가 0의 평균을 가진 안정적 시계열인가를 검증하고자 한다. 본 절에서는 y_t 에 대한 Phillips-Perron 단위근 검정 시 상수를 포함하고, 상수에 대한 t 검정을 실시한다. $y_t = \pi_t - \pi_t^*$ 에 대한 Phillips-Perron 단위근 검정식은 다음과 같다.

$$\Delta y_t = \alpha + \beta y_{t-1} + u_t \quad (11)$$

(11)식에서 $y_t = \pi_t - \pi_t^*$ 가 0의 평균을 가진 안정적 시계열이라면 $\alpha = \beta = 0$ 이 된다.

다음으로 근원인플레이션의 변화가 소비자물가상승률의 변화를 유도하고 그 반대가 되어서는 안 된다는 점을 검증하기 위하여 π 와 π^* 가 1의 계수를 가지고 공적

분되어 있을 때 다음과 같이 오차수정모형을 작성하여 π 와 π^* 간의 인과관계를 정할 수 있다.

$$\Delta\pi_t = \sum_{j=1}^m \alpha_j \Delta\pi_{t-j} + \sum_{j=1}^n \beta_j \Delta\pi_{t-j}^* - \gamma(\pi_{t-1} - \pi_{t-1}^*) + \epsilon_t \quad (12)$$

$$\Delta\pi_t^* = \sum_{j=1}^r \delta_j \Delta\pi_{t-j}^* + \sum_{j=1}^s \theta_j \Delta\pi_{t-j} - \lambda(\pi_{t-1}^* - \pi_{t-1}) + \eta_t \quad (13)$$

(12)식과 (13)식에서 π 가 π^* 에 수렴하며, 그 반대가 안 되려면 $\gamma = 0$ 이 아니고 $\theta_1 = \dots = \theta_s = 0$ 이어야 한다. 또한 $\lambda = 0$ 이면 π^* 가 π 에 대하여 매우 강한 외생성을 지니게 된다.

물가가 단위근을 하나만 가질 때는 소비자물가와 구조적으로 산출된 근원적 물가에 대하여 공적분 관계와 외생성 검증을 하게 된다.

<Table5>는 다섯 가지 근원인플레이션의 유용성 검정 결과를 보이고 있다. 우선 소비자물가와 근원적 물가가 모두 단위근을 하나만 가진다고 보고 소비자물가가 근원적 물가에 수렴하는지를 검정한 결과는 소비자물가에 대하여 근원적 물가가 외생적이지 않은 것으로 나타났다. 한편, 소비자물가와 근원적 물가는 1 의 계수를 가지고 공적분되어 있지 않으나 소비자물가와 근원적 물가의 차이가 단위근을 갖지 않아서 1 에 매우 가까운 계수로 공적분 되어 있다고 하겠다.²⁰

Table 5. Evaluation of Measures of Core Inflation

Null Hypo.	Cointeg. Coeff. = 1	$\pi_t - \pi_t^*$ has unit root ¹⁾	$\alpha = 0$	$\gamma = 0$	$\lambda = 0$	$\theta_1 = \dots = \theta_s = 0$
Statistic	P-value	* 5% sig. **1% sig.	t-value	t-value	t-value	P-value
Official	0.47	기각**	2.04	4.31	-0.01	0.93
Structural (12-month)	0.79	기각*	-0.82	1.63	1.28	0.20
Structural (24-month)	0.01	기각*	-0.96	1.74	-0.33	0.34
Structural (36-month)	0.01	기각*	-1.26	2.01	0.22	0.59
Structural/Stationary	0.02	기각*	-1.02	-0.80	3.38	0.05

Note: 1) The Phillips-Perron test was applied.

²⁰ 요한센 공적분 검정 결과 공적분 계수는 1.02 이고, 추정계수의 표준오차가 매우 작아서 t 값은 무려 126.32 에 달한다.

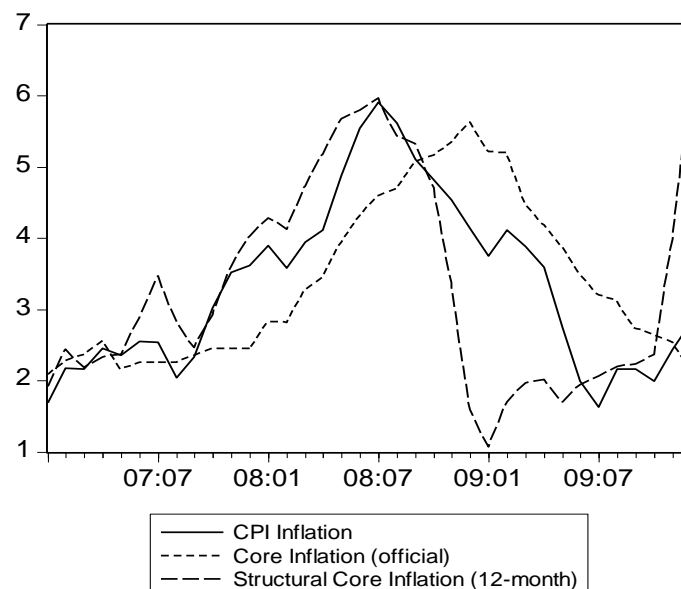
다음으로 기간(horizon)을 달리하는 3 개의 구조적 근원인플레이션은 모두 외생성을 가지나 기간이 24 개월과 36 개월인 경우 공적분 계수가 1 이 아니어서 유용성이 높지 않다고 하겠다. 24 개월 근원인플레이션의 공적분 계수는 1.3 이며 t 값도 1.79 로 낮다. 36 개월 근원인플레이션의 공적분 계수는 -0.21 이며 t 값도 -0.88 로 매우 낮다. 이렇게 공적분 계수가 1 이 아닌 것은 기간이 길어지면서 근원인플레이션이 전년동월 대비 소비자물가상승률에 반영되지 않은 근원적 충격들을 반영하기 때문인 것으로 보인다.

결국 근원인플레이션으로는 통계청에서 발표하는 근원인플레이션과 산출기간을 12 개월로 하는 구조적 근원인플레이션을 사용하는 것이 좋다. 두 경우 모두 공적분 계수가 1 에 가까우며 근원인플레이션이 외생적이어서 소비자물가상승률이 근원인플레이션에 수렴하며, 그 반대는 아니다. 또한 통상적으로 쓰이는 근원인플레이션과 12 개월 구조적 근원인플레이션을 비교하면, 전자는 후자에 비하여 후자에 비하여 외생성이 높으나 편류(drift) 면에서는 전자가 소비자물가상승률과 차이를 보인다.

3. 물가안정목표제 평가

물가안정목표제를 채택한 국가들의 글로벌 금융위기 극복은 물가안정목표제를 채택하지 않았던 국가들에 비하여 양호했던 것으로 분석되고 있다 (Carvalho Filho, 2010). 물가안정목표제를 채택한 국가들은 2008 년 8 월 이후 급격한 실질절하를 경험하였음에도 시장위험이 증가하지 않은 것으로 나타났다. 우리나라도 2008 년 4/4 분기의 심각한 마이너스 성장에서 2009 년에는 다시 플러스 성장으로 전환하고 2007-2009 년간의 중기 물가안정목표도 상한선을 지킬 수 있었다. 이제 중간지표로서 유용성이 높은 통상적 근원인플레이션과 12 개월 구조적 근원인플레이션에 근거하여 물가안정 목표 달성의 원인이 어디에 있었는지 생각해보자.

Figure 6. Inflation Trends during 2007-2009



[Figure 6]은 소비자물가상승률과 통상적 근원인플레이션 및 구조적 근원인플레이션의 월별 추이를 보이고 있다. 농산물 및 석유류 제품 가격이 2008 년 상반기까지 급등하였다가 이후 급락하면서 소비자물가상승률은 2008 년 상반기까지 통상적 근원인플레이션을 상회하고 2008 년 하반기 들어서는 통상적 근원인플레이션을 하회하기 시작하였다. 그러나 구조적 근원인플레이션 추세는 이와 크게 다르다. 구조적 근원인플레이션은 2008 년 상반기까지 소비자물가상승률과 크게 차이가 나지 않았다가 글로벌 금융위기가 발생한 2008 년 9 월 이후 크게 하락하였다. 주목할 점은 하락하였던 구조적 근원인플레이션이 2009 년 들어 경기가 회복되기 시작하면서 빠르게 상승하고 있다는 것이다. 구조적 인플레이션 합산기간을 12 개월로 할 경우 2009 년 12 월에는 2008 년 10 월과 11 월의 대규모 마이너스 수요충격 효과가 근원인플레이션 산정에 포함되지 않으면서 근원인플레이션이 전년동월대비 6.1%까지 상승한다.

그렇다면 근원인플레이션으로 어느 것을 선택하느냐에 따라서 물가안정목표 달성에 대한 평가가 달라진다. 소비자물가에서 농산물과 석유류 제품가격의 일시적 변화를 제외한 통상적 근원인플레이션의 추이를 보면 2008 년 상반기까지 크게 올랐던 농산물 및 석유류 제품가격이 2008 년 하반기 이후 농산물 및 석유류 제품가격이 안정되었기 때문이다. 농산물 및 석유류 제품 가격 변화를 공급충격으로 간주한다면 한국은행이 평가한 바와 같이 ‘일시적인 공급충격’이 물가에 우호적으로 작용하면서 2007-2009 년 중 물가안정목표를 지킬 수 있었다.

구조적 근원인플레이션을 기준으로 평가하면 상당히 다르다. 2007-2008 년의 근원인플레이션은 구조적으로 소비자물가상승률을 상회하고 있었으나 2008 년 4/4 분기 중 글로벌 금융위기 발생에 따른 근원적 충격으로 물가상승압력이 크게 줄어들면서 간신히 물가안정목표를 달성할 수 있었다. 즉 2007-2009 년 중 물가안정목표를 지킬 수 있었던 것은 글로벌 금융위기 발생에 따른 수요충격이 물가안정에 우호적으로 작용하였기 때문이다. 한편, 글로벌 금융위기 발생 이후 2009 년 10 월까지 근원인플레이션이 소비자물가상승률을 밑돌았으므로 공급충격 또는 비근원충격은 오히려 물가상승압력으로 작용했다고 하겠다.

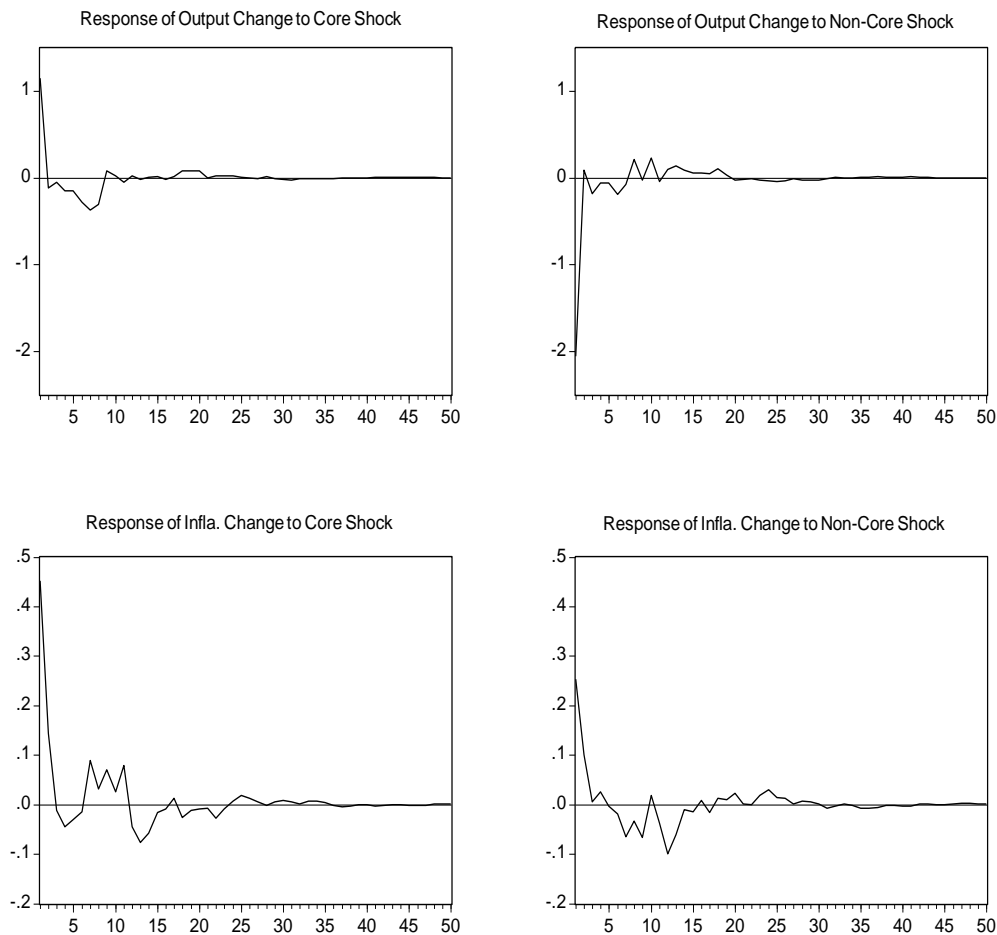
본 고의 서두에서 한국은행은 2007~2009 년 중 국제유가 및 원/달러 환율의 급등락으로 인한 공급충격으로 소비자물가 변동성이 크게 확대되면서 물가안정목표를 달성하게 되었다고 평가하는 것으로 기술하였다. 이러한 해석에 따르면 글로벌 금융위기 발생으로 유가 및 원자재 가격이 크게 안정되면서 목표를 달성하게 되었다는 것인데, 과연 동 기간 중 유가 및 원자재 가격 안정을 공급 충격으로 간주할 수 있을 지 의문이다. 위기 발생으로 전 세계 수요가 둔화되면서 유가 및 원자재 가격이 안정되었을 수 있다. 또한 해외 원자재 가격 변화 등 공급 충격을 제외시켜 근원인플레이션을 추정한다고 하나 해외 원자재 가격의 급등락을 강조하다보면 근원인플레이션에 미치는 수요 충격의 영향보다는 공급충격의 영향을 강조하게 된다.

4. 충격반응과 분산분해

국제유가나 원/달러 환율의 급등락을 공급충격으로 간주하려면 급등락의 원인이 수요 측면이 아니고 공급 측면에 있음을 보여야 한다. 이러한 진단 없이 유가나 원자재 및 식료품 가격 변화를 공급 충격으로 간주해서는 안 된다. 이런 점에서 산출량에 대한 장기중립성을 기준으로 수요 충격과 공급 충격을 구분하는 구조적 벡터자기회귀 모형은 보다 이론적이고 분석적이라고 하겠다.

그렇다면 제 III장의 우리나라의 구조적 벡터자기회귀모형에서 식별된 근원적 충격과 비근원적 충격이 이론적으로 기대되는 방향으로 산출량과 인플레이션에 영향을 미치는지 살펴보자. [Figure 7]은 식별된 근원적 충격 (η_1)과 비근원적 충격 (η_2)에 대한 충격반응 결과이다. 근원적 충격은 수요충격의 특성을 보이고 있어서 단기에 생산과 인플레이션을 모두 증가시킨다. 또한 비근원적 충격은 단기에 생산을 줄이고 인플레이션을 증가시키는 공급충격의 특성을 보인다.

Figure 7. Responses to Structural One S.D. Innovations



유의할 점은 위의 충격 반응이 산출량과 인플레이션의 변화에 대한 충격 반응이라는 것이다. 수요 충격과 공급 충격은 소비자물가상승률을 영구적으로 변화시킨다. 이 점은 통상적으로 작성되는 근원인플레이션에서 공급충격의 역할과 다르다. 통상적 근원인플레이션이 농산물과 석유류 제품가격 등 일시적 공급충격 요인을 제거한 것이라고 한다면 구조적 근원인플레이션은 모든 충격이 지속적으로 소비자물가상승률에

영향을 미친다고 보고 그 중에서 수요충격의 특성을 보이는 근원적 충격의 효과를 측정하는 것이다.

<Table 6>은 구조적 벡터자기회귀모형의 분산분해 결과이다. 근원적 충격은 소비자물가상승률 변화의 70% 이상을 설명하고 있으나 산출량 변화의 27% 밖에 설명하지 못한다. 즉 수요충격의 특성을 보이는 근원적 충격은 소비자물가상승률의 70% 이상을 설명하므로 구조적 근원인플레이션의 역할도 그만큼 크다고 하겠다. 그뿐만 아니라 공급충격에 대하여 물가나 고용을 희생하지 않고 통화당국이 할 수 있는 일은 많지 않으나 수요 충격의 경우 통화당국이 기준금리변경을 통하여 적절하게 대응할 수 있으므로 구조적 근원인플레이션을 중간지표로 활용할 가치가 있다.

Table 6. Variance Decomposition of Changes in Inflation and Output
(Percentage of Variance Due to Core)

horizon(month)	Changes in CPI Inflation	Changes in Output
1	76.1	23.7
3	75.2	23.7
12	72.1	27.7
24	71.7	27.7
48	71.7	27.7

5. 향후 정책 운용에 대한 시사점

앞에서는 근원인플레이션으로 통상적 근원인플레이션과 구조적 근원인플레이션을 사용하느냐에 따라서 물가안정목표제 운용에 대한 평가가 달라진다고 하였다. 그뿐만 아니라 근원인플레이션으로 어느 것을 사용하느냐에 따라서 향후 정책운용에 대하여 시사하는 바가 달라진다.

통상적 근원인플레이션을 기준으로 평가하면 다음과 같다. 2007-2009 년 중 물가안정목표 달성은 글로벌 금융위기를 전후한 농산물과 석유류 제품 가격의 급등락에 힘입은 바 크다. 또한 농산물 및 석유류제품 가격 상승률이 2009 년 하반기 이후 높아지고 있으나 근원인플레이션이 여전히 하향추세를 유지하고 있어서 물가안정목표달성이 무난해 보인다.

그러나 구조적 근원인플레이션을 기준으로 평가하면 매우 달라진다. 글로벌 금융위기를 전후한 수요충격으로 근원인플레이션이 크게 변동하였으며 2007-2009 년 중 물가안정목표 달성은 글로벌 금융위기에 따른 마이너스 성장에 기인한 바가 크다. 또한 글로벌 금융위기 이후 각종 경기확대정책에 힘입어 경기가 빠르게 회복되면서 근원인플레이션이 급격하게 상승하고 있으므로 향후 적절한 출구전략을 마련해야 한다. 물론 [Figure 5]에서 보는 바와 같이 2009 년 들어 근원적 충격 규모가 점차 감소하기 때문에 근원인플레이션이 감소할 것이다. 그러나 근원인플레이션을 밀도는 소비자물가상승률이 점차 근원인플레이션으로 수렴하면서 물가안정목표달성이 용이하지 않을 것이다.

V. 맺 음 말

글로벌 금융위기는 우리나라 물가안정목표 달성에 큰 영향을 미쳤다. 글로벌 금융위기를 물가안정목표 달성의 기준으로만 본다면 호재라고 볼 수 있을까? 2007 년 이후 유가 및 원자재 가격이 급등하면서 물가안정목표달성이 위협하게 되었으나 글로벌 금융위기 발생 후 유가 및 원자재 가격이 급락하고 큰 폭의 마이너스 성장을 하게 되었으므로 물가안정에는 큰 도움이 되었다고 하겠다.

글로벌 금융위기와 같은 충격은 일시적 충격과 영구적 충격으로 나누어진다. 통상적으로는 농산물과 석유류제품의 가격변화를 일시적 공급충격으로 보고 이를 제외한 근원인플레이션을 작성하고 물가안정목표 달성의 중간지표로 활용한다. Blinder(1997)는 중앙은행이 농산물이나 에너지 제품 가격을 제외한 근원인플레이션에 관심을 가지는 것은 농산물이나 에너지 제품가격의 변동성이 매우 크기 때문이 아니라 이들 가격을 중앙은행이 통제할 수 없기 때문이라고 하였다. 그렇다고 하더라도 과연 농산물이나 에너지 제품가격 변화를 공급충격으로 봐야 할 지 의문이다. 또한 중앙은행이 통제하기 어려운 공급 충격은 농산물과 석유류 제품의 가격 변화뿐만이 아닐 것이다.

이상과 같은 인식 하에 본 고에서는 통상적으로 사용하는 근원인플레이션 대신 구조적 근원인플레이션을 추정하여 물가안정목표제 운영 및 향후 정책방향에 대한 시사점을 찾고자 하였다. 글로벌 금융위기의 충격을 산출량에 장기적 중립성을 가지는 근원적 충격과 장기적 중립성을 가지지 않는 비근원적 충격으로 나누어 글로벌 금융위기 기간 중 근원적 충격이 물가안정목표 달성에 미친 영향을 분석하고자 하였다.

통상적 근원인플레이션 대신 구조적 근원인플레이션을 사용하면 물가안정목표달성에 대한 평가 및 향후 정책방향에 대한 시사점이 달라진다. 농산물과 석유류 제품의 가격변화를 제거한 통상적 근원인플레이션을 기준으로 평가하면 2007-2009 년 중 물가안정목표 달성은 글로벌 금융위기에 따른 국제유가 및 원자재 가격의 안정이라는 공급충격에 크게 기인한 것으로 해석된다. 또한 위기 후 국제유가 및 원자재 가격이 안정되었으므로 다시 급반등하지 않는다면 향후 물가도 안정될 것으로 보인다.

그러나 중앙은행의 통제 대상인 구조적 근원인플레이션을 기준으로 평가하면 매우 달라진다. 통상적 근원인플레이션은 위기 후 농산물 및 석유류 제품 안정으로 소비자물가상승률보다 높아졌으나 수요충격을 반영한 근원인플레이션은 글로벌 금융위기에 따른 전 세계적 마이너스 성장으로 소비자물가상승률을 크게 밀돌면서 물가안정목표 달성을 가능하게 하였다. 그러나 글로벌 금융위기 이후 각종 경기확대정책에 힘입어 경기가 빠르게 회복되면서 우리나라의 근원인플레이션이 급격하게 상승하고 있으므로 적절한 출구전략을 마련할 필요가 있다.

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Central Bank Design and Credit Market Distortions: The Case of Korea

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Abstract

In the aftermath of the recent financial crisis, special attention is paid to the design of central banks in order to promote economic and financial stability. Often the concept of inflation targeting, i.e. the focus on stabilizing inflation around a prespecified target, is blamed for leading to a too narrow view of economic stabilization that excludes financial stability objectives. The Korean economy was also hit hard by the financial crisis. After a successful decade of inflation targeting, the recent financial crisis made apparent that the functioning of credit market could be a major obstacle to successful economic stabilization. This paper studies the optimal weight the central bank should attach to stabilizing inflation in light of credit market distortions. The paper uses a standard New-Keynesian model, in which the central bank formulates a robust-control approach to monetary policy. Firms hold working capital to finance the wage bill. Both the central bank and the government share the concern about distortions. As a result, a large weight on inflation stabilization remains optimal. The degree of central bank conservatism should increase with the danger of credit market distortions as the stabilization bias of discretionary monetary policy grows with the fear of distortions. The design of the Bank of Korea accords well with these normative findings.

Keywords: optimal monetary policy, cost channel, monetary policy delegation, robust control

JEL classification: E43, E52

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I. Introduction

In the aftermath of the recent financial crisis, special attention is paid to the design of central banks in order to promote economic and financial stability. Often the concept of inflation targeting, i.e. the focus on stabilizing inflation around a prespecified target, is blamed for leading to a too narrow view of economic stabilization that excludes financial stability objectives.

Like other emerging market countries, the Korean economy was hit hard by the financial crisis. After a successful decade of inflation targeting, the recent financial crisis made apparent that the functioning of credit markets could be a major obstacle to successful economic stabilization.

The aim of this paper is to investigate the optimal weight the central banker should attach to inflation stabilization if the central bank and the government fear credit market distortions. The central bank is unable to attach a probability distribution to alternative crisis scenarios. Instead, policy takes the worst-case outcome into account when formulating policy. This set-up is known as Hansen and Sargent's (2008) robust control approach. In fact, Charles Evans (2009), a member of the Federal Reserve's FOMC, recently argues that his theoretical framework summarizes policy measures in the second half of 2008:

"The current environment is also one in which we have to worry about the evil agents in Hansen and Sargent's robust control analyses. Recall that the 'evil agent' is a parable for how we might end up in states of the world ... that entail huge downside costs to the economy."

This paper models such a situation. We employ a New-Keynesian model that is extended to include a working capital channel, i.e. firms rely on the credit market to finance the wage bill. The central bank fears credit market distortions in the form of a spread between policy-controlled and lending rates. Once we adopt the robust control approach to policy, a natural definition of financial instability arises. We define financial instability as the worst-case interest rate spread the central banker fears.

We use this model to address the following issue: What is the optimal choice of a central banker in terms of his output weight in the loss function? Suppose the government should appoint a central banker. Both the central bank and the government are concerned about credit market distortions. We show that it is indeed optimal for the government to appoint a weight-conservative central banker, i.e. one whose relative weight on inflation stabilization is higher than that of the government. The degree of conservatism increases with the fear of distortions. We will use the case of Korea to contrast the main findings with the institutional design of actual monetary policy in an inflation targeting economy.

The paper is organized as follows: Section 2 introduces a standard New-Keynesian business cycle model for which section 3 derives optimal monetary policy under uncertainty about credit markets. Section 4 studies the optimal delegation of monetary policy, while section 5 applies these results to the case of the Bank of Korea. Section 6 draws some tentative conclusions.

II. The model

The model is an extension of Ravenna and Walsh's (2006) New-Keynesian model.² As in Chowdhury, Hoffmann, and Schabert (2006), the lending rate faced by firms can differ from the policy rate. The forward-looking Phillips curve (1)

$$\pi_t = \beta E_t \pi_{t+1} + \kappa((\sigma + \eta)x_t + \phi R_t^l) \quad (1)$$

and the IS curve (2) represent log-linearized equilibrium conditions

$$x_t = E_t x_{t+1} + \sigma^{-1}(R_t - E_t \pi_{t+1} - r_t^n) \quad (2)$$

where π_t is the inflation rate, x_t the output gap, and R_t the money market interest rate controlled by the central bank. The discount factor is denoted by $\beta < 1$, σ is the inverse of the intertemporal elasticity of substitution, η is the elasticity of labor supply, and κ is the slope coefficient of the Phillips curve. Shocks to the natural real rate of interest are given by $r_t^n \sim N(0, \sigma_r^2)$.

The only departure from the standard New-Keynesian model is the restriction that firms hold working capital as e.g. in Christiano, Eichenbaum, and Evans (2005) or, recently, Uhlig (2009). Firms face a cash-in-advance constraint and borrow at the nominal lending rate R_t^l in order to pay the wage bill. This introduces a simple credit market into the model. The size of this cost channel is given by ϕ . The cost channel constitutes a supply-side transmission mechanism of monetary policy that supplements the standard demand-side effect.³

The model describes a closed-economy and necessarily lacks many aspects that are particularly important from an emerging market's perspective such as exchange rate volatility, foreign indebtedness and capital flows. Clarida, Galí, and Gertler (2001), however, show that the resulting optimal monetary policy in this model is isomorphic to the policy prescription from an open-economy model. Hence, the basic mechanism presented in this paper will survive even in richer models.

If the credit market model is subject to distortions these distortions appear in form of costly financial intermediation. Denote this distortion by z_t . Hence, the refinancing costs for firms are

$$R_t^l = R_t + z_t \quad (3)$$

Monetary policy is assumed to set interest rates in order to minimize inflation and output gap volatility weighted by $\lambda \geq 0$

$$L_t = \frac{1}{2}(\pi_t^2 + \lambda x_t^2) \quad (4)$$

The task is to reformulate the central bank's optimization problem such that the resulting policy performs well even if the credit market is distorted. To illustrate the problem, we introduce a fictitious second rational agent, the evil agent mentioned by Evans (2009) in the introduction, whose goal is to maximize the central bank's loss.⁴

² Tillmann (2010) uses the same model to study cross-country differences in the degree of monetary policy aggressiveness.

³ Barth and Ramey (2001) introduce the cost channel of monetary transmission.

⁴ Leitemo and Söderström (2009) recently derive robust policy in a similar New Keynesian model, although without a cost channel and absent credit market distortions.

The amount of potential misspecifications is given by z_t . The constraint imposed upon the evil agent is explained in the next section. The resulting min-max problem is

$$\min_{x_t, \pi_t, R_t} \max_{z_t} \{ \pi_t^2 + \lambda x_t^2 \} \quad (5)$$

The central bank minimizes the welfare loss by choosing output and inflation and the corresponding interest rate. The evil agent sets the misspecification such that the welfare loss is maximized. If the full amount of possible misspecifications indeed realizes, we refer to the resulting model as the worst-case model.

III. Optimal monetary policy

The Lagrangian of the policy problem can be written as

$$\begin{aligned} \min_{x_t, \pi_t, R_t} \max_{z_t} L = & \pi_t^2 + \lambda x_t^2 - \theta z_t^2 \\ & - \mu_t^\pi [\pi_t - \beta E_t \pi_{t+1} - \kappa((\sigma + \eta)x_t + \phi R_t + \phi z_t)] \\ & - \mu_t^x [x_t - E_t x_{t+1} + \sigma^{-1}(R_t - E_t \pi_{t+1} - r_t^n)] \end{aligned} \quad (6)$$

Where θ , μ_t^π , and μ_t^x denote Lagrange multipliers. We will loosely refer to the Lagrange parameter θ as the inverse of the central bank's fear of credit market distortions. A lower θ means that the central bank designs a policy which is appropriate for a wider set of possible misspecifications.

We assume that commitment is not feasible, both for the central bank and the evil agent. Under discretion, both players optimize taking expectations as given. The first-order condition imply the basic trade-off faced by monetary policy

$$x_t = - \frac{\kappa(\sigma + \eta) - \sigma\phi}{\lambda} \pi_t \quad (7)$$

Thus, as Ravenna and Walsh (2006) note, with $1 + \eta\sigma^{-1} > \phi > 0$, optimal policy will result in greater inflation variability for a given level of output gap variability since stabilizing inflation is more costly.

The first-order conditions also imply the degree of credit market distortion set by the evil agent

$$z_t = \frac{\kappa\phi}{\theta} \pi_t \quad (8)$$

As the fear of distortions increases, i.e. θ falls, z_t becomes larger. The most important determinant of z_t is the rate of inflation. If inflation is low, the evil agent cannot do much harm.

The worst-case solution consists of output, inflation and the interest rate as a function of the real interest rate shock, the only state variable, i.e. $\pi_t^w = \Omega_\pi^w r_t^n$, $x_t^w = \Omega_x^w r_t^n$, and $R_t = \Omega_R r_t^n$ with

$$\Omega_{\pi}^w = \frac{\lambda \theta \kappa \phi}{\lambda \theta - \lambda \kappa^2 \phi^2 + \theta \kappa^2 ((\sigma + \eta) - \sigma \phi)^2} \quad (9)$$

$$\Omega_x^w = -\frac{\kappa((\sigma + \eta) - \sigma \phi)}{\lambda} \Omega_{\pi}^w \quad (10)$$

$$\Omega_R = 1 - \sigma \Omega_x^w \quad (11)$$

Based on estimates of the cost channel coefficient provided by Ravenna and Walsh (2006), i.e. $\phi=1$, and for standard values for σ , $((\sigma + \eta) - \sigma \phi) > 0$.⁵ The robust control approach considers distortions in the neighborhood of the certainty benchmark which corresponds to $\theta \rightarrow \infty$. Here we impose a minor restriction on θ and assume $\theta > \kappa^2 \phi^2$. Based on Ravenna and Walsh's empirical results, this assumption imposes a very low lower bound on θ .

Note that the spread considered here lacks a structural interpretation. In particular, the spread modeled here does not resemble the one observed during the recent crisis. The welfare effect from distortions only stems from its impact on inflation and volatility and, hence, on the central bank's success in stabilizing the economy.

The robust control approach used in this paper also sheds new light on the classical result of Brainard (1967). Brainard argued that multiplicative parameter uncertainty should lead to an attenuated adjustment of the policy instrument. This is known as the "Brainard principle". In a series of papers, Giannoni (2002) and Onatski and Stock (2002), among others, analyze whether the Brainard result carries over to robust policy in a New-Keynesian model of monetary policy. The literature typically finds that uncertainty is likely to lead to more vigorous interest rate setting behavior. Policy no longer obeys the Brainard principle.

The results in this paper corroborate these findings. Straightforward differentiation reveals that $\partial(\Omega_R)^2 / \partial \theta < 0$. A higher degree of uncertainty, i.e. a lower θ , leads to a larger variance of the policy instrument. Under a min-max approach to uncertainty, the central bank should stabilize policy more aggressively than under certainty.

IV. The optimal weight on price stability

Since Rogoff's (1985) seminal analysis, it is now common wisdom that delegating monetary policy to a central bank which is more inflation-averse than the social planner, i.e. to a "conservative central banker", can raise welfare. Here the central bank targets the natural rate of output. Thus, the classic inflation bias is absent. Instead, the rationale for policy delegation is that monetary policy under discretion gives rise to a stabilization bias, see e.g. Clarida, Galí, and Gertler (1999). Since shocks are assumed i.i.d. in this paper, expected inflation is always zero and the stabilization bias is absent.

In the presence of distortions, however, the bias could reappear. Assume that a social planner delegates policy in order to minimize worst-case inflation and output fluctuations. Hence, the planner is also concerned about distortions and, thus, relies in its delegation

⁵ Christiano, Eichenbaum, and Evans (2005) calibrate $\phi = 1$.

decision on the worst-case outcomes for inflation and output. It appears plausible that the social planner shares the central bank's concern about a malfunctioning credit market.

The social planner weights fluctuations in the output gap with a weight λ^P , which is not restricted to coincide with the weight of the central bank. The social planner then chooses λ in order to minimize the welfare loss resulting from the equilibrium outcome for a given λ

$$\min_{\lambda} \left\{ (\pi_t^w)^2 + \lambda^P (x_t^w)^2 \right\} = \min_{\lambda} \left\{ (\theta_{\pi}^w)^2 \sigma_r^2 + \lambda^P (\theta_x^w)^2 \sigma_r^2 \right\} \quad (12)$$

The resulting first-order condition can be reorganized to

$$\lambda = \lambda^P \left(1 - \frac{\kappa^2 \phi^2}{\theta} \right) \quad (13)$$

For a standard parameterization, $1 - \frac{\kappa^2 \phi^2}{\theta} < 1$. It follows that $\lambda < \lambda^P$. The central banker is more conservative than the social planner. If θ falls, inflation is more volatile than under certainty. Put differently, the stabilization bias increases. This bias can be corrected through the optimal choice of λ . If $\theta \rightarrow \infty$, $\lambda = \lambda^P$. Under certainty about the functioning of the credit market there is no role for monetary conservatism as the stabilization bias is absent. As the fear of misspecifications increases, policy in the worst case model becomes more attenuated. This aggravates the stabilization bias of discretionary monetary policy and motivates the appointment of a conservative central banker.

This result holds only as long as $\frac{\kappa^2 \phi^2}{\theta} < 1$. Empirical estimates of κ typically range between 0.01 and 0.1.⁶ Thus, with a cost channel coefficient of about $\phi = 1$, the nominator becomes very small. The obvious difficulty is to specify a value for θ , the central bank's trust in the reference model, which is bounded only by zero. A value of $\theta \rightarrow \infty$ is equivalent to the case of Rational Expectations. To the extent the robust control approach interprets uncertainty as small deviations from a reference model, we should not expect θ being close enough to zero that $\frac{\kappa^2 \phi^2}{\theta} > 1$. With the above mentioned restriction we basically rule out situations in which the central bank does not trust the reference model at all.

⁶ See Walsh (2010, chapter 8) for a survey of the parameterization of the standard New-Keynesian model.

V. The case of the Bank of Korea

The Bank of Korea (BoK) adopted inflation targeting as its monetary strategy following the financial and currency crisis of 1997.⁷

The revision of the Bank of Korea act, which became effective in 1998, explicitly made price stability the primary aim of monetary policy and imposed an explicit inflation target. At the same time, the independence of the Bank of Korea was enhanced and the aim of financial stability transferred to the newly established Financial Services Commission.⁸ Nevertheless, the BoK strives to achieve financial stability in the actual operation of its policy. Kim (2006) stresses the fact that the BoK takes account of other objectives such as financial stability and growth as long as price stability is not endangered.

The inflation targeting regime in Korea is generally seen as being a model of success, see Kim and Park (2006). It helped stabilizing inflation effectively and was a prerequisite for the economic recovery.

The results from the previous sections are easily applied to the case of the Bank of Korea. The recent financial crisis of 2008/09 put the inflation targeting framework in Korea to a test. Put differently, monetary policy faced severe credit market distortions when implementing interest rate policy. Recent research by Yie (2008) indeed finds a role for the cost channel in the Korean economy, although the estimated φ coefficient, ranging from 0.32 to 0.45, is surrounded by substantial estimation uncertainty. It follows that, to the extent the monetary authorities fear credit market distortions, $\lambda < \lambda^P$ should hold. The Bank of Korea should place a weight on stabilizing inflation that is higher than that of the government in order to stabilize inflation efficiently. In other words, the Bank of Korea is wise to put large weight on inflation stabilization. Recently, Sanchez (2009) estimates an empirical macroeconomic model on the Korean economy. He finds that the BoK objective function does indeed include negligible weights on output and exchange rate variability and, hence, does in fact follow a policy of flexible inflation targeting. Likewise, Parsley and Popper (2009) find only an indirect role of the exchange rate in the BoK's monetary policy rule. The authors argue that the BoK actively targets the rate of inflation, not the exchange rate.

While in the past the design of monetary policy in Korea accords well with the findings of this paper, market participants consider the newly appointed governor of the Bank of Korea, Kim Choong-soo, more dovish than his predecessor, Lee Seong-tae.⁹ It remains to be seen whether the BoK continues its successful anti-inflation strategy. The recent interest rate hike in July 2010, with which the BoK responded to increases in inflation expectations, will certainly contribute to foster the BoK's anti-inflation credibility.

⁷ See Filardo and Genberg (2010) for a survey of the institutional arrangements and alternative central bank designs in the Asia-Pacific region.

⁸ For an in-depth analysis of these developments, see Cargill (2001, 2009).

⁹ See, among others, *MarketWatch* (March 16, 2010): "Korea's new central bank chief reportedly dovish".

VI. Conclusions

This paper used a robust control approach to monetary policy to shed light on the design of inflation targeting central banks. It was shown that the fear of credit market distortions motivates the delegation of monetary policy to a conservative central bank - even in the absence of a classic inflation bias. This result lends itself as a benchmark for the evaluation of actual central bank designs. It was shown that the Bank of Korea is wise to emphasize price stability as its primary objective and to safeguard its independence even in the presence of distortions to credit markets.

A final word of caution is warranted here. The model is deliberately simplistic. This paper is about stabilization of the business cycle, not necessarily about financial stability. Absent any form of dynamics, the model is unable to reflect the gradual build-up of risks, preemptive policy measures, and the role of structural frictions in financial intermediation. Nevertheless, the model delivers useful policy prescriptions that are likely to survive in more complex models.

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The Seduction of Bankruptcy

*Yong J. Yoon**

Abstract

Consumer bankruptcy has been rising for three decades until 2005, when the Bankruptcy Abuse Prevention and Consumer Protection Act was enacted. According to the standard theory of bankruptcy, bankruptcy filing is caused by financial distress of consumers. The prediction of this theory is that bankruptcy filings will be cyclical: rising in recession and falling in prosperity. The prediction is consistent with observations until 1979. However, during the 1979-2005 periods, bankruptcy filings have been rising rapidly in spite of strong economic growth. Between 1979 and early 2000s, personal bankruptcy filings increased by more than 400 percent. An alternative explanation considers the fact that the Bankruptcy Reform Act of 1978 has been more forgiving to debtors than earlier laws. This theory considers incentives in rational choice model in explaining the rapid rise in bankruptcy filings. The rational choice theory is not sufficient to explain the fact that the rise took several decades. Considering the stigma people have about filing bankruptcy and the opportunistic behavior, I propose a behavioral theory in which individual behavior results in horizontal evolution. An empirical work has been proposed and performed to compare my proposed theory with the traditional theory. The GINI index is used as a proxy for financial distress. The tentative result based on the data for the 1969 through 2002 indicates that behavioral theory better explains the observed behavior.

JEL codes: D12, K34

Key Words: consumer bankruptcy, Bankruptcy Reform Act, horizontal evolution, GINI index

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I. Introduction

Bankruptcy is the legal process that resolves debts of financially distressed individuals. In this sense, bankruptcy law allows partial anarchy in the fringe of an ordered society. Since the *Bankruptcy Reform Act* of 1978, consumer bankruptcy has been rising for 25 years until 2005. See attachment 1 and 2 at the end of the paper. The bankruptcy filings for each year in the early 2000s, more than a million per year, have been more numerous than the number of college graduates of the year. According to the traditional theory of consumer bankruptcy, bankruptcy filings are caused by financial distress of individuals. The prediction of this theory is that the number of bankruptcy filings will be counter cyclical. During the recession bankruptcy filings will rise, and the filings will fall during the economic boom. The traditional theory explains fairly well the data for 1900-1978. However, contrary to this theory, bankruptcy filings have been rising rapidly, in spite of strong economic growth, during the 1978-2005 periods.

Writers on bankruptcy -- economists, legal scholars, and sociologists -- provide two different or opposing interpretations of the observations of 1979-2005. Sullivan et al (2000), for instance, stick to the traditional theory and interpret the data as indicating some hidden factors that are not shown on the superficial aggregate data. Others claim that the traditional model fails to explain the observation of 1979-2005. Buckley (2002), White (2007), and Zywicki (2005), among others, belong to this group. These authors argue that the rising bankruptcy files are the result of the incentive provided by the 1978 Bankruptcy Code that is forgiving to debtors by extending asset exemptions.

The intellectual background of traditional theory had influence on the 1978 *Bankruptcy Reform Act*. The bankruptcy filing rate was 1.5 million in 2004 and 2 million in year 2005. After the *Bankruptcy Abuse Prevention and Consumer Protection Act* (BAP-CPA) has been enacted in 2005, the filing rate fell sharply to 600,000 in 2006.

It is expected that the forgiving nature of the legal institution will reduce the opportunity cost of filing consumer bankruptcy. That is, institution matters because of its influence on incentives. The incentive argument is based on economic theory and has intuitive appeal. However, the standard incentive argument is not sufficient to understand the bankruptcy behavior. We note that there are many who do not file even if they can benefit from bankruptcy. People have stigma about filing bankruptcy and wish to behave as responsible persons. To understand the role of stigma on behavior, I propose to introduce a behavioral dimension in addition to the dimension of preference/utility calculations.

To contrast the proposed theory with the traditional model for bankruptcy, I conducted an empirical work. The GINI index has been used as a proxy for financial distress. The tentative result indicates that the proposed behavioral model explains the observations of 1979-2005 better than the traditional theory. In the following three sections, I will first discuss the traditional theory of bankruptcy and the data in section II. In section III, I discuss different interpretations of the data. A behavioral theory is proposed in section IV, and report the data analysis. Some concluding remarks appear in the last section.

II. Theory of Consumer Bankruptcy and Data

The traditional theory explains bankruptcy filings by financial distress faced by individuals. The major causes of financial distress are unexpected unemployment, medical problem, divorce, or indebtedness. Each of these factors are discussed in Sullivan et.al (1990).

The traditional theory assumes that people face financial distress during the economic recessions. The implication of this theory is that bankruptcy filings will move with business cycles; filings will rise during recession and fall during prosperity. The theory explains the data fairly well from 1900 through 1978, though the trend has been a slowly increasing rate of bankruptcy filings over time. This theory served as the intellectual background for the *Bankruptcy Reform Act* of 1978. Legal scholars generally agree that the law was forgiving to debtors. We can expect that the 1978 bankruptcy law would affect behavior.

Since 1979, bankruptcy filings have been rising rapidly, in spite of the strong economic growth until 2005. In 2005 *BAP-CPA* has been enacted to prevent abuses of the forgiving nature of 1978 Bankruptcy Code. The new law enacted was less forgiving to debtors, especially Chapter 13 of the Code.

The pattern of consumer bankruptcy filings has been analyzed from the data available for the last hundred years: Annual Report of the Attorney General of the United States and Administrative Office of the United States Courts. See Figure 1 for a plot of this data. During the Great Depression, bankruptcy filings peaked in the 1930s at 60 per 100,000 population. In 2004 the filings were 500 per 100,000 population or 1.5 million filings. In 2005, the filings are 2 million. The bankruptcy filings dropped immediately after 2005, yet the number has been rising again during the financial crisis and economic recession of 2008. As Murray and Dougherty (2010) reports the bankruptcy filing is already 1.4million.

III. Interpretation of the Observation

The simple version of traditional theory of bankruptcy would hardly explain the observed pattern during the period 1979-2005. Basically, there are two different perspectives or theories in interpreting the observation.

Sullivan et al. follow the traditional theory and argue that the American middle class faces financial distress. But they failed to identify and locate factors that would explain the anomaly from the perspective of the traditional theory. In terms of economic theory, their position implies the hypothesis that individual's preference and behavior are stable. Even changes in legal constraints do not affect incentives of an economic man. For an economist, it is hard to accept an argument that assumes, though implicitly, that behavior is unaffected by the legal institution. It should be no surprise to observe the rising bankruptcy filings for 25 years, which is considered as an anomaly to the traditional theorists. In the following section, I consider factors that might influence bankruptcy filings during the time of strong economic growth.

Consider an individual who solves an inter-temporal consumption problem by his earnings, borrowing, and saving. A standard rational choice theory will predict that a forgiving bankruptcy law will give incentive for more borrowing. If default cost is included as the cost of borrowing, much as in corporations, we can predict that lower cost of borrowing offer incentive for borrowing more and thus higher chances for default and bankruptcy filing. This observation may end the debate about explaining away the anomaly. We note, however, that, even in financial distress, most people have stigma about filing bankruptcy. According to some calculation, about 20 to 30% of population will financially benefit from filing bankruptcy. The actual bankruptcy filing is much lower than this.

IV. Alternative Theory and Empirical Work

To better understand the behavioral pattern of bankruptcy filings discussed above, we first develop a theory of financial distress. We note that, during the last thirty years of globalization, along with increased business opportunities, risk and uncertainty has been increased.

As Milton Friedman (1953) has argued, economic freedom in capitalism offers opportunities whose results are uncertain and risky. People may have different attitude toward risk and some individuals have risk-loving range in their utility functions. As a consequence of economic freedom, income inequality follows. Thus, the economic freedom and business opportunities from globalization means more income inequality and financial distress for some. Those who were unsuccessful in risky business will face financial distress and may end up filing bankruptcy. This argument is consistent with the traditional theory of bankruptcy.

Under this scenario of risk and financial distress, GINI index is chosen as a proxy for financial distress. I have chosen GINI index partly because it is readily available data. We can formulate the idea in a linear form. Let x denote the GINI index and y the bankruptcy filing rate. Then y can be expressed in a linear form:

$$Y(t) = a + bx(t)$$

The data used was for the period 1967 through 1997. A simple regression show that the t -value for GINI index is 11.59 and - 10.3 for the constant term. Since both terms have trend during the period of data, we consider the equation for first differences:

$$dy(t) = b [dx(t)]$$

where $dy = y(t) - y(t-1)$ and $dx = x(t) - x(t-1)$. From the regression, t -value for the difference of GINI value is $t = -0.66$. But when we introduce a constant term and regress the equation,

$$dy(t) = a + b [dx(t)]$$

The t -value for the GINI difference is -2.28 and for the constant term the t -value is 3.95. Just conducting regression for a conjecture is not very meaningful, especially for the highly aggregated data we have. I test this theory against the behavioral theory proposed below.

Unlike the traditional theory, the alternative explanation considers economic incentives in different legal institutions. However, the standard rational choice theory also begs a question. The incentive offered by the 1978 Bankruptcy Act will boost bankruptcy filing, and the level of filing rate should stabilize immediately. But what we observe is the continuous increase over 25 years. Spread of information certainly takes time, but not 25 years! Even in financial distress most people or a significant number of people do not file bankruptcy. This indicates that the simple incentive argument in rational choice model is not sufficient to counter the argument of Sullivan et al. We have to consider the dimension of behavior.

The fact that most people have stigma about filing bankruptcy suggests that the social norm about bankruptcy has been the result of cultural or social evolution. Hayek emphasized cultural evolution in explaining the emergence of institutions. The process of removing or reducing such stigma is another behavior pattern similar to horizontal evolution or learning. Stigma, however, is difficult to define and measure functionally. In quantifying stigma I borrow from behavioral psychology. In the Darwinian theory of evolution, the basic evolutionary mechanism tells that new and more adaptive distribution emerges through natural selection. Likewise, in the learning process, through instrumental conditioning, new distribution emerges. The new law and those who have filed bankruptcy serves as conditioning for the rest of the population. See Rachlin (1991).

As an alternative hypothesis to the traditional model based on GINI index, I mobilize the behavioral theory proposed above. My conjecture is that changes in bankruptcy filings can be explained by the number of existing bankruptcy filings. The assumption of this conjecture is that preference/utility function approach does not fully explain bankruptcy behavior. Behavior changes as the stimulation increases, and the filing activities of other individuals serve as stimulation.

Based on the theory developed above, we can formulate a linear equation in which bankruptcy filing rate is a function of the GINI index and the number of bankruptcy cases that have been already filed. Then,

$$\begin{aligned} y(1) &= a + bx(1) + cy(0) \\ y(2) &= a + bx(1) + c[y(1)+y(0)] \\ &\dots\dots\dots \\ y(t-1) &= a + bx(t-1) + c[y(t-2) + \dots + y(0)] \\ y(t) &= a + bx(t) + c[y(t-1) + \dots + y(0)] \end{aligned}$$

By subtracting $y(t-1)$ from $y(t)$, we obtain
 $y(t) - y(t-1) = b[x(t)-x(t-1)] + c y(t-1)$ or

$$(1) \quad dy(t) = b dx(t) + c y(t-1)$$

Data Work.

Equation (1) has been applied to the data for the period 1967-2002. See Table 1 for the data. The data covers the period of *Bankruptcy Reform Act*, between 1978 and 2005. The regression result shows is this. The t-value for GINI term is -1.13 and the t-value for the sum of bankruptcy filings is 2.99. It is possible that people who file bankruptcy has information about bankruptcy filings in the economy and form expectations. In this case, the regression equation could be,

$$(2) \quad dy(t) = b dx(t) + c y(t)$$

In this case, the t-value for the GINI index term is -1.1 and the t-value for the historical sum of bankruptcy filings is 3.38.

By comparing the t-values, we conclude that the behavioral theory explains the bankruptcy filing behavior better than a traditional theory for bankruptcy.

V. Conclusion

The behavioral model proposed has an implication that was not discussed so far. The behavior from reduced stigma is different from economic response to incentives. Behavioral change will stay even after the economic incentive is gone. This finding will help our interpretation of future bankruptcy data. The result of this paper also raises questions about what should be the principle of bankruptcy law. Should it be the efficiency, or social safety net?

American bankruptcy law is unique in that, unlike bankruptcy laws in other countries, bankruptcy law offers a fresh start or a partial anarchy in the fringe of the society. In this way, bankruptcy serves as consumption insurance and social safety net. The common law countries like England and Canada have more social safety net and less bankruptcy filings. We may ask whether bankruptcy is proper substitute for social safety net, if indeed we consider social safety net. Bankruptcy is an old one question as we read from a clause in the U.S. Constitutions on bankruptcy.

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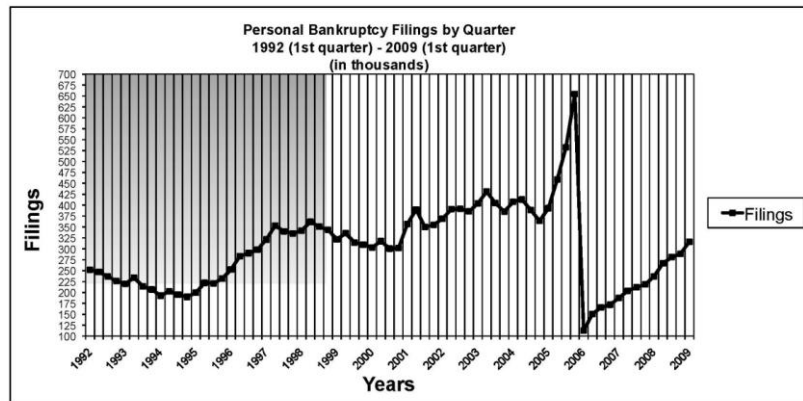
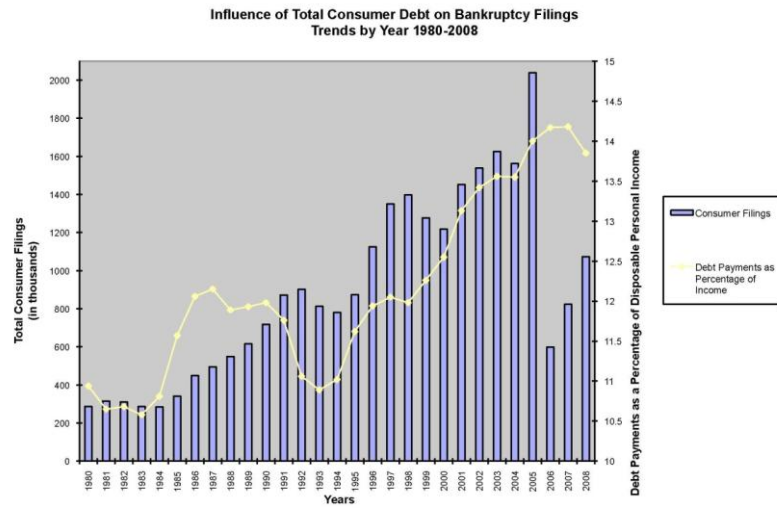
Table 1. Gini index and bankruptcy filing rates

CF: Bankruptcy filing rate

Gini: Gini index

Year	CF	Gini
1967	964.8584	0.399
1968	903.1417	0.388
1969	836.3063	0.391
1970	869.0569	0.394
1971	877.2484	0.396
1972	784.6409	0.401
1973	734.6227	0.397
1974	788.8843	0.395
1975	1038.226	0.397
1976	968.7749	0.398
1977	826.8547	0.402
1978	774.6405	0.402
1979	875.233	0.404
1980	1385.791	0.403
1981	1376.384	0.406
1982	1342.48	0.412
1983	1239.816	0.414
1984	1206.476	0.415
1985	1434.026	0.419
1986	1870.335	0.425
1987	2034.142	0.426
1988	2248.807	0.427
1989	2498.804	0.431
1990	2878.595	0.428
1991	3459.954	0.428
1992	3532.428	0.434
1993	3153.425	0.454
1994	2997.979	0.456
1995	3328.124	0.45
1996	4241.647	0.455
1997	5041.825	0.459
1998	5173.7	0.456
1999	4699.759	0.457
2000	4327.922	0.46
2001	5098.476	0.462
2002	5337.303	0.466

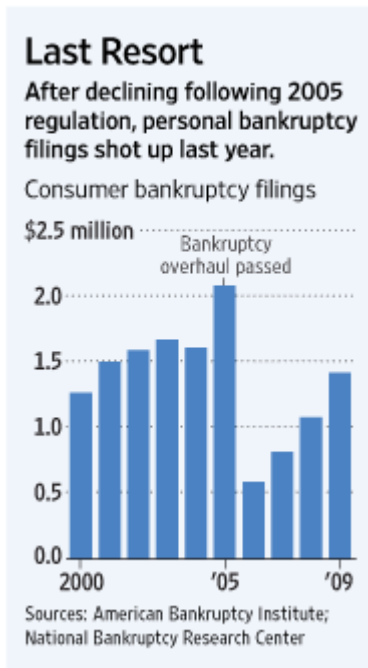
Note: The next two attachments on bankruptcy filings come from American Bankruptcy Institute.



From WSJ JANUARY 5, 2010

Personal Bankruptcy Filings Rising Fast

By SARA MURRAY and CONOR DOUGHERTY



Private Benefits of Corporate Control: Measured from Control Rights Transactions

Wi Saeng Kima
Tae Jun Parkb

Abstract

This paper utilizes actual data for control rights transactions for Korean firms. This data offer a detailed specific information on the purchase price of the control rights. Utilizing the actual control right transactions data, this paper measures the size of premium associated with the corporate control rights transactions.

This study finds that control rights transactions produced positive stock price effects, suggesting that the ownership changes in the Korean market appear to be efficient according to definition offered by Bebchuk (1994). The study also finds that control right premiums vary with firm-specific factors. This finding suggests that private benefits for corporate control are not uniform across all Korean firms, and that some controlling shareholders enjoy more private benefits than other firms, as posited by Bebchuk (1994). Unlike Bargaron et. al (2008) for U.S. block tradings, the study finds that managers for stock exchange listed firms do not pay higher premiums for the corporate control right than for managers of unlisted firms.

JEL Classification Codes: G15, G34

Keywords: Private benefits, managerial rent protection, control transactions

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I. Introduction

The modern theory of the firm is based on the premise that the corporate ownership structure is dispersed and the corporate decisions are delegated to managers (agents) who may maximize their own utilities rather than shareholders wealth (Berle and Means, 1932). The seminal work of Jensen and Meckling (1976) advanced the agency theory to reconcile the conflicting objectives between the agents and principals, so as to minimize agency costs and yield maximum values for the firm. Fama (1980) and Jensen and Ruback (1983) argued that the agency problems will be insignificant when managerial labor market is competitive, because the agents who do not perform well under shareholders wealth maximization rule will be replaced, either internal monitoring and/or external monitoring forces managers. Furthermore, Grossman and Hart (1980) and Lambert and Larcker (1985) offered compensation schemes which reduce the free rider problems and expedite corporate takeover activities.

Recent literature adds new dimensions to the agency theory of the firm. LaPorta, Lopez-de-Silanes, and Shleifer (1999), for example, reported that corporate ownerships are not dispersed in many countries outside America.¹ Bebchuk (1999) indicates that in countries where control rights offer large private benefits (i.e. ownership rents), founding families tend to have a lock in the control to protect the ownership rents. Through pyramidal ownership structure, the founding families have a lock in the control of the firm, even if they are minority shareholders in terms of cash flow rights of the firm. In these firms, a disparity exists between the voting rights and cash flow rights.

The literature indicates that the magnitude of ownership rents will be larger, *ceteris paribus*, for firms in countries where managerial labor markets are not competitive and disclosure rules are lenient, compared to firms in countries where managerial labor markets are competitive and disclosure rules are restrictive. Furthermore, Bebchuk (1999) argued that some of the corporate control transactions in such economies may be motivated to extract ownership rents rather than to maximize share values. Since it has been argued that the ownership rents are large in Korea because the corporate ownership is neither dispersed nor easily challenged (Joh, 2003; Bae, Kang and Kim 2002; Baek, Kang and Lee, 2006), this paper measures ownership rents in the Korean market. It also examines if corporate control transactions are motivated to extract ownership rents or to maximize share values.

The paper obtained recent corporate control transactions data for Korean firms, and empirically examines if the corporate control transactions in the Korean market are motivated to extract ownership rents rather than to create values for the involved firms. The study also measures acquisition premiums (a proxy for ownership rents), and compares the magnitude and determinants for ownership rents with those of acquisitions in other countries.

The paper is organized as follows. Section 2 reviews the literature on the corporate control rights valuation and develop hypotheses. Section 3 describes the unique features of corporate control transaction data in the Korean market. Section 4 presents empirical results and interpretations of the findings. The final section offer a summary and policy implications.

¹ They also found that in some countries, controlling shareholders (founding families) employ pyramid stock ownerships, cross-holdings, and dual-class stock in order to lock the corporate control. They also indicated that the extents of minority shareholder protection differ by national legal origins, and that controlling shareholders are common in civil law origin countries.

II. Literature Review and Hypotheses

There are two schools of thoughts on the relationship between the takeover acquisition price and post-acquisition equilibrium price. On the one hand, Grossman and Hart (1980) and Lambert and Larcker (1985) argue that corporate control market must offer some private gains for the acquirer. If the acquirers are not entitled to private gains and free-rider problems exist in takeover markets, potential acquirers are not encouraged to actively engage in hostile takeover attempts.² Therefore, Grossman and Hart (1980) argues that the tender offer (acquisition) prices should be lower than post-acquisition equilibrium values of target firms. The price differences (discounted prices) represent the private benefits accrue to the acquirers.

On the other hand, Bebchuk (1999), Barclay and Holderness (1989), and Holderness and Sheehan (1985) argue that the corporate control offers substantial private benefits (ownership rents) to the controlling shareholders. Barclay and Holderness (1989) and Holderness and Sheehan (1985) argue that, in a competitive takeover market, the acquisition prices should command premiums to reflect private benefits that accrue exclusively to the controlling shareholders. Holderness and Sheehan (1989) reported that blocks trades are priced at premiums (average 20%) to the post-announcement share price.³ Levy (1983) found a 45.5% premium in Israel. Zingales (1994) found an 81.5% premium for voting shares over nonvoting shares in Italy.⁴ Zingales (1994) also concluded that actual premium in a bidding situation is closely related to the private benefits of control.⁵

1. Competition in corporate control markets and acquisition premium

If corporate control markets are not competitive and if the arguments of Grossman and Hart (1980) and Lambert and Larcker (1985) are followed, the acquirers would pay less than the fair values of target firms. Then the acquisition price will command a discount over post-acquisition equilibrium prices. Even when the acquirers anticipate private benefits from the corporate control, if corporate control markets are not competitive, then the acquirers would not pay the fair value of the target firms.

The acquisition price of the corporate control right will not command premium under the following three scenarios. The first scenario is to avoid possible free-rider problems in corporate takeovers. Grossman and Hart (1980) and Lambert and Larcker (1985) argue that, in order to avoid free-rider problems in corporate takeovers, those who organize corporate takeovers should be entitled to receive more than his/her share of the post-acquisition equilibrium values. To reflect the extra benefits to the acquirer, the acquisition price should be lower than the post-acquisition equilibrium prices. The second scenario is that since the corporate control transactions market are not competitive, the acquirers pay less than the equilibrium post-acquisition prices, even if corporate control rights offer private benefits.

² Grossman and Hart (1980) pointed out that if all of the post-acquisition benefits are accrued to all shareholders in proportion to their stock ownership and the acquiring investors do not receive any private benefits, then large-percentage blocks will trade at the post-acquisition equilibrium prices. Grossman and Hart (1980) further argued that, in order to resolve the free-rider problems of minority shareholders, controlling shareholders should be allowed to take private benefits on corporate takeover transactions.

³ Lease, McConnell, and Mikkelsen (1983) found an average premium of 5.4% in the US, while Smith and Amoako-Adu (1995) found an average premium of 10.4%.

⁴ Zingales (1994) concluded that most of this premium represents the private benefits accrue to the controlling shareholders and the inefficiency of the Italian market for corporate control.

⁵ Holderness and Sheehan (1989) found that the premiums for corporate block trades increase with firm size, fractional ownership, and firm performance. The larger premiums were paid for firms with greater leverage, lower stock-return variance, and larger cash holdings.

The third scenario is that since the corporate control rights do not offer private benefits, the acquisition price will be close to the post-acquisition equilibrium prices.

Therefore, if the empirical data shows that acquisition prices command premiums in corporate control transactions, then the premiums can be interpreted as the ownership rents. The finding will also suggest that the corporate control markets are competitive.^{6, 7}

Hypothesis 1: To the extent that the acquirers expect private benefits accrue exclusively to themselves, and that the control transactions markets are competitive, the acquirers will pay premiums for the target firms

If the acquirers expect some future cash flows accrue exclusively to themselves, and the corporate takeover market is competitive, then the acquirers must pay premium for target firms. The benefits accruing to the acquirers may take the following forms of private benefits as well as publicly known benefits as follows:

Private benefits = $E(NF_p) + E(\mu V_p)$

Publicly known benefits = $E(V_p^* - NF_p)\alpha$

Where, Private benefits represents the cash flows accrue exclusively to the controlling shareholders. Publicly known benefits correspond to the owners' share of publicly disclosed cash flows.

$E(NF_p)$ = Future cash inflow expected to accrue exclusively to the controlling shareholders (private benefits),

μV_p = Future expected non-pecuniary benefits accruing to the controlling shareholders,

α = Controlling shareholders' equity position,

$E(V_p^*)$ = Post acquisition optimal firm value in the absence of private gains,

V_p^* = current firm value V + value addition from better management and any synergistic gains from the acquisition,

$V_p^* - NF_p$ = Post acquisition firm value based on publicly disclosed cash flows,

Financial benefits to acquiring owners = $E(NF_p) + E(V_p^* - NF_p)\alpha$

Total benefits to acquiring owners = $E(NF_p) + E(V_p^* - NF_p)\alpha + \mu V_p \dots \dots \dots (1)$

Therefore, acquisition premiums that the acquirers are willing to pay are the present value of expected future private benefits and public benefits as follows:

$E(NF_p) + E(\mu V_p) + E(V_p^* - NF_p)\alpha \dots \dots \dots (2)$

The first two terms represent private benefits and the last term represents publicly known benefits.

The expression (2) can be rewritten as,

$E(NF_p) + E(\mu V_p) - E(NF_p)\alpha + E(V_p^*)\alpha$

$E(NF_p)(1 - \alpha) + E(\mu V_p) + E(V_p^*)\alpha \dots \dots \dots (3)$

Expression (3) suggests that for a given non-pecuniary benefits, $E(\mu V_p)$, and pecuniary benefits, $E(NF_p)$, the premium for corporate control is negatively associated

⁶ If for some reason, large-block shareholders anticipate to incur costs, then the blocks will trade at a discount to post acquisition equilibrium prices.

⁷ Barclay and Holderness (1989) shows that many public corporations listed on NYSE and Amex have one or more shareholders who own a large-percentage block of the firm's common stock

with the equity holdings for the controlling shareholders. As the controlling shareholders equity position increases, they tend to take less private benefits, consistent with Jensen and Meckling (1976).

The equation (3) suggests that in the absence of private benefits, benefits to acquiring owners are $E(V_p^*)\alpha$. So, we propose the following hypotheses.

Hypothesis 2: In the presence of private benefits of corporate control rights, the acquisition premium will be negatively associated with controlling shareholders equity ownership percentage.

Equation (3) indicates that the private benefits for corporate control contain pecuniary and no-pecuniary benefits. The costs of extracting private benefits depend on the country-specific business environments. In a country where the legal systems and environments encourage the controlling shareholders to extract private gains from corporate control, the costs of extracting private benefits will be low, and therefore, controlling shareholders will enjoy larger private benefits than in countries where institutional legal systems and enforcement of the law are strict and the costs of extracting private benefits are high. It is arguable that private benefits accruing to the controlling shareholders are relevant to the country-specific institutional and legal systems.

2. Motives for acquisitions and target firm share prices

If the corporate control transactions add values to the involved firms, and if the acquirers do not extract private benefits from the control right, then all shareholders will receive post-acquisition valuation benefits in proportion to their fractional equity ownership. All post-announcement valuation effects in corporate control transactions will be shared equally by all outstanding shareholders. Under the efficient capital markets assumptions, the information contents are reflected in the share values upon the announcement of corporate control changes. The greater acquisition valuation benefits, the greater positive price reactions to target firms around the announcement date of the corporate control change.

Furthermore, Bebchuk (1994) argues that at times control transfers can be inefficient, when motives for the new controller are to extract private benefits rather than to improve on the firm value. Under inefficient transfers, the post-transfer firm value will not be greater than pre-transfer firm value, because the new controller does not have a greater ability to manage and produce firm value, rather he will extract more from the minority shareholders than the old controller. Accordingly, the post-transfer stock valuation in relation to the pre-transfer firm valuation will indicate if the transfers are efficient or inefficient. If the control transfers in the Korean market are inefficient transfers, then the post-transfer stock valuation will be lower than the pre-transfer firm valuation.

Hypothesis 3: To the extent that the corporate takeover markets are competitive and that the acquirer, without creating values more to the firm, may take more private benefits than the current owners, then the acquisition announcement may have negative valuation effects on target firms.

If the private benefits to the controlling shareholders are predominantly determined by the country level factors rather than firm-specific factors, the acquisition premiums may not vary across firms. If, however, the private benefits to controlling shareholders are not predominantly determined by the country level factors and a significant portion of the

private benefits are derived from firm-specific factors, then the acquisition premiums may vary across firms. Furthermore, if private benefits for controlling shareholders vary across firms, then determinants for premiums, proxy for private benefits, can be estimated from firm-specific financial factors.

Especially, Barclay and Holderness(1989) argue that there are private costs as well as private benefits associated with block ownership. Since these costs vary cross-sectionally, it is reasonable that the net private benefits of block ownership are negative for some firms. They argue that this phenomena reflects that an underestimation of the announce effect or unanticipated stock price changes between the consummation of the trade and the public announcement. But the more substantial discounts are often associated with firms in severe financial distress, suggesting that the private costs of block ownership are likely to increase during times of financial difficulties. In such firms, for example, blockholders are likely to spend considerable time monitoring management, and they face an increased threat of litigation brought by disgruntled minority shareholders. Therefore, we also construct hypothesis 5 according to this Barclay and Holderness(1989) opinion.

Hypothesis 4: If institutional and legal systems at the country level dominate the size of private benefits accruing to the controlling shareholders of listed firms, then the size of private benefits may not vary across firms. Specifically, percentage Premium $\neq f$ (firm-specific factor).

Hypothesis 5: If the premiums are affected by the financial distress factors, leverages (liquidity) in premium firms are lower (higher) than those in discount firms under same conditions in other factors.

The managerial discretion theory of corporate acquisition [Jensen and Meckling (1976)] proposes that there are private benefits for managers such that managers of publicly traded firms may be willing to pay more for target firms than private investors. Barger et al. (2007) found from the U.S. data that the wealth effects of target shares were larger when acquired by publicly traded corporations than when acquired by either unlisted firms or private equity funds.

This paper also investigates if the market clearing premiums for corporate control rights differ by agency relationships of acquiring shareholders. To the extent that the acquirer representing publicly traded corporations care less about the acquisition costs compared to the private company or private equity fund, the former group may pay higher premiums, *ceteris paribus*. However, since Korean firms' ownership structure is not widely held and managers do not possess agency problems suggested by Jensen and Meckling (1976), the acquisition premium may not differ by corporate status of the acquirer.

Hypothesis 6: Owners of publicly traded firms will pay a higher premium for the control rights than the owners of unlisted firms.

III. Data collection

Previous studies employed two types of data to measure the acquisition premiums, an estimate for the value of corporate control rights. Table 1 displays results of empirical literatures on voting premium. The first group, using the dual class stock samples, investigated the prices of common shares with different voting rights, and found that shares with superior voting rights trade at a premium compared to shares with inferior voting rights, and the size of the premium varies substantially across countries. As exhibited in Table 1, Lease, McConnell, and Mikkelsen (1983) found an average premium of 5.4% in the US, while Smith and Amoako-Adu (1995) found a median premium of 10.4%. Levy (1983) found a 45.5% premium in Israel. Zingales (1994) found an 81.5% premium for voting shares over nonvoting shares in Italy.⁸

The second group analyzed the pricing of block trades involving at least 5% of the common stock of NYSE or Amex corporations. The arguments are that a prospective purchaser evaluates two benefit streams when negotiating for corporate controlling rights. The first is the expected stream of dividends and other cash flows that accrue to all shareholders in proportion to their fractional ownership. The market value of this stream is captured by the post-announcement exchange price of the firm's stock. The second is anticipated private benefit accruable only to the controlling shareholders.

Barclay and Holderness (1989) found that the block-trade prices are on average 20% above the post-announcement exchange price, and more than 80% of the blocks trade above that exchange price. Barclay and Holderness (1989) argue that if investors perceive the block trades will lead to changes in corporate control, then the post announcement stock prices will reflect post-acquisition equilibrium prices.

⁸ Zingales (1994) concluded that most of this premium represents the private benefits accrue to the controlling shareholders and the inefficiency of the Italian market for corporate control.

Table 1. Empirical literature on voting premium

Source	Premium (%)	Premium calculation	Country	Sample data	Sample period	Number of firms in the sample
Lease, McConnell, and Mikkelsen (1983)	5.4	$(P_v - P_{nv}) / P_{nv}$	USA	Dual class stock	1940-1978	30
Zingales (1994)	81.5	$(P_v - P_{nv}) / P_{nv}^b$	Italy	Dual class stock	1987-1990	96
Smith and Amoako-Adu (1995)	10.4	$(P_v - P_{nv}) / P_{nv}^b$	Canada	Dual class stock	1981-1992	98
Levy (1982)	45.5	$(P_v - P_{nv}) / P_{nv}^b$	Israel	Dual class stock	1981	22
Bergström and Rydqvist (1992)	15.2	$(P_v - P_{nv}) / P_{nv}^b$	Sweden	Dual class stock	1980-1990	65
Meggison (1990)	13.3	$(P_v - P_{nv}) / P_{nv}^b$	UK	Dual class stock	1955-1982	152
Horner (1988)	22.4	$(P_v - P_{nv}) / P_{nv}^b$	Switzerland	Dual class stock	1973-1983	45
Barclay and Holderness (1989)	20.4	$(P_b - P_e) / P_e^c$	USA	Block Trading	1978-1982	63

Note: a: P_v =voting shares price (or superior voting shares), P_{nv} = non-voting shares price (or inferior voting shares)

b: P_b =stock price at the time of agreement to sell the controlling interests of the firm (or the block trading), P_e = the announcement date exchange price

Unlike previous studies, this study utilizes corporate control rights transactions data for publicly traded firms and privately held firms in Korea. The Korean corporate control rights transactions data offer special features and therefore have potentials to shed additional lights to the important theoretical issues of managerial rents for corporate control.

First, the data offer the detailed specific information on the purchase price of the control rights, which are equipped to measure the size of premium (discount) associated with the corporate control rights transactions (see Appendix 1 for a sample of such transactions announcement). Second, the data provide corporate control rights transactions data that traded among publicly traded corporations; between publicly traded corporations and non-public firms, and between publicly traded corporations and private equity funds. Third, the measurement for the private benefits for Korean firms will be less biased than the previous studies which used either block trading data or dual class stock samples.

Since the actual control transfer data had not been available, previous researchers utilized the block tradings to measure the private benefits for corporate control. To the extent that some block trading do not lead to transfer of corporate control, the empirical measures for private benefits would tend to be biased downward. It should additionally be noted that unlike the U. S. publicly traded firms, publicly traded firms in Korea exhibit a concentrated ownership structure. Therefore, the private benefits will be larger for Korean firms than for American firms [Bebchuk (1994), Dyck and Zingales (2003), and Nenova (2003)]. Since minority shareholders' interests are more strongly protected in America, the managerial rents are expected lower in America than in a country with concentrated ownership.

This paper used the online announcements for securities listed on the Korea stock exchanges and KOADAQ from the period of January 1 2003 to October 31 2007. The sample firms in this study are the firms which reported the change in the controlling shareholders. To be included in the sample, the report must have purchase prices and number of shares purchased by the acquiring teams. Financial data must be available in FN guide and data base from the Listed Securities Association. The study uses 157 cases of corporate control transactions in the Korean market. Out of the total sample, 116 cases are corporate control rights transferred from the publicly traded firms to private firms and private equity funds, and 41 cases were transactions between the two publicly traded corporations.

This paper constructs proxy variables for measuring the values of corporate control rights, and estimating the determinants of private benefits (costs) of major shareholders who own corporate control rights. The paper investigates several issues: (i) How large is the size of private benefits for those who have the corporate control rights? (ii) How large is the size of public gains when the corporate control rights are transferred to new owners? (iii) Does the size of private benefits of corporate control rights differ by acquiring investor group? (iv) Can the magnitude of the private benefits for the corporate control rights be estimated from firm characteristics?

IV. Empirical results

Table 2 provides sample characteristics and distributions for the sample used in the study. The acquiring shareholders on average purchased 24.94% of the outstanding shares. The average total assets of the target firm are 33,866 million Korean Won. Table 2 also shows the difference between the acquisition by publicly traded firms and private firms. The acquirers purchase on average 29.47% of the outstanding shares for the publicly traded firms, 23.15% of the outstanding shares for non public firms, respectively. The target firm size is also smaller for private acquirers (30,870 million Korean Won) than public acquirers (42,404 million Korean Won).

Table 2. Descriptive statistics

Variables	Total Samples (N=157)				Pubic(N=41)	Private(N=116)	Private-Public Difference	t-value
	Mean	Median	Min.	Max.				
Panel A : premium for corporate control rights transactions								
Equity ownership percentage acquire (%)	24.94	22.36	0.85	64.80	29.47	23.15	-6.33	-1.98 *
Acquiring price per share(won)	6,480.99	4,067.29	1.00	92,857.14	7,210.28	6,223.23	-987.05	-0.67
Total acquiring amount(million won)	12,139.35	8,500.00	5.30	88,000.00	17,211.18	10,346.72	-6,864.45	-2.44 **
Total acquiring amount /Market capitalization(%)	87,481.47	37,342.73	1,114.80	1,754,105.80	83,080.38	89,037.03	5,956.65	0.17
Stock price at announcement day(won)	40.70	25.22	0.00	583.06	53.61	36.13	-17.48	-1.26
Panel B : Financial information of target firm								
Total Asset(million won)	33,866	25,503	4,361	160,914	42,404	30,870	-11,534	-1.98 *
Debt(million won)	14,805	10,102	386	114,401	18,094	13,650	-4,443	-1.15
Debt/Total Asset (%)	41.93	41.68	1.75	167.53	38.30	43.20	4.90	0.92
Administrative expense/Sales(%)	41.60	22.68	2.65	254.09	38.36	42.74	4.38	0.52
Cash Balance/Total Asset(%)	9.73	6.38	0.00	59.52	9.17	9.92	0.75	0.39
Net worth ratio(%)	58.07	58.32	-67.53	98.25	61.70	56.80	-4.90	-0.92
Net income/Sales(%)	-53.22	-10.44	-845.48	62.96	-45.13	-56.05	-10.92	-0.47
Tobin's q	1.09	0.79	0.09	13.27	1.12	1.08	-0.05	-0.25
Average annual return from before two month of announcement day(%)	10.28	8.83	-65.39	106.43	10.81	10.09	-0.72	-0.13
Average annual S.D. from before two month of announcement day(%)	477.60	470.58	225.12	780.37	457.32	484.77	27.45	1.23

1. premium calculation

As discussed in section II, a prospective block purchaser assesses two streams of benefits when negotiating for control rights: proportional cash flows that accrue to all shareholders and net private benefits that accrue to the controlling shareholders alone. The economic theories outlined above relate most directly to the total dollar value of the net private benefits. Following Barclay and Holderness (1989, 1991), we measured private benefits of control interests as follows:

Total value of private benefits is:

$$\text{Premium} = \frac{(P_b - P_e) \cdot N_b}{P_e \cdot N_t}$$

Where, P_b is stock price at the time of agreement to sell the controlling interests of the firm

N_b is number of shares acquired

P_e is average closing price in month after the announcement date

N_t is total number of shares outstanding on the announcement date Per share value

of private benefits is: $\text{Premium} = \frac{P_b - P_e}{P_e}$

We employ two measures of the premium. We standardize dollar premium by dividing by the total market value of the firm's outstanding equity measure at the exchange

price ($P_e \cdot N_t$). The standardized dollar premium $\left[\frac{(P_b - P_e) \cdot N_b}{P_e \cdot N_t} \right]$ is less skewed and

more closely approximates the normal distribution than does the unstandardized dollar premium; it also has an intuitive interpretation as the value of the private benefits as a percentage of the total value of the firm's equity.

Table 3 shows the regression estimates for the acquisition premium. It shows that premiums are negatively associated with acquirer's equity ownership percentage. This finding indicates that the acquirers with a high equity ownership pay lower premiums. The acquisition premiums are negatively associated with standard deviation of the security returns, and negatively associated with the firm size. These findings are different from Holderness and Sheehan (1989) who found that the premiums for corporate block trades increase with firm size, fractional ownership, and firm with larger cash holdings.

Panel A of Table 3 used the acquisition premiums as dependent variables. The OLS results does not control for industry effect. The regression results under panel fixed-effect controlled for industry effect. The estimated coefficient signs do not differ between the two results, but the significance level is higher for Stock return SD and dummy for unlisted firm.

Table 3. Multivariate regression estimations

	OLS						Panel Fixed-Effect					
Panel A: Dependent variable: Percentage premium												
Equity ownership acquire	-0.0416	***	-0.0452	***	-0.0370	***	-0.0405	***	-0.0457	***	-0.0352	***
	(0.0134)		(0.0135)		(0.0132)		(0.0135)		(0.0137)		(0.0124)	
Log(firmsize)	-0.975	***	-1.019	***	-0.763	***	-0.795	***	-0.790	***	-0.492	***
	(0.150)		(0.152)		(0.167)		(0.175)		(0.172)		(0.168)	
leverage	-0.623		-0.368		-0.354		-0.760		-0.560		-0.607	
	(0.902)		(0.908)		(0.871)		(0.978)		(0.970)		(0.860)	
Cash Balance/Total Asset(%)	0.910		1.587		1.276		0.498		1.167		0.556	
	(2.357)		(2.374)		(2.280)		(2.503)		(2.496)		(2.218)	
Administrative expense/Sales(%)	-0.343		-0.333		-0.501		0.271		0.122		-0.313	
	(0.503)		(0.499)		(0.482)		(0.638)		(0.635)		(0.572)	
Average annual S.D. from before	0.0430		0.0410		0.211		0.0734		0.0995		0.352	**
two month of announcement day(%)	(0.176)		(0.175)		(0.176)		(0.188)		(0.186)		(0.176)	
Unlisting firm dummy			-0.656		-0.450				-0.733*		-0.439	
(private 1, public 0)			(0.402)		(0.392)				(0.427)		(0.385)	
Premium dummy					1.257	***					1.621	***
(premium 1, discount 0)					(0.406)						(0.384)	
Constant	25.53	***	26.99	***	18.94	***	20.85	***	21.18	***	11.53	**
	(3.881)		(3.952)		(4.597)		(4.473)		(4.410)		(4.531)	
Observations	107		107		107		107		107		107	
R-squared	0.332		0.349		0.407		0.322		0.353		0.499	
Number of industry							38		38		38	

Panel B: Dependent variable: Percentage premium adujusted stock index

Equity ownership acquire	-0.0416 (0.0134)	***	-0.0453 (0.0134)	***	-0.0371 (0.0132)	***	-0.0406 (0.0135)	***	-0.0458 (0.0137)	***	-0.0353 (0.0124)	***
Log(firmsize)	-0.978 (0.150)	***	-1.022 (0.151)	***	-0.767 (0.167)	***	-0.797 (0.174)	***	-0.792 (0.172)	***	-0.495 (0.168)	***
leverage	-0.618 (0.900)		-0.360 (0.906)		-0.346 (0.869)		-0.757 (0.977)		-0.553 (0.968)		-0.600 (0.859)	
Cash Balance/Total Asset(%)	0.909 (2.352)		1.594 (2.368)		1.284 (2.275)		0.484 (2.501)		1.166 (2.491)		0.558 (2.216)	
Administrative expense/Sales(%)	-0.342 (0.502)		-0.331 (0.498)		-0.498 (0.480)		0.273 (0.638)		0.121 (0.633)		-0.312 (0.572)	
Average annual S.D. from before two month of announcement day(%)	0.0413 (0.176)		0.0393 (0.174)		0.208 (0.176)		0.0718 (0.188)		0.0984 (0.186)		0.349* (0.175)	
Unlisting firm dummy (private 1, public 0)			-0.664 (0.401)		-0.459 (0.391)				-0.746* (0.427)		-0.453 (0.385)	
Premium dummy (premium 1, discount 0)					1.252 (0.405)	***					1.612 (0.383)	***
Constant	25.61 (3.873)	***	27.08 (3.942)	***	19.07 (4.587)	***	20.91 (4.469)	***	21.25 (4.402)	***	11.64 (4.526)	**
Observations	107		107		107		107		107		107	
R-squared	0.334		0.352		0.409		0.323		0.355		0.500	
Number of industry							38		38		38	

Standard errors in parentheses

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

These findings suggest that the values of corporate control are not uniform and that the acquirers' expertise to increase firm value may not be homogeneous. This finding is consistent with the hypothesis that the size of private benefits depends on firm-specific variables. Private benefits to the controlling shareholders, therefore, depend in part on the acquirers' specific skills and their intentions to extract private benefits.

In order to estimate the public gains to target firm shareholders, we used standard event study methodology as follows:

$$A_{jt} = R_{jt} - a - b \cdot R_{mt}$$

Where, R_{jt} is security j 's return on the day t and R_{mt} is the market index return on day t , A_{jt} is the abnormal return on security j on day t .

Table 4 shows the abnormal returns to target shareholders around the control transfer announcements. Statistically significant positive abnormal returns were detected from day -9 and such patterns continued one day after the announcement date. Cumulative abnormal returns for window period of (-9, 1) are 19.3%. This finding indicates that control transfer for Korean firms belong to efficient transfer, according to Bebchuk (1994).

Table 4. Announcement effects of negotiated transactions of corporate controls

Days	Total Sample(N=157)		
	AAR	t-value	
-10	0.002801	0.70	
-9	0.015526	3.33	***
-8	0.009464	1.99	*
-7	0.018784	3.62	***
-6	0.012282	2.69	***
-5	0.011264	2.67	***
-4	-0.000937	-0.20	
-3	0.021356	2.71	***
-2	0.032490	5.71	***
-1	0.046737	7.76	***
0	0.041557	5.93	***
1	-0.017859	-2.22	**
2	-0.003355	-0.51	
3	-0.001848	-0.32	
4	0.001716	0.34	
5	-0.004951	-0.96	
6	0.010503	2.29	**
7	0.005153	1.02	
8	0.000769	0.15	
9	0.002836	0.57	

10	0.009104	0.91	
(-1, 1)	0.071090	4.94	***
(-2, 2)	0.100633	5.00	***
(-3, 3)	0.119508	5.18	***
(-9, 1)	0.192626	8.37	***

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

Table 5 shows whether or not the wealth effects of the corporate control transactions for target firms differ by the acquiring shareholders corporate listing status. It shows that positive wealth effects on target firms start from day -9 and ends on the announcement dates when they are acquired by unlisted firms, suggesting inside information was reflected in the stock prices. However, abnormal returns were registered from day -3 and ends on day +1. The cumulative abnormal returns [CAR (-9, 1)] show that the target shareholders gain more when they are acquired by unlisted firms.

Table 5. Announcement effects and mean difference test : exchange listed firms vs. unlisted firms

Panel A : Average abnormal returns(AAR) around the announcement date				
Days	Listed Sample(N=41)		Unlisted firm Sample(N=116)	
	AAR	t-value	AAR	t-value
-10	0.002066	0.28	0.003060	0.65
-9	0.005299	0.81	0.019141	3.26 ***
-8	0.003669	0.53	0.011513	1.93 **
-7	0.009565	1.04	0.022043	3.55 ***
-6	0.004161	0.74	0.015153	2.59 ***
-5	0.002396	0.33	0.014398	2.84 ***
-4	0.002844	0.40	-0.002274	-0.38
-3	0.039781	1.65 *	0.014844	2.31 **
-2	0.015245	1.56	0.038585	5.65 ***
-1	0.036502	3.88 ***	0.050354	6.77 ***
0	0.041594	3.19 ***	0.041544	4.99 ***
1	-0.042436	-2.77 ***	-0.009096	-0.97
2	-0.011714	-0.97	-0.000375	-0.05
3	-0.015955	-1.79 *	0.003182	0.44
4	-0.014720	-2.17 **	0.007627	1.20
5	-0.007509	-0.79	-0.004031	-0.66
6	0.005937	0.89	0.012145	2.10 **
7	0.000031	0.00	0.006951	1.11
8	-0.003231	-0.47	0.002172	0.34

9	0.003951	0.45	0.002438	0.41
10	0.002066	0.28	0.003060	0.65

Panel B: Cumulative average abnormal returns for Public vs. Private

Window period	Public vs. Private	CAAR	t-value	Private - Public Mean difference	t-value
(-1, 1)	Public (n=41)	0.035660	1.45	0.048062	1.47
	Private (n=116)	0.083722	4.82 ***		
(-2, 2)	Public (n=41)	0.039190	1.27	0.083349	2.11 **
	Private (n=116)	0.122539	4.95 ***		
(-3, 3)	Public (n=41)	0.063016	1.60	0.076632	1.47
	Private (n=116)	0.139648	5.01 ***		
(-9, 1)	Public (n=41)	0.118619	3.22 ***	0.100393	2.17 **
	Private (n=116)	0.219012	7.82 ***		

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

Barclay and Holderness(1989) argue that the more substantial discounts are often associated with firms in severe financial distress. To investigate this argument, we classifies the sample into two groups in Table 6, premium and discount. Table 6 shows the tests results if corporate performance, firm size, leverage, and cash balance differ between the two groups. For total sample, the firm size is larger for premium group than discount group. The leverage ratio is lower for premium group than discount group. The Tobin's Q and cash balance do not differ between the two groups.

Table 6. Determinants of discounts

Variables	Total Samples (N=157)			Public Samples (N=41)			private Samples (N=116)		
	premiu m	discoun t	Mean diff. t- value	premiu m	discoun t	Mean diff. t- value	premiu m	discoun t	Mean diff. t-value
Firm size	36,710	28,121	2.06 *	40,845	49,753	-0.44	34,761	24,679	2.78 **
Tobin's q	1.02	1.23	-0.79	1.06	1.44	-0.76	1.00	1.20	-0.65
Leverage	38.5	48.8	2.37 *	35.4	52.2	-1.34	40.0	48.3	-1.82 *
Cash Balance/Total Asset	10.6	8.0	1.47	9.6	7.4	0.50	11.1	8.1	1.51
Leverage* (Cash Balance/Total Asset)	3.4	2.8	1.19	2.2	3.4	-1.37	4.0	2.7	1.90 *

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

The managerial discretion theory of corporate acquisition [Jensen and Meckling (1976)] proposes that there are private benefits for managers such that managers of publicly traded firms may be willing to pay more for target firms than private investors. Bargerion et al. (2007) found from the U.S. data that the wealth effects of target shares were larger when acquired by publicly traded corporations than when acquired by either unlisted firms or private equity funds.

This paper also investigates if the market clearing premiums for corporate control rights differ by agency relationships of acquiring shareholders. To the extent that the acquirer representing publicly traded corporations care less about the acquisition costs compared to the private company or private equity fund, the former group may pay higher premiums, *ceteris paribus*. However, since Korean firms' ownership structure is not widely held and managers do not possess agency problems suggested by Jensen and Meckling (1976), the acquisition premium may not differ by corporate status of the acquirer.

Table 7 shows that the average premium paid by listed firms is 132.89 percent, while the premium paid by unlisted firms is 72.75 percent. But the mean difference is not statistically significant. Therefore, the agency problem of premium overpayment by publicly traded firms is not supported in the Korean control transaction markets.

Table 7. Control rights premium

Variables	Total Samples (N=157)				Pubic(N=41)	Private(N=116)	Private-Public	t-value
	Mean	Median	Min.	Max.	Mean	Mean	Difference	
Average per share premium(won)	1,201.4	901.2	-46,578.2	87,072.4	2,421.1	766.5	-1,654.6	1.16
Average per share premium(%)	88.56	44.19	-99.99	1,654.30	132.89	72.75	-6,013.56	1.19
Average per share premium adjusted by stock index(%)	88.77	44.01	-100.32	1,650.96	133.26	72.91	-6,034.95	1.19

V. Summary and policy implications

This paper utilizes corporate control transactions data for publicly traded firms and privately held firms in Korea. The Korean corporate control rights transactions data offer special features. Unlike the block trading data employed by previous studies, our data provide detailed specific information on the purchase price of the control rights, which enable us to measure the size of premium associated with the corporate control transactions without downward biases.

This study finds that the announcement of controlling shareholder change produced positive stock price effects, suggesting that the ownership changes in the Korean market appear to be efficient according to definition offered by Bebchuk (1994). The study also finds that control right premiums vary with firm-specific factors. This finding suggests that private benefits for corporate control are not uniform across all Korean firm, and that some controlling shareholders enjoy more private benefits than other firms. Interestingly, the study finds that managers for publicly traded firms pay less premium for the corporate control right than for managers of privately owned firms. Unlike Barger et al. (2008) for U.S. block trading, this study finds that average premiums paid for control transactions do not statistically differ between stock exchange listed firms and unlisted firms.

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Appendix 1.

Example of major corporate event report

This report is filed in accordance with the article 186 of the Securities Exchange Regulations

Company name:

Address:

Name of CEO, President:

Name of the employee prepared the report:

1. Reason for filing the report: largest shareholder ownership report and control rights transfer
2. Important contents
The largest shareholder of company XXX agrees to sell 6,000,000 shares (11.25%) of XXX and agrees to transfer the control right of XXX.
3. Agreement date : 7/19/2007
4. Details of transactions
 - A. Seller: XXX
 - B. Buyer: YYY
 - C. Number of shares: 6,000,000 (11.25% of total outstanding shares)
 - D. Selling price: 12,000,000 Korean Won
 - E. Selling price per share: 2,000 Won (par value of 500 Won)
 - F. Contract and other payment schedule
7/19: 700,000,000 KrWon
7/20: 500,000,000 KrWon
8/3: 10,800,000,000
 - G. Largest shareholder changes
New owner: YYY
President: Name
Establishment date: July 6, 2007
Main business:
Purpose of acquisition: to exercise control rights
Mean of financing: owners equity
Post acquisition board of directors: New board members to be elected on 8/3/2007 stockholders meeting
 - H. Strategy on shareholders: maximize shareholders' wealth

Financial Integration in East Asia Evidence from Stock Prices

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Abstract

This paper investigates the extent of global and regional integration in East Asia using stock price index as a measure of economic performance. We employ a structural VAR model to separate the underlying shocks into “global”, “regional” and “country-specific” shocks. The estimation results show that country-specific shocks still play a dominant role in East Asia although their role appears to have declined over time, especially after the 1997 financial crisis. Global and regional shocks are responsible for small but increasing shares of stock price fluctuations in most countries. The results indicate that, despite years of liberalization and regional integration, economics in East Asia remain dissimilar and are subject to asymmetric shocks in comparison to European countries. This suggests that it might be costly to abandon monetary policy independence and that a more flexible exchange rate regime might be desirable.

Key Words: Financial integration, East Asia, Optimum Currency Area
JEL Classification: G0, N2

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I. Introduction

The 1997-8 financial crises in East Asia have had far-reaching repercussions in the real economy, policy making, and academia. Within the region, countries have started showing a strong interest in the search of an exchange rate regime that would be more robust to financial crises. At the same time, East Asian nations have been working in earnest for regional economic integration in the past decades. To enhance the financing facilities in the aftermath of the financial crisis, the Chiang Mai Initiative was launched by 10 member countries of the Association of Southeast Asian Nations (ASEAN) plus China, Japan, and Korea (ASEAN+3) in May 2000.¹ In order to facilitate the channel for better utilization of Asian savings for Asian investments and enhance efficiency and liquidity in bond markets in Asia, a local currency-denominated bond market under the Asian Bond Markets Initiative has been developed.² In 2005, the East Asia Summit was established by ASEAN+3 plus Australia, New Zealand and India, for the total of 16 countries.

As an important element of financial integration, East Asian countries have been seeking the feasibility of an economic and monetary union. Key policymakers are increasingly vocal about the need to establish a monetary union in the region or create a single currency. Earlier attempt by Japan to create a monetary union died quickly due to strong oppositions from the IMF and the US Treasury. Inspired by the European Currency Unit, now replaced by the Euro, the Asian Development Bank has proposed the Asian Currency Unit (ACU) – a weighted index of currencies for ASEAN+3. Despite numerous technical and political obstacles, the ACU has been moving forward from an academic exercise to a real outcome, one that can be used in the market amid a growing consensus among academic and policy practitioners that intraregional exchange rate stability is desirable for East Asia and a monetary union is the ultimate form to ensure it.³

One natural question is whether East Asian countries are well integrated financially in a global sense. Are they also regionally well integrated as they have tried to achieve in the aftermath of financial crises? These are important questions since regional integration may reduce the cost of forming a currency union or some form of common-currency pegging within the region. Individual member countries will lose the ability to independently use monetary and exchange rate policy when they form a currency union, which may entail severe costs if they are subject to dissimilar macroeconomic shocks and go through different business cycles. If countries within the region are similar to each other, the cost from losing the independent monetary and exchange rate policy would be lower. Trade and financial integration of an individual economy with the region is likely to reduce the cost of such a common currency arrangement to the extent that it makes the economy more similar to that of the region.

It is well known that East Asian economies are well integrated in terms of intraregional trade. For instance, Bayoumi and Eichengreen (1994) suggest that, in terms of trade integration, East Asia can qualify optimum currency area (OCA) criteria as well as European countries. Evidence on financial market integration, however, is much less clear. The majority of studies claim that the degree of financial market linkage in East Asia still

¹ ASEAN consists of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. 16 bilateral swap arrangements have been successively concluded by the 10th ASEAN+3 Finance Ministers' Meeting in May 2007. The ASEAN+3 finance ministers also introduced a surveillance system to monitor the region's economies and to encourage good policies via peer pressure.

² This initiative has produced some visible results, including the issuance of Korean Collateralized Bond Obligations (CBO) with a guarantee by the Japan Bank for International Cooperation (JBIC) and the Industrial Bank of Korea (IBK).

³ From the discussion in 39th Annual Meeting of Asian Development Bank. The Asian Development Bank was to announce the details of the ACU in March 2006. However external pressures delayed this announcement although the concept was still being studied in detail.

remains low compared to Europe. Using data on cross-border bilateral holdings of financial assets and liabilities, real interest rate differentials, and consumption risk sharing, Jeon et al (2005) show that East Asian economies became more financial integrated in the post-crisis period. The development is more in the direction of global integration than in regional integration. With similar and additional data such as equity portfolios, debt securities, and bank claims, Kim et al (2008) reach a similar conclusion that East Asian countries are financially less integrated in general than European countries. They also estimate the degree of consumption risk sharing in East Asia by regression analysis and tend to be relatively more linked to the global markets than integrated with one another regionally, particularly compared to Europe.

The purpose of this paper is to assess the extent of financial integration within East Asia and study whether countries in the region satisfy the conditions for an OCA. We employ the overall stock price index as an indicator of macroeconomic performance as well as the development of financial market in each country. The availability of high-frequency data is also a big advantage in our case where the sample period is short due to general data problems of developing countries and made even shorter as a result of the recent financial crisis and resulting structural breaks.

We use a structural vector autoregressive (VAR) method to investigate the extent of financial market integration in East Asia. Returns to investors in each country's market are affected by three types of underlying shocks: country-specific shocks, regional shocks and global shocks. These structural shocks are identified by long-run restrictions developed by Blanchard and Quah (1979). To investigate the progress in financial integration, we also separate the sample into 8 non-overlapping 2-year subperiods before and after the crisis. We then compare the East Asian region with that of 15 European countries. The experiences of the Economic and Monetary Union (EMU) provide a natural benchmark as the member countries have followed the rigorous process of regional integration in trade and finance and successfully formed a monetary union.

The empirical results show that, in all East Asian stock markets, country-specific shocks are dominant although they became less important in the post-crisis period than in the pre-crisis period.⁴ Regional shocks play a minimal role in most cases while the importance of global shocks varies across countries depending on the extent of financial openness and development. In European countries, in marked contrast, external shocks that combine both global and regional shocks appear to take over the dominant position. This suggests that, despite years of efforts toward financial liberalization and cooperation in the region, the East Asian economies are subject to asymmetric shocks and far less integrated financially compared to the European countries. The region seems sufficiently unique perhaps due to different resource endowments, growth experience or economic policies although the efforts for financial integration in the post-crisis period appear to have some effects on the economic and financial structure in the region. Theory of optimum currency area would predict that pegging to the same currency would be more costly in East Asia than it would be in European countries.

The rest of the paper is organized as follows. Section II reviews the current status of trade and financial integration in East Asia. Section III illustrates the data and methodology used in our empirical analyses. Section IV examines the degrees and patterns of regional shocks and country-specific shocks on domestic stock market by using forecast error variance decomposition. Section V investigates the robustness of the benchmark model. Section VI provides concluding remarks.

⁴ There are noticeable drops in the role of country-specific shocks in Korea, Hong Kong, Singapore, Malaysia, Taiwan and Australia. The decline is not uniform though. There are wide variations between periods. There are substantial increases in the role of global shocks in Korea, Hong Kong, Singapore, Malaysia, Indonesia, and Australia while little changes in China.

II. Economic Integration in East Asia

1. Trade Integration in East Asia

The extent of regional integration through trade in East Asia has been rising fast over the last twenty years. Wyplosz (2001) uses a gravity approach to determine a “normal level” of bilateral trade among Asian and European economies and finds that East Asia is more, while Europe is less, integrated than one would expect. According to the theory of OCA, a high degree of intraregional trade can increase the efficiency gain of using a common currency while lowering the cost of losing monetary policy autonomy. There is some evidence that joining a currency union can increase trade among member countries, which will further strengthen the case for the formation of the currency union.⁵

⁵ Rose (2000) reports that bilateral trade between countries that use the same currency is over 200 percent larger than otherwise, controlling for other effects. Lee and Barro (2007) find that a currency union can generate welfare gains from the additional trade with countries belonging to the same currency union, which in turn stimulates an increase in consumption growth rates.

Table 1. Regional Trade Patterns, 1980 to 2007 (Percentage of Total Exports/Imports with the World)

	1980		1990		1995		2000		2006	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
ASEAN										
Within ASEAN	21.2	16.8	25.3	19.7	31.7	23.5	29.8	27.8	29.2	29.3
With USA	16.3	15.3	19.4	14.4	18.4	13.8	19.0	14.0	14.0	9.7
With Japan	29.5	22.1	18.9	23.1	14.3	23.7	13.4	19.1	10.4	12.1
With Euro Area	13.1	14.4	16.0	15.7	14.7	15.1	15.0	11.1	12.6	9.8
East Asia										
Within East Asia	33.6	31.2	36.5	38.8	44.6	45.7	42.5	48.0	46.0	48.8
With USA	21.1	17.0	25.4	17.5	22.0	16.2	23.7	14.1	18.1	9.1
With Japan	11.6	11.6	8.5	13.0	8.5	15.4	8.6	12.7	7.1	10.7
With Euro Area	16.0	10.0	17.9	15.0	15.1	14.3	15.8	11.5	15.4	10.1
East Asia/Pacific										
Within East Asia / Pacific	37.0	36.6	39.5	42.3	47.1	48.2	45.0	50.6	48.6	51.9
With USA	20.2	17.3	24.4	17.9	21.2	16.5	23.1	14.5	17.6	9.4
With Japan	11.1	11.0	8.4	12.4	8.6	14.9	8.6	12.3	7.1	10.3
With Euro Area	16.0	11.4	17.6	15.8	14.9	14.9	15.7	12.1	15.3	10.7
Euro Area										
Within Euro Area	61.3	54.2	66.9	64.0	66.4	64.4	67.7	62.5	67.7	63.1
With USA	5.3	8.2	6.9	7.3	6.5	7.2	9.1	7.9	7.5	4.8
With Asia	3.2	3.6	4.4	5.3	6.6	7.3	5.3	9.1	5.6	10.5

1 ASEAN: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

2 East Asia: ASEAN plus Japan, China, P.R.: mainland, China, P.R.: Hong Kong, Korea

3 East Asia and Pacific Area : East Asia plus Australia, New Zealand

4 Euro Area: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal Spain.

Source: IMF Direction of Trade Statistics, World Development Indicators June 2007

Table 1 summarizes the changes in the share of intraregional trade for various regions in the world over the period of 1980-2006.¹ For comparison, the fourth panel of the table lists the trade pattern for the Euro area within the region and with the outside world. It shows that the intraregional trade in the Euro area is stable and maintained at around 65 percent.

The first panel reports trade patterns in the ASEAN. Intraregional trade within the ASEAN increased steadily since 1980 except a slight downturn in exports after 1995, perhaps reflecting the recessionary consequences of the financial crisis that hit the region. The roles of the United States and Japan are still dominant but have declined over the whole period. In addition, there is a significant increase in intraregional trade ratio in a broader region. By adding China, Hong Kong, Japan and Korea to the region in the second panel, we find that nearly half of international trade of the region is with regional partners in 2006. The United States is still the largest importer in East Asian trade, but it is no longer the largest exporter. Trade with the Euro area increased early, peaked in 1990 at 17.9 percent for exports and 15.1 percent for imports. Since then, the trade preference of East Asia with Euro area seems to have declined. Exports to the Euro area dropped to 15.4 percent and imports from Euro area dropped to 10.1 percent in 2006.

In the third panel, Australia and New Zealand are added to East Asia. The intraregional exports and imports have risen dramatically from the 1980s through the 2000s. For instance, in 1980, 37 percent of total import and export were with the regional trading partners. By 2006, the figures rose to 48.6 percent and 51.9 percent, respectively. The table demonstrates, however, that the intraregional trade ratios among East Asian economies are still lower than those of the Euro area by more than 10 percent in 2006.

2. Financial integration in East Asia - the Chiang Mai Initiative

Before the Asian financial crisis broke out in 1997, few would have seriously argued for the creation of a new regional financial cooperation system. Economic integration in the region had been mostly a market-led process. One of the most noteworthy outcomes of the financial crisis would be the initiation of regional financial cooperation by the East Asian economies. The financial crisis gave East Asia a strong impetus to search for a regional mechanism that could forestall future crisis. Japanese financial authorities proposed the creation of an Asian Monetary Fund (AMF) as a framework for promoting financial cooperation and policy coordination in the region at the G7-IMF meetings in Hong Kong during September 20-25, 1997.² The United States, European Union and the IMF opposed the proposition on grounds of moral hazard and duplication. In November 1997 the East Asian economies, together with the United States, Canada, Australia and New Zealand, agreed to establish the Manila Framework Group in order to develop a concerted approach to restoring financial stability in the East Asia. The Manila Framework took an initiative to create a mechanism for regional surveillance complimentary to the global surveillance by the IMF.³

¹ In the paper, the intra-regional trade ratio is defined as exports or imports within the region as a share of total exports or imports with the world.

² The intrepid proposal for a regional alternative to the International Monetary Fund (IMF) seemed to arise without warning and at the worst possible moment. Both the Philippines and Indonesia had floated their currencies and the Asian Financial Crisis was increasingly showing signs of contagion at the time. The proposal raised temporary hopes among the crisis-ridden economies of Asia but elicited a stringent rebuke from the IMF and the US Treasury and ultimately fell to the wayside in favor of a more IMF-centered approach. See Phillip (2003).

³ Manila Framework terminated its function in November 2004 after 12 meetings. The failure of the Manila Framework is said to be attributable to the lack of mutual trust and lack of a professional secretariat.

In October 1998, Japan pledged \$30 billion to support the economic recovery of the crisis-affected countries. The initiative provided major assistance for restructuring corporate debt, reforming financial sectors, strengthening social safety nets, generating employment and addressing the credit crunch. The initiative was called "New Miyazawa Initiative" and was highly successful.⁴ In November 1998, the United States and Japan jointly announced the Asia Growth and Recovery Initiative (AGRI), which was a multilateral effort to stimulate economic growth in Asia. With support from the World Bank and the Asian Development Bank (ADB), AGRI supported corporate restructuring and restored market to private capital. It also strengthened bond guarantee functions of the World Bank and the ADB.

The idea of an AMF was revived when the finance ministers of China, Japan and South Korea, along with the ten ASEAN members, agreed on May 6th, 2000 in Chiang Mai, Thailand to establish a system of swap arrangements within the group. The regional scheme for financial cooperation known as the Chiang Mai Initiative (CMI) has been gathering momentum and opening the doors to possibly significant policy-led integration in East Asia. The CMI has two components: expanded ASEAN Swap Arrangements (ASA) encompassing the ten ASEAN countries; and a network of Bilateral Swap Arrangements (BSA) repurchasing arrangements basically encompassing the thirteen ASEAN + 3 countries.

At present, the total amount of BSAs covering all 13 countries is estimated to be around \$83 billion.⁵ The maximum amount that any individual country can draw varies a great deal. For instance, the maximum liquidity through the CMI to Thailand is about \$12 billion while the BSA to Malaysia is \$6.5 billion. Doubts have been raised as to whether the BSA system could truly be a credible and effective system of defense against future speculative attacks. The success of the CMI will depend on whether the surveillance system in East Asia can work as effectively as expected. A mechanism that enforces exchange of information and applies peer review and pressure through policy coordination is the right approach to boost the confidence of the countries in the region. It is expected that East Asia will reach deeper monetary and economic integration with gradual development of the CMI to a more effective and efficient regional arrangement.

3. Financial integration in East Asia - Asian Bond Market Initiative

Due to the underdevelopment of capital markets, countries in East Asia have depended on short-term foreign currency-denominated financing. This causes "maturity" and "currency" mismatches which make the region vulnerable to volatility in short-term capital movements. The East Asian financial crisis vividly illustrates the risks of the double mismatches. It has been agreed that developing bond markets in the region would be effective in regional financing as well-functioning bond markets set the benchmark interest

⁴ The Japanese Ministry of Finance and the Ministry of Finance of Malaysia have reached an agreement regarding the basic features of the short-term financing facility under the framework of the "New Miyazawa Initiative". The facility is aimed at supporting credit-extending schemes which intend to promote economic activities in Malaysia, such as a trade financing facility, small and medium size enterprise credit line, etc. This will serve as a standby facility for the Malaysian Government should the need arise. In this short-term facility, the Japanese Ministry of Finance is committed to providing up to US\$ 2.5 billion liquidity to Bank Negara Malaysia, if and when necessary, through swap transactions between the US dollar and the Ringgit.

⁵ Japan concluded six agreements with China, South Korea, Thailand, the Philippines, Indonesia and Malaysia: two-way arrangement with China, Korea, Thailand, and the Philippines and one-way arrangement with Indonesia and Malaysia. Korea concluded four agreements in addition to Japan-Korean BSA. China concluded four agreements in addition to its agreements with Japan and Korea except with Singapore. See Table 1 for details. Figure is from Ministry of Finance, Japan.

rates for all debts with varying maturities and risks and thereby promote efficient uses of resources for economic growth. The Asian Bond Market Initiative (ABMI) aims to develop efficient and liquid bond markets in East Asia, enabling better utilization of regional savings for investment within the region.⁶ Its activities focus on the following two areas: (1) facilitating access to the market through a wider variety of issuer and types of bonds, and (2) enhancing market infrastructure to foster bond markets in Asia.⁷ Asian governments, central banks and the Asian Development Bank are keen to see the expansion of Asian bond markets in order to help provide finance for the large infrastructural development that the region needs over the next decade. Alongside the expansion of the bond markets, Asian governments and central banks are currently discussing the creation of an ACU. The ADB has suggested that bonds may also be issued in ACU over the next few years which would help lower the financing costs for Asian issuers who have substantial trade links with other countries in the region.⁸

4. Stock Markets in East Asia

Stock exchanges in Asia developed much later than those in Europe or America. The first Asian market for securities trading was in Shanghai which began in the late 1860s. The first share list appeared in June 1866. The Bombay Stock Exchange, launched in 1875, was the oldest organized market in the region, followed by the Tokyo Stock Exchange (TSE) three years later. In 1891 during the boom in mining shares, foreign businessmen founded the "Shanghai Sharebrokers' Association" headquartered in Shanghai as China's first stock exchange.

Off to a late start amid dramatic historic events, Asian stock markets were quick to adopt cutting-edge strategies and have experienced rapid growth. They espoused technology, demutualized and listed their own shares long before U.S. markets did. The TSE is the second stock exchange in the world by market value, second only to the New York Stock Exchange. It currently lists 2,271 domestic companies and 31 foreign companies, with a total market capitalization of over 5 trillion dollars.⁹ The TSE was established in 1943, the exchange was combined with ten other stock exchanges in major Japanese cities to form a single exchange.

The Shanghai Stock Exchange was reestablished on November 26, 1990. A market capitalization of nearly \$2.38 trillion makes it the fifth largest in the world. There are two types of stocks being issued in the Shanghai Stock Exchange: A shares and B shares. A shares are priced in the local Renminbi yuan currency, while B shares are quoted in U.S. dollars. Initially, trading in A shares is restricted to domestic investors only while B shares are available to both domestic (since 2001) and foreign investors. However, after reforms were implemented in December 2002, foreign investors are now allowed to trade in A shares with some restrictions under the Qualified Foreign Institutional Investor system and there is a plan to eventually merge the two types of shares.

⁶ At the 6th ASEAN+3 Finance Ministers' Meeting in August 2003 at Manila, the Philippines, finance ministers agreed to promote Asian bond markets.

⁷ A robust primary and secondary bond market in Asia requires a wide variety of issuers and products that could be addressed by encouraging: (1) Sovereign bond issuance by Asian governments to establish benchmarks; (2) Asian government financial institutions to issue bonds in Asia to meet their financing requirements; (3) The creation of asset-backed securities markets, including collateralized debt obligations (CDOs); (4) Bond issuance in the region by multilateral development banks and government agencies; (5) Bond issuance in the region for funding foreign direct investment in Asian countries; and (6) The expansion of local currency-denominations of bonds and the introduction of currency-basket bonds.

⁸ At the ASEAN+3 Finance Ministers' Meeting (AFMM+3) on August 7, 2003, six voluntary working group (WG) on the ABMI have been established to address key areas of bond market development. Since the establishment of the six WGs, comprehensive efforts have been made to develop regional bond markets.

⁹ Information from *Wikipedia.org*.

Figure 1 East Asia Stock Markets Price indices (1989:6 to 2007:7)

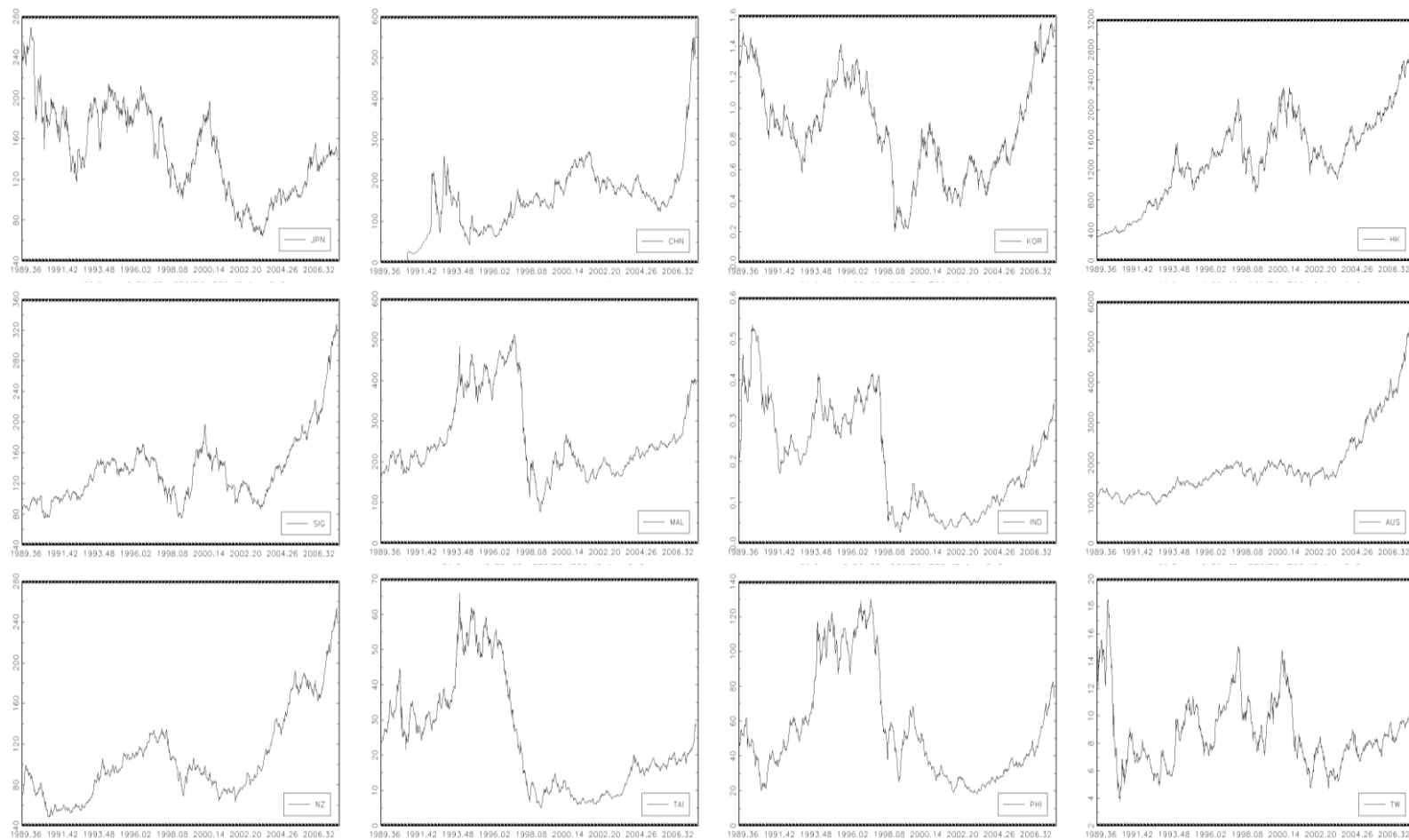
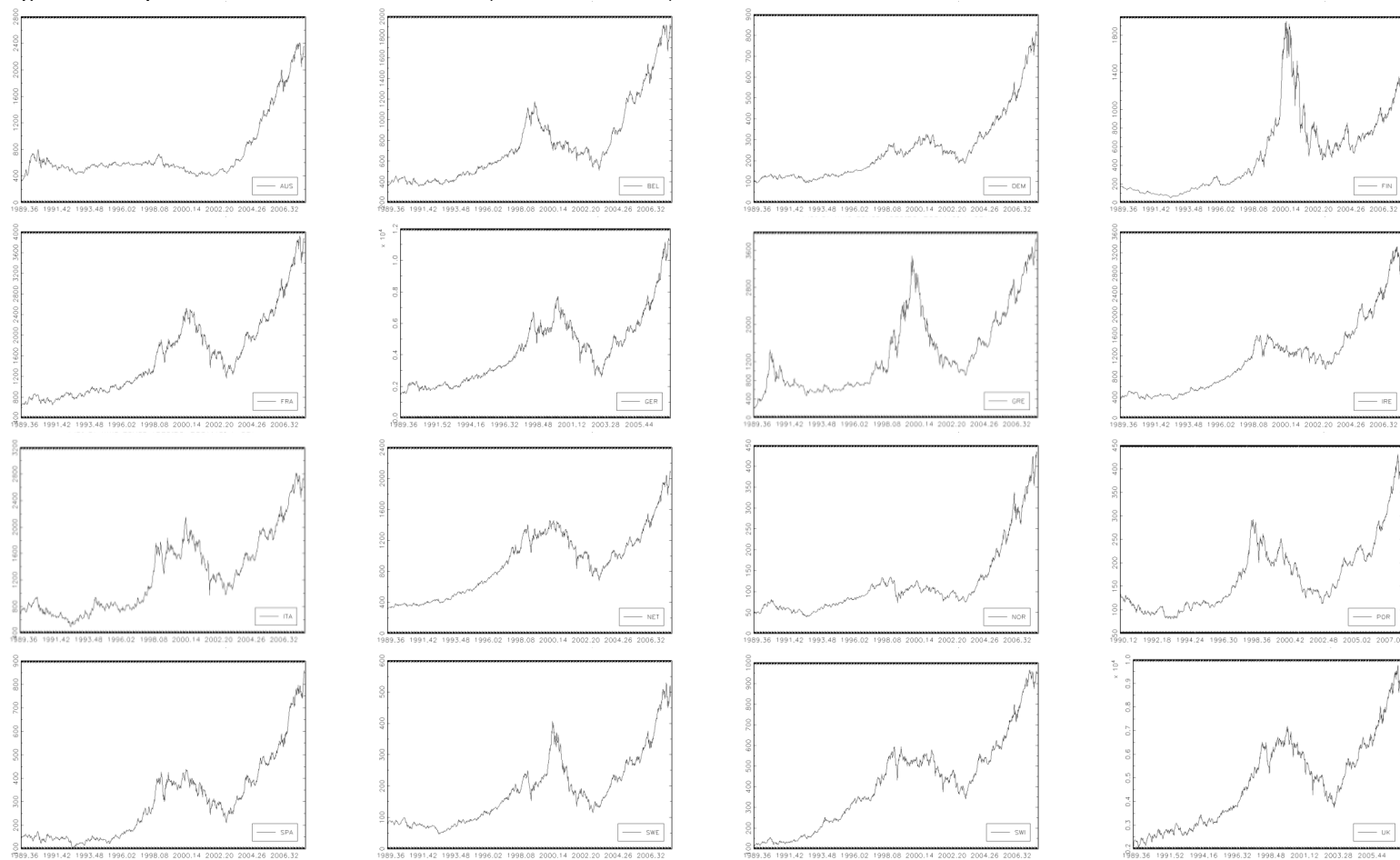


Figure 2 European Stock Market Price Indices (1989:6 to 2007:10)



The stock price indices for East Asian stock markets and European stock markets are plotted in Figures 1 and 2. Despite divergent economic and financial conditions in various countries, the stock prices seem to share similar movements. There is a steep decline after the 1997 financial crisis for most East Asian countries; the East Asian stock prices and European stock prices exhibit a common decline after 2002 presumably due to sharp increases in oil prices. As the economies recovered in 2003, the indices resumed the rising trend in the European countries.

In this paper we employ and focus on the overall stock price index as indicator of the overall performance of the economy. It is well known that stock prices are a good leading indicator of economic activity. Traditional models suggest that the price of a firm's stock equals the expected present value of the firm's future payouts or dividends. As long as these expectations reflect the underlying fundamental factors, they must ultimately reflect real economic activity.¹

III. Data and Methodology

According to the theory of optimum currency areas (OCA), joining a single currency area brings in costs and benefits. The benefits include reductions in uncertainty and transactions costs that can arise under floating exchange rates. The costs are due to the inability to use monetary and exchange rate policy for economic stabilization. The magnitude of the costs is expected to be lower if business cycles in the member countries are closely correlated and their economic structures are similar.

The OCA criteria have been operationalized and quantified in a number of studies. Bayoumi and Eichengreen (1993), in a well-known study, examine the correlation of aggregate supply shocks to investigate the similarity of economic structure across potential member countries. Their assumption is that aggregate demand shocks are regime-specific while aggregate supply shocks are likely to be invariant with respect to changes in the exchange rate regime. In this study, we separate shocks to the economy into "global", "regional", and "country specific" shocks. The latter will be interchangeably called "domestic" shocks. Global shocks affect economies both inside and outside the regional boundary. Commodity price shocks can be an example of such shocks. Regional shocks are common to the economies within the region. German unification of 1989 and the resulting fiscal expansion may constitute a regional shock for European countries. In East Asia, large fluctuations in the yen-dollar exchange rate seem to have been a common, important regional source of disturbances (Kwan, 1994). Country-specific shocks are unique to a particular economy. They may be either from aggregate demand shocks that are associated with monetary or fiscal policies or supply shocks on productivity or the terms of trade.

¹ Fama (1990) showed that stock returns are actually significant in explaining future real activity for the whole period from 1953 to 1987 in the United States stock market. Quarterly and annual stock returns are highly correlated with future production growth rates. According to the reported regressions past stock returns are significant in explaining current production growth rates and vice versa. Merton (1984) found that movements in the United States stock prices were positively correlated with real GNP. Schwert (1990) showed that Fama's results could be replicated by using data that goes back as far as to 1889. He finds the correlation between future production growth rates and current stock returns to be robust for the whole period from 1889 to 1988. However, Binswanger (2000) concluded that traditional links between stock market performance and two major macroeconomic indicators, production and GDP, broke down in the most recent United States bull market. Although the regressions of stock returns on measures of real activity in the United States over the period from 1953 to 1997 seem to confirm the findings of Fama (1990), stocks returns do not reflect real activity in the current stock market boom from 1984 to 1997. In recent research, Mao (2007) found the links between stock prices and industrial production or GDP remained strong during the high-growth phase since 1980s in the Australian stock market.

Regional shocks are expected to be important in a small open economy or in an economy with an economic structure similar to its trading partners or neighbors in the region. External shocks can extend regional boundary. Global shocks affect all countries in the same direction.

Following Chow and Kim (2002), we assume that global, regional and domestic price indices – y_t^g , y_t^r , and y_t^d – are affected by three different types of shocks that arise from the global, regional and the domestic markets and are denoted as u_t^g , u_t^r and u_t^d , respectively. In a matrix form, it can be summarized as follows:

$$(1) \quad \begin{pmatrix} \Delta y_t^g \\ \Delta y_t^r \\ \Delta y_t^d \end{pmatrix} = \begin{pmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{pmatrix} \begin{pmatrix} u_t^g \\ u_t^r \\ u_t^d \end{pmatrix}$$

where $A_{ij}(L) = a_{ij}^0 + a_{ij}^1 L + a_{ij}^2 L^2 + a_{ij}^3 L^3 + \dots$ are polynomials of the lag operator L .

For the identification of structural shocks, we employ the following 3 restrictions of the Blanchard-Quah (1989) type based on the assumption that the individual economy is small in the region and, in turn, the region is a small part of the world. 1) Regional shocks have long-run effects on the global index; 2) Country-specific shocks have long-run effects on the global index; 3) Country-specific shocks have no long-run effects on the regional index. We impose these restrictions only in the long-run responses but not on short-run responses.

The identifying assumptions imply that the cumulative effects of a u_t^d shock on y_t^r is equal to zero and so are the cumulative effects of the u_t^d or u_t^r shocks on y_t^g . The assumptions can be restated in terms of impulse responses, $\sum_{k=0}^{\infty} a_{23}^k = \sum_{k=0}^{\infty} a_{12}^k = \sum_{k=0}^{\infty} a_{13}^k = 0$.

We assume that each structural shock has unit variance and is uncorrelated to other shocks.

The importance of regional shocks – which affect countries in the region in a symmetric fashion – is taken as the indicator of similarity of economic structure within the potential member countries since, by construction, they affect each country in the group. On the other hand, the costs associated with a loss of monetary independence and flexible exchange rate adjustments could be heavy if dominant shocks are country-specific shocks and therefore uncorrelated across the region. For global shocks, a global rather than regional arrangement might be a better course of action in dealing with such shocks. In the context of East Asia, for instance, if global shocks (say, affecting U.S. output) are relatively more important than regional ones (say, affecting Japanese output), forming a dollar bloc may be a better policy choice than forming a yen bloc.

The overall stock price index is used as an indicator of macroeconomic performance to identify the three underlying shocks. Stock price data are ideal for our purpose since the availability of high frequency data as a proxy for macroeconomic performance can help us overcome the serious problem of having to work with a short-time span such as the post-crisis period, for which at best 6-7 years of data are available.²

² Kaminsky and Reinhart (1999) show that stock price indices are a significant predictor of currency crisis. As the crisis nears, changes in stock prices are about 40 percent below those observed in non-crisis periods. Weakening equity prices reflects both deteriorating cyclical position of the economy and reduced foreign demand as capital

We employ weekly price data from July 1, 1989 to December 31, 2006 for 12 stock exchanges in East Asia: Japan, China, South Korea, Hong Kong, Singapore, Malaysia, Taiwan, Indonesia, Thailand, the Philippines, Australia and New Zealand. [Data from July 1, 1997 to December 31, 1998 are omitted because of large turmoil due to the financial crises in the region during that period.] For comparison, the model is first estimated for 16 European countries that consist of 11 EMU countries – Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain – and 5 non-EMU countries – Denmark, Norway, Sweden, Switzerland, and the United Kingdom.³

The regional and global indices are defined as follows. For European countries, we use the U.S. index as the global index. The regional index is represented by the weighted average of price indices of the selected European countries excluding the local country's own index. For East Asian countries, the regional index is the weighted average of all East Asian stock markets excluding the country's own index. The global index is the weighted average of the U.S., Germany, Italy, France and the U.K. ⁴ The weights for the global and regional indices are based on constant PPP-value GDP estimates, averaged over the 1994 to 2006 period.⁵

IV. Empirical Results

We estimate a structural vector autoregressive model for two groups of countries separately: East Asia and Europe.⁶ The results of the forecast error variance decomposition for European (East Asian) countries at 10-week forecast horizon are reported in Table 2 (3). Global shocks, regional shocks and country-specific shocks are denoted as 'U-G', 'U-R' and 'U-D' respectively. For brevity, we report only the variance decompositions of the domestic price index since the regional and global indices are mostly explained by regional and global shocks themselves.

inflows are reversed and worsening balance sheets of firms. The beginning of a recession is also reflected in the stock market, which collapses a year before the crisis.

³ Stock price index data in this study are retrieved from Data stream (Thompson Financial) and Yahoo Finance; the data for exchange rate are collected from PERS (Pacific Exchange Rate Service) from University of British Columbia, Sauder School of Business. GDP, PPP data are from WDI (World Development Indicator) online database.

⁴ The stock price indices which are originally reported in local currency terms are converted into US dollar terms by dividing by the exchange rate.

⁵ The weighting system employed for each country is available from the authors upon request.

⁶ For unit-root tests, not reported here for space reasons, we employ the augmented Dickey-Fuller (ADF) test, the Schmidt-Phillips (SP) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The null hypothesis for the ADF and the SP tests is that the stock price index is non-stationary. A time trend is included in all regressions; the number of lags used in the unit root tests is determined using the optimal lag length tests based on the Akaike Information Criterion (AIC), Hannan-Quinn Criterion (HQC), and Schwarz Criterion (SC). (Typically, all three criteria report the same results. When they are different, we take the result indicated by the AIC criterion.) The null hypothesis that the stock price index is non-stationary cannot be rejected for any East Asian countries with the ADF and SP tests. For the KPSS test, the null hypothesis is that the stock indices are stationary, which is rejected at the conventional significance level. When the same tests are applied to the first differences of the series, the unit-root null is strongly rejected with the ADF and SP tests and the stationarity null is not rejected with the KPSS test. These results suggest that all the series contain a unit root and thus should be first differenced to achieve stationarity. The empirical results are available upon request.

Table2. Variance Decomposition of domestic index in sub-periods for European countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Averag e
<i>Austria</i>	U-G	0.17	0.06	0.07	0.13	0.11	0.02	0.04	0.33	0.12
	U-R	0.24	0.27	0.15	0.18	0.11	0.39	0.37	0.38	0.26
	U-D	0.58	0.67	0.78	0.69	0.78	0.59	0.59	0.29	0.62
<i>Belgium</i>	U-G	0.33	0.02	0.14	0.08	0.11	0.45	0.41	0.37	0.24
	U-R	0.46	0.24	0.26	0.18	0.10	0.29	0.45	0.55	0.32
	U-D	0.21	0.74	0.60	0.74	0.79	0.26	0.14	0.09	0.45
<i>Denmark</i>	U-G	0.31	0.00	0.16	0.21	0.23	0.41	0.33	0.25	0.24
	U-R	0.33	0.23	0.20	0.25	0.11	0.19	0.12	0.53	0.25
	U-D	0.36	0.76	0.64	0.54	0.65	0.40	0.54	0.23	0.52
<i>Finland</i>	U-G	0.10	0.01	0.13	0.19	0.38	0.36	0.50	0.48	0.27
	U-R	0.20	0.09	0.24	0.02	0.10	0.01	0.02	0.20	0.11
	U-D	0.70	0.89	0.63	0.79	0.53	0.63	0.47	0.31	0.62
<i>France</i>	U-G	0.29	0.03	0.20	0.18	0.48	0.75	0.63	0.45	0.38
	U-R	0.55	0.54	0.45	0.41	0.30	0.22	0.33	0.41	0.40
	U-D	0.17	0.42	0.35	0.41	0.22	0.03	0.04	0.14	0.22
<i>Germany</i>	U-G	0.26	0.01	0.08	0.17	0.42	0.75	0.47	0.52	0.34
	U-R	0.44	0.39	0.26	0.42	0.40	0.17	0.13	0.33	0.32
	U-D	0.31	0.60	0.66	0.41	0.18	0.08	0.41	0.14	0.35
<i>Greece</i>	U-G	0.01	0.01	0.06	0.00	0.01	0.17	0.14	0.20	0.08
	U-R	0.09	0.15	0.08	0.13	0.08	0.21	0.34	0.32	0.18
	U-D	0.89	0.84	0.87	0.87	0.91	0.61	0.52	0.48	0.75
<i>Ireland</i>	U-G	0.12	0.05	0.25	0.17	0.18	0.31	0.38	0.24	0.21
	U-R	0.25	0.30	0.15	0.29	0.08	0.07	0.14	0.41	0.21
	U-D	0.63	0.65	0.60	0.54	0.73	0.62	0.48	0.35	0.58
<i>Italy</i>	U-G	0.16	0.02	0.00	0.08	0.16	0.44	0.38	0.39	0.20
	U-R	0.19	0.10	0.39	0.10	0.52	0.17	0.44	0.34	0.28
	U-D	0.64	0.88	0.61	0.82	0.32	0.39	0.18	0.28	0.52
<i>Netherlands</i>	U-G	0.25	0.01	0.35	0.29	0.40	0.66	0.68	0.49	0.39
	U-R	0.29	0.45	0.46	0.30	0.31	0.15	0.26	0.38	0.33
	U-D	0.46	0.54	0.19	0.41	0.29	0.19	0.06	0.14	0.29
<i>Portugal</i>	U-G	0.21	0.01	0.09	0.08	0.06	0.26	0.14	0.26	0.14
	U-R	0.10	0.26	0.15	0.37	0.41	0.57	0.38	0.32	0.32
	U-D	0.69	0.73	0.76	0.54	0.52	0.17	0.48	0.42	0.54
<i>Spain</i>	U-G	0.20	0.15	0.20	0.09	0.35	0.43	0.38	0.50	0.29
	U-R	0.36	0.31	0.18	0.25	0.38	0.28	0.25	0.29	0.29
	U-D	0.45	0.54	0.62	0.66	0.27	0.29	0.37	0.21	0.43
<i>Norway</i>	U-G	0.08	0.05	0.16	0.13	0.22	0.26	0.18	0.19	0.16
	U-R	0.10	0.16	0.17	0.21	0.06	0.14	0.33	0.38	0.19
	U-D	0.82	0.79	0.66	0.66	0.72	0.60	0.48	0.43	0.65
<i>Sweden</i>	U-G	0.29	0.03	0.13	0.17	0.31	0.55	0.49	0.42	0.30
	U-R	0.29	0.28	0.18	0.16	0.25	0.09	0.28	0.44	0.25
	U-D	0.42	0.70	0.69	0.67	0.44	0.36	0.22	0.14	0.46
<i>Switzerland</i>	U-G	0.31	0.02	0.14	0.06	0.18	0.62	0.47	0.42	0.28
	U-R	0.37	0.43	0.20	0.18	0.18	0.21	0.17	0.33	0.26
	U-D	0.32	0.54	0.66	0.75	0.64	0.17	0.36	0.26	0.46
<i>United Kingdom</i>	U-G	0.17	0.04	0.35	0.18	0.49	0.68	0.56	0.44	0.36
	U-R	0.42	0.41	0.33	0.25	0.05	0.11	0.12	0.30	0.25
	U-D	0.41	0.55	0.32	0.57	0.46	0.22	0.31	0.26	0.39

Average	U-G	0.20	0.03	0.16	0.14	0.26	0.45	0.39	0.37	0.25
	U-R	0.29	0.29	0.24	0.23	0.22	0.20	0.26	0.37	0.26
	U-D	0.50	0.68	0.60	0.63	0.53	0.35	0.35	0.26	0.49

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30; Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

Table 2 reports the forecast error decomposition for the European countries. Global, regional, and country-specific shocks on average explain 25, 26, and 49 percent of the variations in the domestic stock price throughout the whole sample period. The table also shows that the role of country-specific shocks declines over time in all countries. Thus, after period V, 35 percent or less of variations in the stock price can be explained by its own market shocks in all European countries while they did more than 50 percent before period VI.

The corollary of the above change in the role of country-specific shocks is the increase in the sum of the roles played by global and regional shocks.⁷ Global shocks became more important virtually in all countries. They explain less than 15 percent of most countries' domestic stock market price variations before period V. More than 35 percent of domestic price variations are explained by global shocks after period VI. The change in the role of regional shocks is varied, however. In Germany and France, the two largest economies in the European continent, regional shocks became less important after 1999.⁸ In the majority of cases of smaller countries, however, regional shocks play an increasingly more important role in recent years. In almost every European country except Finland, the regional shocks can explain nearly 40 percent or more of domestic market price variations in period VIII (2005 - 2006). It appears there is clear evidence of greater financial market integration in Europe after the introduction of the euro. Financial integration has progressed both globally and regionally.

It is also interesting to note that, in terms of financial integration, there is little difference between the Eurozone countries and the rest. All but five countries listed at the bottom of the table became members of the EMU. Denmark, Sweden, and the U.K. decide to opt out. Norway and Switzerland are not part of the European Union. A comparison of the two groups does not reveal any significant differences. There is no evidence that countries specific shocks are less important – and thus financially more integrated – in the Eurozone countries. Similarly, there is no indication that regional shocks are more important in those countries.

These results are reasonable given the fact that financial market openings pursued in European countries beginning in the 1980s have caused the stock market in each country to be more exposed to external/global shocks. It is also interesting to note that the introduction of the euro has accelerated the globalization of each stock market whether the country has become a member of the EMU or not. At same time, the fixed exchange rate arrangement under the European Monetary System (EMS) and the efforts of individual countries to participate in the single currency area seem to have gradually increased the extent of financial integration among the EMU and non-EMU members alike as indicated by the increasing role of regional shocks in virtually all European countries in the recent periods.

⁷ Variance decompositions are not steady. We compare the average of the last two period and that of the first two.

⁸ This might be due to the construction of the regional shock. Since own price series is removed in the construction of the regional index, the bigger the economy, the smaller coverage the resulting regional index becomes. Consequently, its influence becomes smaller.

Table 3. Variance Decomposition of domestic index in sub-periods for Asian countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
<i>Japan</i>	U-G	0.19	0.07	0.05	0.11	0.22	0.18	0.14	0.18	0.14
	U-R	0.01	0.00	0.05	0.02	0.02	0.05	0.05	0.05	0.03
	U-D	0.79	0.93	0.90	0.87	0.75	0.78	0.81	0.77	0.83
<i>China</i>	U-G	0.01	0.01	0.01	0.13	0.01	0.01	0.03	0.09	0.04
	U-R	0.10	0.01	0.07	0.05	0.04	0.04	0.02	0.00	0.04
	U-D	0.88	0.98	0.92	0.82	0.95	0.95	0.95	0.91	0.92
<i>Korea</i>	U-G	0.05	0.01	0.02	0.04	0.25	0.34	0.21	0.18	0.14
	U-R	0.01	0.01	0.02	0.03	0.05	0.07	0.00	0.08	0.03
	U-D	0.94	0.97	0.96	0.93	0.71	0.59	0.78	0.75	0.83
<i>Hong Kong</i>	U-G	0.24	0.03	0.19	0.22	0.43	0.39	0.33	0.35	0.27
	U-R	0.02	0.01	0.01	0.03	0.07	0.07	0.09	0.03	0.04
	U-D	0.74	0.95	0.79	0.75	0.50	0.53	0.58	0.61	0.68
<i>Singapore</i>	U-G	0.42	0.07	0.14	0.06	0.23	0.33	0.18	0.32	0.22
	U-R	0.03	0.08	0.02	0.01	0.06	0.01	0.14	0.22	0.07
	U-D	0.55	0.85	0.84	0.93	0.70	0.67	0.68	0.45	0.71
<i>Malaysia</i>	U-G	0.17	0.01	0.18	0.09	0.08	0.07	0.04	0.30	0.12
	U-R	0.01	0.00	0.00	0.05	0.01	0.01	0.22	0.05	0.04
	U-D	0.82	0.98	0.82	0.86	0.91	0.91	0.74	0.66	0.84
<i>Taiwan</i>	U-G	0.01	0.01	0.02	0.01	0.09	0.25	0.17	0.19	0.09
	U-R	0.01	0.00	0.00	0.03	0.15	0.02	0.06	0.06	0.04
	U-D	0.98	0.99	0.97	0.96	0.76	0.72	0.77	0.75	0.86
<i>Indonesia</i>	U-G	0.01	0.02	0.09	0.06	0.06	0.01	0.10	0.16	0.06
	U-R	0.01	0.02	0.00	0.01	0.03	0.01	0.05	0.06	0.02
	U-D	0.99	0.96	0.91	0.93	0.91	0.98	0.85	0.78	0.91
<i>Thailand</i>	U-G	0.28	0.09	0.21	0.02	0.26	0.16	0.14	0.17	0.17
	U-R	0.01	0.05	0.00	0.02	0.02	0.08	0.11	0.13	0.05
	U-D	0.71	0.86	0.79	0.95	0.72	0.76	0.75	0.71	0.78
<i>Philippines</i>	U-G	0.19	0.10	0.22	0.09	0.29	0.08	0.17	0.21	0.17
	U-R	0.00	0.01	0.01	0.08	0.01	0.01	0.03	0.11	0.03
	U-D	0.81	0.89	0.77	0.83	0.70	0.91	0.80	0.67	0.80
<i>Australia</i>	U-G	0.05	0.04	0.11	0.09	0.18	0.29	0.17	0.34	0.16
	U-R	0.02	0.09	0.00	0.03	0.02	0.03	0.02	0.05	0.03
	U-D	0.93	0.87	0.89	0.89	0.81	0.68	0.81	0.61	0.81
<i>New Zealand</i>	U-G	0.12	0.03	0.21	0.02	0.09	0.31	0.07	0.14	0.12
	U-R	0.03	0.13	0.01	0.02	0.04	0.01	0.04	0.10	0.05
	U-D	0.84	0.84	0.79	0.96	0.81	0.69	0.89	0.76	0.82
<i>Average</i>	U-G	0.15	0.04	0.12	0.08	0.18	0.20	0.15	0.22	0.14
	U-R	0.02	0.03	0.02	0.03	0.04	0.03	0.07	0.08	0.04
	U-D	0.83	0.92	0.86	0.89	0.77	0.76	0.78	0.70	0.82

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30; Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

Table 3 reports the variance decompositions of stock price indices in East Asian economies. One cannot fail to notice sharp contrasts between Tables 2 and 3. First of all, in most East Asian economies, country-specific shocks are dominant in the determination of the domestic price index for all estimation periods. They are responsible on average for 80 percent or more of changes in the local stock price index in all countries except Hong Kong, and Singapore. (This is not surprising given that the two economies are small and open, especially in financially.) After the financial crisis, their role seems to have declined in several countries including Japan, Hong Kong, Korea, Singapore, Malaysia, and Australia. Nevertheless, they are still far more important than that can be observed in the European countries, explaining 60 percent or more except Singapore.⁹ China is also exceptional in that country-specific shocks continue to be dominant or appear to have become more important after the financial crisis. Throughout the whole sample period, before and after the crisis, more than 90 percent variations in China's stock prices are explained by its own domestic shocks.¹⁰

Regarding the role of external shocks, we find that there is a substantial increase in the role of global shocks in the post-crisis period in Korea, Hong Kong, Singapore, Taiwan, and Australia, and in subperiod VIII, in Malaysia and Indonesia. For instance, 32 percent of variations in the domestic stock price are explained by global shocks in Singapore in the most recent period, up from 6 percent in period IV. On the other hand, little change is observed in China, Thailand and the Philippines after the financial crisis. This may be due to the fact that the latter two countries may have had highly integrated stock markets even before the crisis.

Another important difference between the European and the East Asian financial markets is the role of regional shocks. Compared to country-specific and global shocks, regional shocks seem to be negligible in the East Asian economies, explaining on average 7 percent or less of variations in the local stock price in all cases. In the post-crisis period, particularly in period VII, there were noticeable increases in their role in several countries including Malaysia, Thailand, and Singapore. (In Malaysia, the increase did not last and evaporated in period VIII.) The lack of sustained increase in the importance of regional shocks in East Asian economies is surprising given the scope of liberalization of trade and financial markets, which is expected to make the countries more open and susceptible to increased capital flows and other external shocks.

V. Robustness

Japan has been the dominant economic power in East Asia. However, China, upon its rapid growth of the past several decades, has rapidly become a regional and global player. The emergence of China and the decade-long stagnation of Japan have complicated the leadership position in the region.¹¹ Any currency arrangement in the region is likely to involve the Japanese yen and the Chinese yuan as major components. Therefore, we redo the test by considering each of the two countries as an alternate global index.

⁹ There are also sharp declines in the role of country-specific shocks in a few years after the crisis. For instance, from period V to period VI, fluctuations in the domestic stock price due to own shocks declined from 86 percent to 46 percent, 76 to 52 percent, and 84 to 47 percent in the three countries. The decline is probably due to the fact that stock markets in these economies were able to avoid the sharp falls followed by sharp recoveries instead of any other structural factors.

¹⁰ The China stock exchange used to separate the market into A share and B share markets. Foreign investors, who were allowed to participate only in B shares, can invest in the A share market after December 2002. The results seem to suggest that numerous remaining restrictions might still limit the size and effect of external influences on the local stock market of China.

¹¹ We note, however, that several factors block the natural emergence of a leader country in East Asia similar to the United States in the Western Hemisphere or the Franco-German alliance in Western Europe. Among other things, Japan has been mired in economic stagnation over the last decade and China, while recently emerging as an economic power, has a long way to go to achieve fundamental transition to a market-based democratic economy with a mature financial system.

We build our alternative models by identifying various structural shocks with a more narrowly defined "global shocks". For the first alternative model, reported in Table 4, the Japanese Stock price index is chosen as a proxy for the global index and the output-weighted price index of East Asian countries excluding Japan is used as the regional index. In the second alternative model, reported in Table 5, the Chinese stock price index is chosen as a proxy for the global index instead with the regional index defined in the same way.

Table 4. Robustness test 1: Variance Decomposition of domestic index in sub-periods for Asian countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
<i>China</i>	U-G	0.00	0.01	0.05	0.01	0.02	0.03	0.03	0.06	0.03
	U-R	0.00	0.01	0.03	0.11	0.00	0.00	0.08	0.10	0.04
	U-D	0.99	0.97	0.92	0.88	0.98	0.96	0.90	0.84	0.93
<i>Korea</i>	U-G	0.13	0.07	0.01	0.05	0.15	0.21	0.10	0.27	0.12
	U-R	0.00	0.07	0.02	0.03	0.04	0.07	0.06	0.06	0.04
	U-D	0.87	0.87	0.97	0.92	0.82	0.72	0.84	0.67	0.84
<i>Hong Kong</i>	U-G	0.23	0.00	0.01	0.14	0.30	0.26	0.26	0.13	0.17
	U-R	0.00	0.01	0.04	0.03	0.18	0.15	0.06	0.26	0.09
	U-D	0.77	0.99	0.95	0.83	0.52	0.59	0.68	0.61	0.74
<i>Singapore</i>	U-G	0.37	0.12	0.08	0.05	0.12	0.17	0.31	0.48	0.21
	U-R	0.00	0.04	0.00	0.04	0.23	0.15	0.16	0.15	0.10
	U-D	0.63	0.84	0.92	0.91	0.65	0.68	0.53	0.38	0.69
<i>Malaysia</i>	U-G	0.17	0.04	0.01	0.09	0.04	0.07	0.24	0.12	0.10
	U-R	0.00	0.03	0.05	0.04	0.11	0.20	0.16	0.26	0.11
	U-D	0.83	0.93	0.94	0.87	0.85	0.73	0.59	0.62	0.80
<i>Taiwan</i>	U-G	0.01	0.03	0.02	0.01	0.17	0.06	0.12	0.21	0.08
	U-R	0.00	0.01	0.00	0.06	0.08	0.07	0.05	0.05	0.04
	U-D	0.98	0.96	0.97	0.93	0.75	0.87	0.83	0.74	0.88
<i>Indonesia</i>	U-G	0.05	0.05	0.00	0.02	0.03	0.03	0.12	0.12	0.05
	U-R	0.04	0.00	0.02	0.04	0.09	0.01	0.13	0.06	0.05
	U-D	0.92	0.94	0.98	0.95	0.88	0.96	0.75	0.83	0.90
<i>Thailand</i>	U-G	0.09	0.05	0.03	0.01	0.12	0.22	0.21	0.19	0.12
	U-R	0.00	0.00	0.03	0.05	0.22	0.13	0.14	0.07	0.08
	U-D	0.90	0.94	0.94	0.94	0.66	0.66	0.65	0.74	0.80
<i>Philippines</i>	U-G	0.06	0.01	0.00	0.02	0.05	0.06	0.08	0.29	0.07
	U-R	0.01	0.09	0.00	0.11	0.23	0.10	0.03	0.16	0.09
	U-D	0.93	0.90	1.00	0.86	0.72	0.84	0.88	0.55	0.84
<i>Australia</i>	U-G	0.03	0.07	0.21	0.06	0.09	0.08	0.12	0.21	0.11
	U-R	0.01	0.04	0.02	0.10	0.03	0.07	0.19	0.11	0.07
	U-D	0.96	0.89	0.77	0.84	0.88	0.85	0.70	0.68	0.82
<i>New Zealand</i>	U-G	0.13	0.10	0.20	0.02	0.04	0.11	0.08	0.14	0.10
	U-R	0.00	0.07	0.00	0.00	0.04	0.08	0.26	0.14	0.07
	U-D	0.87	0.82	0.79	0.98	0.92	0.81	0.66	0.72	0.82
Average	U-G	0.12	0.05	0.06	0.04	0.10	0.12	0.15	0.20	0.11
	U-R	0.01	0.03	0.02	0.06	0.11	0.09	0.12	0.13	0.07
	U-D	0.88	0.91	0.92	0.90	0.78	0.79	0.73	0.67	0.82

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30; Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

Table 5. Robustness test 2: Variance Decomposition of domestic index in sub-periods for Asian countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
<i>Japan</i>	U-G	0.00	0.01	0.04	0.00	0.00	0.01	0.00	0.04	0.01
	U-R	0.07	0.24	0.00	0.16	0.19	0.22	0.22	0.28	0.17
	U-D	0.93	0.75	0.95	0.84	0.81	0.77	0.78	0.68	0.81
<i>Korea</i>	U-G	0.00	0.08	0.01	0.03	0.00	0.03	0.02	0.04	0.03
	U-R	0.13	0.07	0.02	0.06	0.20	0.31	0.12	0.24	0.14
	U-D	0.87	0.85	0.97	0.91	0.80	0.67	0.86	0.72	0.83
<i>Hong Kong</i>	U-G	0.01	0.02	0.02	0.07	0.03	0.01	0.01	0.19	0.05
	U-R	0.31	0.00	0.02	0.17	0.37	0.30	0.27	0.09	0.19
	U-D	0.68	0.98	0.97	0.76	0.60	0.69	0.72	0.71	0.76
<i>Singapore</i>	U-G	0.01	0.02	0.00	0.04	0.01	0.01	0.10	0.15	0.04
	U-R	0.46	0.15	0.03	0.06	0.23	0.25	0.30	0.42	0.24
	U-D	0.53	0.83	0.96	0.90	0.76	0.74	0.60	0.44	0.72
<i>Malaysia</i>	U-G	0.00	0.07	0.09	0.06	0.01	0.00	0.10	0.18	0.06
	U-R	0.23	0.05	0.01	0.10	0.09	0.11	0.24	0.07	0.11
	U-D	0.77	0.88	0.90	0.84	0.91	0.88	0.67	0.75	0.83
<i>Taiwan</i>	U-G	0.00	0.01	0.02	0.03	0.09	0.01	0.00	0.06	0.03
	U-R	0.02	0.03	0.00	0.01	0.18	0.11	0.16	0.21	0.09
	U-D	0.98	0.97	0.97	0.96	0.73	0.88	0.84	0.73	0.88
<i>Indonesia</i>	U-G	0.03	0.00	0.08	0.03	0.01	0.01	0.05	0.03	0.03
	U-R	0.03	0.05	0.00	0.03	0.06	0.03	0.12	0.11	0.05
	U-D	0.94	0.95	0.92	0.94	0.94	0.96	0.83	0.86	0.92
<i>Thailand</i>	U-G	0.00	0.01	0.01	0.03	0.01	0.00	0.07	0.06	0.02
	U-R	0.13	0.05	0.02	0.01	0.19	0.34	0.19	0.20	0.14
	U-D	0.86	0.95	0.97	0.96	0.80	0.66	0.74	0.74	0.84
<i>Philippines</i>	U-G	0.02	0.07	0.04	0.15	0.01	0.01	0.01	0.11	0.05
	U-R	0.08	0.01	0.00	0.03	0.13	0.10	0.07	0.25	0.08
	U-D	0.90	0.93	0.96	0.83	0.85	0.89	0.92	0.64	0.87
<i>Australia</i>	U-G	0.02	0.06	0.02	0.12	0.04	0.00	0.04	0.14	0.06
	U-R	0.04	0.07	0.02	0.09	0.17	0.14	0.12	0.15	0.10
	U-D	0.94	0.88	0.96	0.79	0.79	0.85	0.84	0.71	0.85
<i>New Zealand</i>	U-G	0.00	0.07	0.01	0.00	0.06	0.02	0.06	0.13	0.04
	U-R	0.18	0.09	0.06	0.02	0.06	0.22	0.06	0.12	0.10
	U-D	0.82	0.84	0.93	0.98	0.87	0.76	0.87	0.75	0.85
<i>Average</i>	U-G	0.01	0.04	0.03	0.05	0.02	0.01	0.04	0.10	0.04
	U-R	0.15	0.07	0.02	0.07	0.17	0.19	0.17	0.19	0.13
	U-D	0.84	0.89	0.95	0.88	0.81	0.80	0.79	0.70	0.83

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30; Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

The results are qualitatively similar to the benchmark. Country-specific shocks are still dominant in the determination of the domestic price index for all estimation periods. Their role declines in the post-crisis periods; meanwhile, the roles of global and regional shocks have increased. In the case of Singapore, country-specific shocks became less influential than did global shocks during the 2005-2006 period. Only 38 percent of domestic stock price

fluctuations can be explained by its own market shocks while 48 percent are due to global (Japanese) stock markets. On average, shocks from the Japanese market explain 11 percent of changes in East Asian stock price indices through all periods. Compared to the pre-crisis periods, regional shocks and global shocks play more important roles in the post-crisis periods.

Table 5 reports the results with the Chinese stock price index as the global proxy. Country-specific shocks explain more than 80 percent domestic stock prices fluctuations throughout the sample period. However, in the post-crisis period, especially the most recent period, there is a significant increase in the role of global shocks and regional shocks. In period VIII, the two types of shocks contribute nearly 30 percent of stock price variations reflecting rapid growth of the Chinese stock market in the past few decades and its growing influence on other Asian stock markets. The Chinese market became more influential than the regional market in such economies as Hong Kong and Malaysia or nearly as influential in Australia and New Zealand. In general, East Asia has become more similar after the financial crisis in the sense that global and regional shocks play more important roles. However, regional shocks still play far less important role than that can be observed in the European stock markets. This diversity and heterogeneity within East Asia could constitute a serious impediment to regional policy coordination and hinder economic and monetary integration in the near future.

VI. Conclusion

In this paper, we investigate the extent of financial integration in Europe and East Asia using stock price indices. We apply the OCA theoretic criterion to examine whether pegging to a common currency is a desirable option in East Asia. In our model, the stock price index is subject to three types of shocks: global, regional and country-specific shocks. We apply a structural VAR analysis to 8 non-overlapping sub-periods in the pre-crisis and post-crisis periods.

The European benchmark estimates and the comparison with the East Asian cases suggest that the model produces sensible results. They indicate that country-domestic shocks are still dominant in all East Asian stock markets whereas external shocks that combine both global and regional shocks appear to take over the dominant position in European countries. This may suggest that, despite years of efforts toward liberalization and financial integration in the region, countries in East Asia still remain idiosyncratic and are subject to asymmetric shocks. Theory of optimum currency area would predict that pegging to the same currency would be more costly in East Asia than in European countries. The region seems sufficiently unique perhaps due to different resource endowments, growth experiences or economic policies. The efforts for financial integration in the post-crisis period appear to have some effects on the economic and financial structures in the region. However, it is too soon to see sustainable improvement.

Our results also contradict the previous study by Eichengreen and Bayoumi (1999) who find that East Asian countries are almost as qualified as the EMU countries in terms of OCA criteria. We find that regional shocks tend to play increasingly more important role in East Asia as financial markets become more integrated with those of the United States and Japan. Nonetheless, our results indicate that there may be a general lack of similarity in shocks in the region. A more flexible exchange rate regime might be more desirable and a full-fledged monetary integration seems too early an option to consider in East Asia. The regional economies should strengthen information and resource coordination. Some sub-regional currency stabilization schemes that involve a smaller set of countries could be considered as an interim measure.

It took over half a century for Europe to come to this point. It is not surprising that East Asia is behind Europe in the extent of financial integration given that European countries started the process of capital market opening much earlier than in East Asia and went ahead with monetary integration by 1999. In East Asia, the move toward financial integration started earnest only after the 1997 crises. In monetary integration, visible progress has yet to be seen.

Can we expect East Asia would become more similar and satisfy the conditions for OCA ex post by moving ahead with the efforts for financial integration? The European experience suggests that the consequence would be mixed. Countries would become more similar in the sense that country-specific shocks become less important and the combined role of global and regional shocks is likely to increase. However, there is no guarantee that they will be more strongly integrated regionally. Instead, global shocks are more likely to gain importance.

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Seasonality of dividend stock returns

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This paper reports seasonal price movement of the KOSPI dividend stocks. Based on the last 13 year data from 1997 to 2009, dividend paying stocks settling in March (March stocks) accumulated most of their capital gains during the four months from November to February, close to ex-dividend date. However, returns for the remaining eight months were negligible or negative in these March stocks, the period deemed unattractive to investors as who gets dividend is determined in the end of March. Compared to March stocks, dividend paying stocks settling in December look less affected by the dividend payment, but their monthly returns also revealed the minor impact of dividend payment on their pricing. The seasonality of dividend stock returns is thought to be caused by the seasonal behavioral pattern of dividend investors. They increase the overall demand of dividend stocks as the fiscal year end approaches but reduce the demand after ex-dividend dates. The seasonal behavior is believed to be caused by investors' mentality that the dividend factor weighs more in investment decision-making during the selective time period. Given this behavioral pattern, portfolio managers can capture additional return by utilizing the seasonality.

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I. Introduction

What makes Korean stock market different from advanced stock markets is the dividend payment method. While companies in advanced stock markets pay their dividends quarterly, at least bi-annually, most Korean firms pay their dividends once a year when they settle their business. With increasing foreign ownership of Korean companies and growing demand on cash dividend, many Korean companies started to pay their dividends more frequently, but it is still the case that majority firms pay their dividends once-a-year. For instance, in the fiscal year of 2009, KOSPI stocks settling in March provided the 99.7 percent of their total annual dividend in March and KOSPI stocks settling in December paid 94.3 percent of their total annual dividend in December¹ (Refer to table 1 at appendix).

When the market is efficient, pricing of a stock should not be influenced by the difference of the frequency of dividend payments. It is economically reasonable that a stock price drops as much as the amount of expected dividend on ex-dividend date. As large dividend is legally entitled to stockholders on ex-dividend date, price correction will be larger in once-a-year payment scheme than that of frequent payment schemes. However, as a dividend stock is priced by reasonable investors reflecting the expected future dividends stream and the uncertainty engaged with the cash flow, the stock prices are not affected by the difference of the frequency of dividend payment.

However, such a case can differ for inefficient market. If the dividends are paid quarterly or bi-annually, they will function as anchoring points of which the market can justify the pricing of stocks. Frequent dividend payment also lowers the risk level of a company perceived by investors and perceived low risk can reduce the volatility of the stock.² However, if dividends are paid in once-a-year scheme, it is only the time when dividend factor can be reflected in their pricing. In terms of risk level, investors perceive the stock more risky and the stock prices are more likely to deviate from its enterprise value in daily price movement.

In my view, dividend investors can have seasonal demand on dividend stocks. As fiscal year end approaches, dividend stocks would be regarded as more attractive assets than before because sizable dividends are returned to investors. Due to changed perception, investors increase their investment in dividend stocks and, as a result, large capital gains will accrue to dividend stocks. However, after the ex-dividend dates, dividend investors find dividend stocks less attractive to invest and this perception would lead to low returns of dividend stocks until investors will be attracted to next dividend. If investors have such a seasonal pattern of demand on dividend stocks, dividend stocks prices can exhibit certain seasonality.

This paper examines whether such seasonality exists among dividend stocks in Korea due to this once-a-year dividend payment scheme. Regarding the seasonality of dividend stocks, there have been much research works in US and UK however by far not in Korea.

¹ The KOSPI listed companies are largely divided into two categories in terms of settlement. While 90 percent of companies report their profits in December, the remaining companies settle in March, including a few settling in other months.

² Kahneman and Tversky (1979) argue that investors are concave for gains (implying risk aversion) and convex for losses (risk seeking) upon their prospect theory. As frequent and certain dividend income is favored by investors, they find frequent dividend paying stocks low in risk level and once-a-year dividend paying stocks high in risk level.

Keim (1985) finds a high January return for zero-dividend portfolios, and a positive relation between dividend yield and January return for the non-zero dividend portfolios. Returns of rest of the year are lower and not related to the dividend yield, suggesting that relationship between dividend yields and returns is concentrated in the month of January. He attributes this seasonality of returns to the size effect which he has shown in his earlier work (1983). In other words, he discovered the January seasonality in the US equities but rejected the idea that the seasonality is found in and related to dividend stocks. Similar works were done for other markets. Clare, Psaradakis, and Thomas (1995) find January, April, and September effects in UK equity market. Regarding this seasonality, they explain that January effect is due to the possible turn of the year portfolio rebalancing and the US tax year and that April effect reflects the end of the UK tax year. Regarding the September effect, they do not provide explanation. Morgan and Thomas (1997) also claim that January and April effects exist in the UK equity market. Regarding the January and April effect, they also explain them as linked to the size effect as Keim (1985) did.

The seasonality in earlier studies was found in the context of the effects of dividend yield, but it was not thought as directly caused by investors' behavioral pattern. This paper differs from earlier studies in this aspect. To my best knowledge, it is the first paper to test the seasonality of dividend stocks in Korea.

If certain seasonal pattern is observed in dividend stocks, it is an important opportunity for investors. While this seasonal pattern continues, they can capture extra return from this. However, as many investors reap the benefit from this phenomenon, the seasonality will eventually disappear. So the seasonality reflects inefficiency of the Korean stock markets.

The paper proceeds as follows. Chapter 2 describes investors' behavior to dividend stocks and relates the behavior to the possible seasonality that can be found in once-a-year dividend payment scheme. Chapter 3 explains data used in the paper and how the dividend portfolios are constructed. Chapter 4 contains monthly returns of March dividend stocks and December dividend stocks and tests whether seasonal monthly returns over market returns exist using one-period Sharpe-Linter CAPM. Chapter 5 focuses on the implication of the finding in terms of portfolio strategy. Finally, chapter 6 provides conclusion and future research directions.

II. Dividend payment and stock prices

Finance theory says that stock prices equal the rationally expected or optimally forecasted future dividends discounted by a constant discount rate (or variable discount rates). When stock prices change abruptly, the valuation theory interprets that new information is reflected to the pricing, affecting either the future dividend estimates or riskiness of the future dividends, so that market corrects prices accordingly.

The dividend valuation model is quite simple and theoretically strong, but daily price movement is more than the model dictates. While stock prices revert to the real value in a long-run (the real value here means the stock prices justified by the dividend valuation model), daily stock prices seem to be too volatile to be attributed to actual events. Leroy and Porter (1981) claim that stock prices are too volatile to accord with efficient market concept. Shiller (1981) also discovers that stock price volatility is far too high to be attributed to new information about future real dividends. Such high volatility in equity market implies that estimating the impact of new information on stocks prices is a very challenging job.

In my view, dividend stocks should be distinguished from growth stocks due to the inherent difference. Reflecting the representative characteristics of companies, investors designate companies as growth stocks or dividend stocks. Growth stocks are believed to have large, but uncertain, growth potential so that their stock prices assume large upside potential of future dividends. To finance these growth opportunities, growth stocks tend to pay low or minimal dividends as indicated by Roseeff (1982) and Fama and French (2002). As pricing of growth stocks is formed based on the possibility, their stock prices are more affected by new information and subsequently volatile. The terminology 'dividend stock' is used to designate a company with low growth potential and high payout ratio. As a dividend stock returns large part of incomes to investors and the market expects constant dividend streams from it, the company should have certain and positive cash flows (Lintner (1956) and Chay and Suh (2009)). Due to this stable dividend stream, their stock prices are more linked to near term dividends and less susceptible to market noises. More importantly, investors are more interested in growth stocks in average times than dividend stocks, which is seen from higher valuation level of growth stocks in terms of PE or PEG ratio.

In addition, it should be noted that the dividend investors tend to increase their demands on dividend stocks when dividend season approaches. Dividend investors (both individual and institutional investors) increase their investment on dividend stocks as fiscal year end approaches. Some are buying dividend stocks to obtain dividend incomes and others are just seeking capital gains from their holding period. On the contrary, the attractiveness of dividend stocks diminishes after ex-dividend dates as dividend stocks have low growth potential (which means low expected returns) and investors face many alternative investment opportunities. I would like to call this phenomenon as seasonal demand on dividend stocks.³

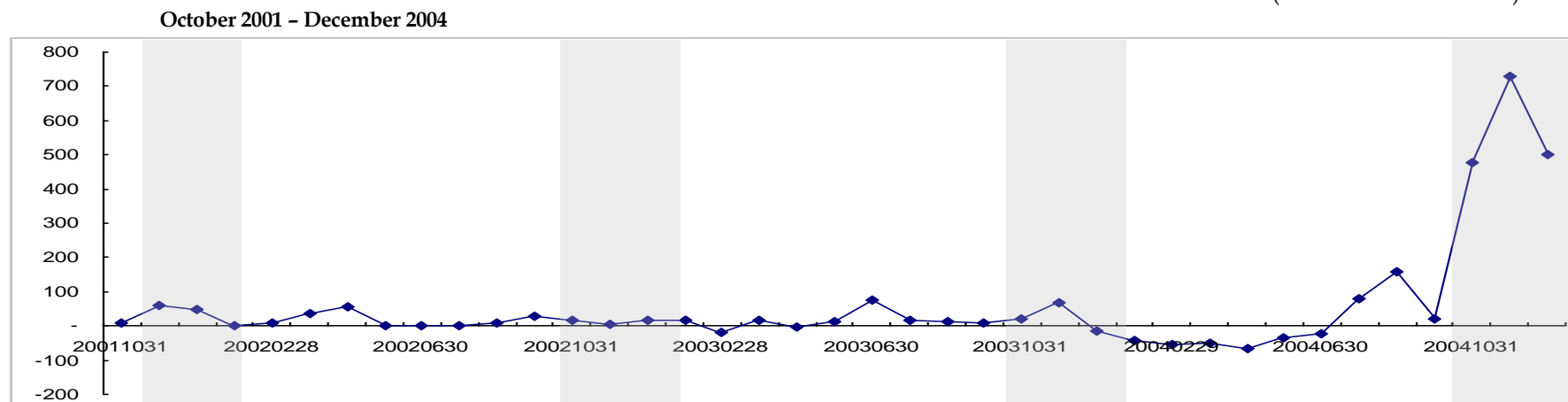
Such seasonal demand on dividend stocks can be partially validated from the monthly net cash inflow to Korean dividend funds (Refer chart 1 below). As the first dividend fund was launched in October 2001, the chart contains the cash flow information of last 8 years. During the period, dividend funds had 6 positive net cash inflows at the end of the year out of the eight years. In seven out of eight years, net cash flow was significantly reduced or turned to the negative at the beginning of the year. As dividend fund market continued to expand from year 2002 and 2004, the fluctuation of the net cash flow was not vivid in early years. However, in year 2004, 2005, 2006, 2007, and 2008, net cash inflows to dividend funds showed the seasonal pattern of the money flow clearly. I think that such a cash flow pattern is caused by the investors' time selective perception that the specific time period is the time to invest in dividend stocks.

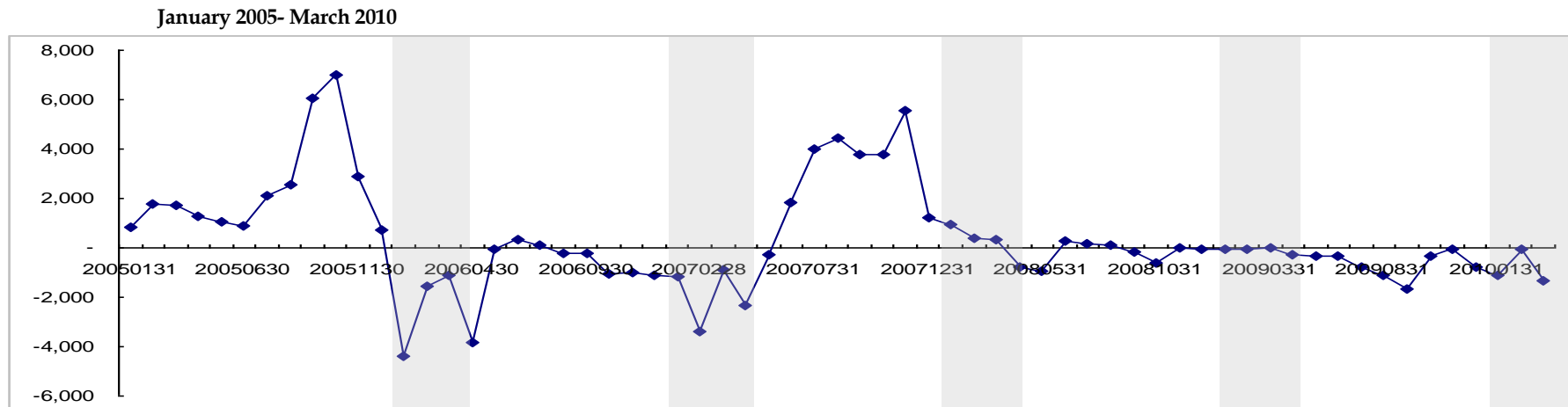
The efficient market theory assumes that seasonal pricing behavior should not appear either in dividend stocks or non-dividend stocks. As market prices are determined by economically reasonable investors and any seasonal anomaly is detected and utilized by arbitragers, no seasonal pattern can last. However, if many dividend investors continue to behave according to their seasonal demand and their influence on the market outweighs that of arbitragers, pricing seasonality can take place in dividend stocks.

³ The seasonal demand argument does not reject the case that there are individual or institutional investors holding dividend stocks not affected by the seasonal demand movement. However, I believe that investors with seasonal demand on dividend stocks outweigh long-term dividend investors so that dividend stocks prices are affected from this overall demand shift.

Figure 1. Monthly net cash flow to dividend funds in Korea

(Unit: 100 Million KRW)





Source: Zeroin, www.zeroin.co.kr

* In October 2001, two dividend funds were first launched in Korea. In the end of 2009, the size of Korean dividend funds is estimated to be 2.74 trillion won and 40 dividend focused funds are operating. The data only focused on public dividend funds which announced dividend investment as their primary investment goal and do not includes private funds aiming dividend investment.

Based on this seasonal behavior of dividend investors, this paper examines whether seasonality exists in Korean equities, separately in March dividend stocks and December dividend stocks. Following is the conjecture tested later in this paper.

- (1) March dividend stocks show the seasonal pattern that they make most of the capital gains during the near months before the ex-dividend date and underperform the market during the months after the ex-dividend date
- (2) December dividend stocks also show the seasonal pattern that they make most of the capital gains during the near months before the ex-dividend date and underperform the market during the months after the ex-dividend date
- (3) Higher dividend yield portfolios have stronger seasonal pattern that they will make more capital gains during the near months before the ex-dividend dates and less capital gains during the months after the ex-dividend dates.
- (4) Investment performance can be improved by holding positive seasonal period of March stocks and subsequently December stocks for the rest of the year

III. Data and portfolio

The data are from KOSPI common and preferred stocks provided by Fnguide Dataguidepro. As Korean financial data started to be maintained systematically after the 1997 crisis, I gathered the information of all common and preferred stocks of KOSPI index from March 1997 to June 2010 and examined this data period. However, during the three years from 1997 to 1999, Korean equity market experienced great volatility, particularly in the case of preferred stocks.¹ Therefore the paper looks at returns on dividend stocks at period from March 1997 to June 2010 as well as from March 2000 to June 2010.²

As new firms are added and delisted from the index, the number of firms considered each year continues to change. It ranges from 661 in March 2000 to 825 in March 2010. As KOSPI listed companies are largely divided into two segments in terms of settlement, the sample was divided to March settling stocks and December settling stocks to see their seasonal pricing pattern separately. Then, March stocks and December stocks were each grouped into six different portfolios of increasing dividend yield at the end of June and March respectively (one group containing all zero-dividend firms, the other five representing the quintiles of the positive yield firms). Constructing portfolios based on dividend yields, I assumed that higher dividend yield groups have more features of dividend stocks and lower dividend yield groups and zero-dividend group have less features of dividend stocks.

June and March were deliberately chosen to avoid the information effect which was proven to exist by Miller and Scholes (1982)³. December stocks have the annual meetings from February to March. If dividends of a year are decided more or less than expected value in annual meetings, they can push up or drive down the prices from January to

¹ The anomaly behavior of preferred stocks is reported by Chay and Mun (2006). They explain that the anomaly behavior of 1998 was caused by limited supply of preferred stocks and price exploitation by the sellers.

² Test result based on the period from March 2000 to June 2010 yields similar seasonality pattern but the seasonal pattern was found weaker than one appeared during the period from March 1997 to June 2010. The Regression result of this period from 2000 to 2010 is found at Table 4.

³ Miller and Sholes (1982) claim that yield related effects found in their test design are traced to biases, introduced by dividend announcement effects using the short-run dividend yield definition.

March. Likewise, March stocks have the annual meetings from May to June that unexpected dividend payment can trigger the price effect from April to June. Such information effect can generate the return biases of dividend stock portfolio if the December settling portfolio is selected at the end of December and March settling portfolio selected at the end of March. Therefore, December portfolios and March portfolios were constructed at the end of March and June respectively.

In detail, March stocks and December stocks were sorted to six portfolios each using the dividend yields derived at the end of June and March respectively. Each dividend yield was calculated by adding all the dividend payments of the last 12 months. As a few companies provide their equity holders with bi-annual or quarterly payments, these payments were added to compare them with others on equal standing. Then, the sum of dividend of the last 12 months was divided by the closing price of the June for March settling stocks and that of March for December settling stocks. Portfolios were kept for a year and monthly portfolio returns were observed. New portfolios were constructed next June for March settling stocks and next March for December settling stocks upon the same procedure.

The return of the portfolio was calculated by averaging the returns of constituent individual stocks, assuming equal weighted portfolio. Monthly return of each stock (at t) was calculated by dividing the closing price of the month (at t) by the closing price of last month (at $t-1$) except March for March settling stocks and December for December settling stocks. On March, monthly returns for March stocks were obtained by dividing closing prices of one day before the ex-dividend date (cum dividend prices) by closing prices of February. On December, monthly returns for December stocks were calculated dividing closing prices of one day before ex-dividend dates (cum dividend prices) by closing prices of November. Such a return calculation was designed to include all the available capital gains before ex-dividend dates that we can see maximum capital gain and price behavior before and after ex-dividend dates. This return calculation deliberately excluded dividend from calculating its annual and monthly return and assumed that monthly return calculated using cum-dividend prices is a good proxy of the return of the month.⁴

KOSPI index was also assumed to be equal weighted in calculating its monthly return. Each monthly return (at t) was calculated by dividing closing index value of the month (at t) by closing index value of last month (at $t-1$).⁵

⁴ The return of the month in March and December is the [closing price of the month (t) - closing price of the month ($t-1$) + dividend]/closing price of the month ($t-1$). In our test design, the return of the month in March and December is calculated as [cum-dividend price - closing price of the month ($t-1$)]/closing price of the month ($t-1$). This return calculation was designed to capture the all the capital movement related to dividend and assumed that both return measures are good proxy to each other.

⁵ As portfolio return was calculated using the closing prices (cum-dividend prices) of the ex-dividend dates on March and December, KOSPI returns for March and December are also needed to be derived using the index (cum-dividend index) of the ex-dividend dates to compare them with portfolio return on an equal standing. Table 8 and Table 9 are the regression result based on this adjustment.

IV. Returns on dividend stocks portfolio

1. Result

The test result shows that seasonal pattern strongly exists in March settling stocks while it is not much found in December settling stocks. March settling stocks made most of the capital gains during the four months from November to February. For highest 20% dividend yield portfolios for the last 13 years, they achieved 24.7% return during the four months from November to February while they ended up producing 28.2% return if held one year from July to June. The tendency was also found when examining the sample for the last 10 years from 2000 to 2009. The highest 20% portfolios returned the average of 22.2% during the four months while they ended up generating 26.8% if held one year from July to June (Refer to Chart 2 and Chart 3). This uneven return distribution shows that the first assumption about the seasonality of March stocks is valid. Later in this chapter, the same portfolios are examined whether they generate abnormal returns after controlling market returns.

Interestingly, the seasonality of monthly return was not perfectly linear to dividend yield. At a 13 year time horizon, group 1, 2, and 3 produced linear return-dividend yield relationship as higher yield group outperformed lower yield group during the four months and the gap between two periods' returns decreases. But group 4, 5, and 6 broke the linearity as they achieved higher four month return than group 3. At a 10 year time horizon, the linearity was also found only in group 1, 2, and 5. Most interestingly, zero dividend group also followed the return distribution pattern of high dividend yield groups, which was not expected from early assumption.

In addition, it should be noted that higher dividend yield group tends to outperform lower dividend yield groups. For a 13 year period, a higher dividend yield group outperformed every lower dividend yield portfolio except group 4 and group 6. Group 4 resulted in 21.1% annual return, 0.9% higher than group 3 portfolio, and group 6 showed non-linearity by producing 18.1% annual return. For a 10 year period, return and yield linearity among non-zero dividend groups is broken as group 3 and group 4 achieved higher returns than group 1 and group 2.

Table 1. Monthly return of March stocks, 1997-2009
From 1997 to 2009

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Sum
Group 1	3.8%	1.4%	-0.1%	-2.7%	7.3%	6.1%	9.7%	1.6%	2.4%	-2.9%	-0.6%	-0.1%	28.2%
Group 2	4.3%	-0.3%	-2.6%	-2.3%	4.1%	4.0%	9.2%	1.2%	3.1%	0.4%	1.1%	1.8%	26.1%
Group 3	0.1%	6.2%	-3.5%	-0.7%	2.7%	-1.7%	10.0%	0.5%	1.8%	-1.0%	3.9%	0.8%	20.2%
Group 4	3.1%	0.8%	-2.8%	-1.4%	7.2%	4.9%	3.7%	2.3%	0.3%	2.1%	0.4%	-0.9%	21.1%
Group 5	-0.4%	0.4%	-3.5%	-2.4%	4.5%	-3.2%	10.6%	1.5%	1.4%	0.4%	-1.8%	1.4%	8.4%
Group 6	7.4%	-0.2%	-2.5%	-1.5%	4.7%	5.0%	9.6%	0.6%	-2.2%	0.8%	-2.0%	-1.9%	18.1%
KOSPI	3.0%	3.1%	-3.0%	-2.5%	4.1%	-2.7%	6.4%	1.7%	2.3%	1.8%	0.6%	-0.3%	15.1%

From 2000 to 2009

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Sum
Group 1	2.7%	0.0%	-0.1%	-5.7%	6.0%	2.6%	7.2%	6.3%	1.9%	0.0%	1.7%	2.1%	26.8%
Group 2	1.4%	1.8%	-2.1%	-6.2%	6.4%	3.0%	7.1%	4.5%	-0.6%	2.5%	2.6%	2.2%	24.1%
Group 3	0.0%	5.5%	-1.5%	-2.3%	5.3%	1.9%	5.2%	4.1%	0.4%	3.2%	5.4%	2.6%	33.7%
Group 4	3.0%	2.1%	-1.8%	-0.9%	8.2%	3.3%	-1.3%	5.2%	-0.5%	5.0%	3.1%	0.3%	28.1%
Group 5	-0.9%	1.6%	-0.4%	-1.4%	3.6%	1.6%	3.6%	3.7%	-0.8%	5.1%	-0.1%	-0.5%	16.0%
Group 6	3.0%	2.1%	-2.0%	-5.0%	3.0%	4.1%	6.7%	4.4%	-3.8%	2.9%	-0.1%	1.3%	17.3%
KOSPI	0.8%	3.0%	-1.5%	-3.0%	4.2%	-0.8%	3.1%	3.7%	1.0%	2.1%	2.5%	0.8%	16.7%

Figure 2. Return distribution of March stocks, 97-2009

Unit: Percentage

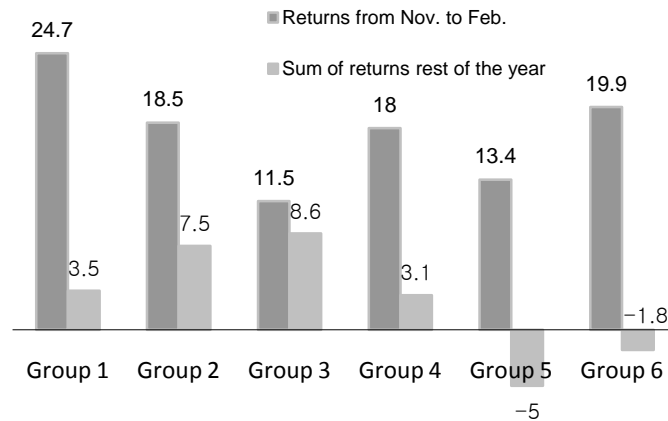
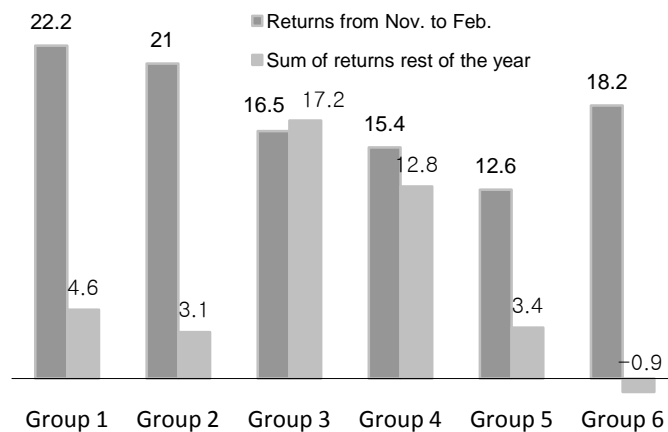


Figure 3. Return distribution of March stocks, 00-2009

Unit: Percentage



December stocks did not reveal strong seasonal pattern as much as it was vivid in March stocks. They did not generate large capital gains during the near months before the ex-dividend date and just provide random return distribution which is not quite different from market return. However, it should be noted that high dividend yield groups return lower (negative returns in 10 year time horizon) monthly returns in January. While January effect exists in Korean markets as indicated by Choe (1994) and Kim (2008), they largely underperformed market in January in line with our second assumption.¹ Therefore, December stocks are found less seasonal than March stocks as they did not produce characteristic accumulated returns near to ex-dividend dates. But they also present seasonality in a sense that high dividend yield groups highly underperform the market in

¹ Choe (1994) finds the January effect of KOSPI enlisted companies using the data from 1975 to 1993 and Kim (2008) indicates the January effect of KOSPI stocks using the data from 1994 to 2002.

January. Later in this chapter, the same portfolios are examined whether they generate abnormal returns which exceed their risk level.

To analyze the relation between risk-adjusted returns and dividend yields, abnormal returns are estimated for each portfolio relative to one-period Sharpe-Linter CAPM. In order to see the monthly seasonal effects, I estimate the following model:

$$(R_{pt} - R_{ft}) = \Sigma(D_{pt})\alpha_{pt} + \beta_p (R_{mt} - R_{ft}) + \epsilon_{pt}; \quad p=1,2,3,4,5,\text{and } 6; t=1,2,3,\dots, \text{and } 12$$

where R_{pt} = rate of return for portfolio p in month t , R_{mt} = rate of return for equal weighted KOSPI index in month t , and R_{ft} is the risk-free interest rate in month t . I also include 12 dummy variables for every month which return 1 for each month and 0 for other 11 months. If there is a monthly seasonality that Sharpe-Linter model cannot explain, statistically significant α_{pt} would be obtained.

In order to confirm the seasonality of the risk-adjusted returns, I estimated abnormal return of each month using the one-period Sharpe-Linter CAPM. Most interesting result is that March portfolios yielded the positive abnormal returns in December in four groups - group 1, group 2, group 4, and group 6 - (Refer to Table 2) While they outperformed the index from November to February in risk unadjusted returns, only December is found to be seasonal in terms of risk-adjusted return. Instead of December seasonality, group 3 and group 5 are found to be January seasonal, but the January seasonality of group 3 and group 5 is hard to be distinguished from the previously known January effect. Interestingly, December seasonality was not confined to high dividend yield groups, including lowest dividend yield group as well as zero dividend group. Group 4 and group 6 each shows seasonality in August and July.

In addition, it should be noted that five out of six March portfolios returned negative coefficients in April. While they failed to reject the null in a 13 year time horizon, these consistent negative April coefficients revealed the seasonal tendency after ex-dividend dates. It is more vivid when they are compared to the positive April coefficients of the December stocks.

The seasonality of March stocks was found weakened during the 10 year time horizon from 2000 to 2009 (Refer to Table 3). Group 1 and group 2 can not reject the null hypothesis that their December return is same to December return of KOSPI in a 95% confidence level. Instead of December seasonality, they returned risk-adjusted positive returns in January. However, it should be noted that group 1 produced statistically significant negative return in April with its coefficient of -0.044. In the same time horizon, group 4 and 6 maintained their December seasonality in a confidence level of 95 percent.

Table 2. Regression table for March settling stocks and December stocks, 1997 – 2009

March stocks	β_p	$\alpha p1$	$\alpha p2$	$\alpha p3$	$\alpha p4$	$\alpha p5$	$\alpha p6$	$\alpha p7$	$\alpha p8$	$\alpha p9$	$\alpha p10$	$\alpha p11$	$\alpha p12$
Group 1	1.380	0.027	-0.003	-0.012	-0.044	-0.004	0.001	-0.003	-0.025	0.042	0.008	0.042	0.134
	15.06	0.78	-0.09	-0.35	-1.27	-0.13	0.04	-0.08	-0.72	1.20	0.23	1.22	3.88
Group 2	1.157	0.036	-0.006	0.005	-0.001	0.012	0.019	0.009	-0.037	0.010	0.010	0.008	0.076
	17.43	1.43	-0.26	0.21	-0.03	0.48	0.75	0.36	-1.47	0.38	0.40	0.32	3.04
Group 3	1.0515	0.0593	-0.0125	-0.0074	-0.0165	0.0426	0.0233	-0.0260	0.0656	-0.0033	0.0356	-0.0224	0.0123
	14.97	2.21	-0.47	-0.28	-0.62	1.61	0.88	-0.98	2.47	-0.12	1.34	-0.84	0.47
Group 4	0.9795	-0.0163	0.0068	-0.0202	0.0130	0.0076	-0.0073	0.0077	-0.0219	0.0057	0.0144	0.0312	0.0792
	15.250	-0.666	0.282	-0.833	0.538	0.314	-0.301	0.316	-0.901	0.235	0.595	1.278	3.269
Group 5	1.049	0.069	-0.004	-0.011	-0.008	-0.016	0.015	-0.033	-0.028	0.000	0.010	-0.006	0.006
	14.91	2.56	-0.14	-0.42	-0.30	-0.60	0.56	-1.23	-1.07	0.00	0.36	-0.22	0.24
Group 6	1.6194	0.0192	-0.0181	-0.0551	-0.0098	-0.0186	-0.0140	0.0657	-0.0014	0.0223	0.0404	0.0099	0.1091
	20.12	0.63	-0.60	-1.82	-0.32	-0.61	-0.46	2.16	-0.05	0.73	1.33	0.32	3.59

Dec. stocks	β_p	$\alpha p1$	$\alpha p2$	$\alpha p3$	$\alpha p4$	$\alpha p5$	$\alpha p6$	$\alpha p7$	$\alpha p8$	$\alpha p9$	$\alpha p10$	$\alpha p11$	$\alpha p12$
Group 1	0.967	-0.053	0.006	0.021	0.026	0.011	0.022	-0.007	0.017	0.021	0.015	0.003	0.040
	28.52	-4.10	0.49	1.64	2.04	0.84	1.71	-0.51	1.35	1.61	1.18	0.24	3.16
Group 2	0.838	-0.014	0.011	0.017	0.016	-0.001	0.004	-0.001	-0.014	0.013	-0.009	-0.011	0.010
	28.13	-1.23	0.97	1.53	1.40	-0.12	0.39	-0.11	-1.27	1.18	-0.83	-0.94	0.92
Group 3	0.875	-0.008	0.018	0.013	0.021	-0.020	0.009	-0.013	-0.017	0.015	-0.014	-0.011	0.030
	23.64	-0.59	1.30	0.91	1.50	-1.42	0.64	-0.92	-1.19	1.09	-0.98	-0.80	2.14
Group 4	0.938	-0.002	0.010	0.017	0.003	-0.007	0.002	-0.014	-0.027	0.013	-0.024	-0.005	0.065
	17.17	-0.12	0.48	0.85	0.16	-0.35	0.09	-0.69	-1.29	0.65	-1.19	-0.22	3.17
Group 5	0.876	0.008	-0.004	-0.006	0.004	-0.008	-0.001	-0.012	0.004	0.006	-0.013	0.012	0.004
	29.40	0.72	-0.39	-0.52	0.34	-0.70	-0.10	-1.05	0.36	0.52	-1.17	1.07	0.33
Group 6	1.129	0.020	0.000	0.000	0.002	0.004	0.014	0.003	0.025	-0.002	-0.002	0.025	0.011
	36.92	1.71	-0.01	0.01	0.14	0.31	1.22	0.28	2.18	-0.17	-0.14	2.16	0.92

The first row of the table is the estimate of β_p and $\alpha_{pt}(t=1,2,\dots,12)$ and the second row is the t-statistic of each estimate

Table 3. Regression table for March settling stocks and December stocks, 2000 – 2010

March stocks	β_p	α_{p1}	α_{p2}	α_{p3}	α_{p4}	α_{p5}	α_{p6}	α_{p7}	α_{p8}	α_{p9}	α_{p10}	α_{p11}	α_{p12}
Group 1	1.175	0.057	0.016	0.014	-0.044	-0.013	0.016	0.017	-0.037	0.018	-0.022	0.022	0.037
	13.74	2.59	0.74	0.64	-2.01	-0.59	0.75	0.79	-1.69	0.80	-0.99	0.99	1.67
Group 2	1.244	0.055	-0.005	-0.009	-0.019	-0.006	0.017	0.005	-0.019	0.000	-0.021	0.018	0.041
	14.09	2.44	-0.20	-0.40	-0.83	-0.28	0.77	0.23	-0.85	0.01	-0.95	0.77	1.82
Group 3	1.3798	0.0331	-0.0133	0.0011	-0.0189	0.0206	0.0246	-0.0095	0.0147	0.0116	0.0193	0.0040	0.0321
	15.79	1.47	-0.59	0.05	-0.84	0.91	1.10	-0.43	0.65	0.52	0.86	0.18	1.43
Group 4	1.3076	-0.0438	-0.0004	-0.0091	0.0025	0.0004	-0.0014	0.0287	-0.0173	0.0075	0.0338	0.0375	0.0468
	15.17	-1.98	-0.02	-0.41	0.11	0.02	-0.06	1.30	-0.78	0.34	1.53	1.68	2.12
Group 5	1.124	0.014	-0.009	-0.010	0.009	-0.029	-0.010	-0.013	-0.018	0.016	0.024	-0.006	0.025
	13.87	0.67	-0.44	-0.47	0.42	-1.39	-0.47	-0.60	-0.84	0.75	1.14	-0.30	1.21
Group 6	1.3419	0.0420	-0.0092	-0.0407	-0.0193	-0.0344	0.0113	0.0236	-0.0199	0.0031	-0.0070	-0.0153	0.0559
	16.73	2.03	-0.44	-1.98	-0.93	-1.67	0.55	1.15	-0.96	0.15	-0.34	-0.74	2.72

Dec. stocks	β_p	α_{p1}	α_{p2}	α_{p3}	α_{p4}	α_{p5}	α_{p6}	α_{p7}	α_{p8}	α_{p9}	α_{p10}	α_{p11}	α_{p12}
Group 1	0.784	-0.041	0.023	0.024	0.027	0.017	0.004	0.004	0.009	0.023	0.004	0.011	0.033
	17.77	-3.53	2.00	2.06	2.34	1.45	0.38	0.33	0.80	1.97	0.33	0.92	2.88
Group 2	0.891	-0.027	0.015	0.025	0.007	0.001	-0.001	0.004	-0.013	0.019	0.001	-0.001	0.028
	27.23	-3.08	1.70	2.91	0.78	0.16	-0.15	0.47	-1.52	2.20	0.11	-0.13	3.26
Group 3	0.955	-0.019	0.011	0.021	0.009	-0.019	0.000	-0.008	-0.010	0.014	0.004	-0.004	0.017
	29.69	-2.25	1.34	2.45	1.07	-2.24	-0.04	-0.97	-1.16	1.64	0.43	-0.50	1.97
Group 4	1.000	-0.013	-0.002	0.023	-0.008	-0.010	0.001	-0.009	-0.016	0.009	-0.004	0.000	0.009
	33.78	-1.69	-0.31	2.95	-0.97	-1.29	0.13	-1.20	-2.06	1.20	-0.45	-0.06	1.14
Group 5	0.967	-0.003	-0.012	0.003	0.001	-0.006	-0.010	-0.015	-0.014	0.011	0.000	0.011	0.004
	33.16	-0.43	-1.61	0.40	0.12	-0.78	-1.36	-1.92	-1.82	1.39	-0.04	1.42	0.46
Group 6	1.153	0.025	-0.004	0.002	0.006	-0.001	0.021	0.004	0.014	-0.002	-0.002	0.017	-0.010
	24.02	1.99	-0.32	0.15	0.44	-0.08	1.70	0.28	1.12	-0.19	-0.14	1.34	-0.80

The first row of the table is the estimate of β_p and $\alpha_{pt}(t=1,2,\dots,12)$ and the second row is the t-statistic of each estimate

December portfolios also presented December seasonality in group 1, group 3, and group 4 in a 13 year time horizon. (Refer to Table 2) Interestingly, four highest dividend yield groups produced negative coefficients in January and group 1 returned risk-adjusted negative abnormal return in January. Group 1 was found to be seasonal in April and group 6 seasonal in August and November.

For a 10 year time horizon, the regression result becomes more complex. December positive seasonality is found in group 1 and group 2 and negative January seasonality is found in group 1, group 2, and group 3. Compared to the 13 year time frame, seasonal tendency in December and January is more focused on highest dividend yield groups, as they are found only in group 1, 2, and 3. In addition, group 1 is found to be seasonal in February, March, and April and group 2, 3, and 4 are found to have positive March seasonality.

2. Interpretation

The most interesting aspect of the result is the accumulation of returns of March stocks near to their fiscal year end and their strong December seasonality. The monthly returns of December stocks do not show such a particular return distribution of March stocks but they also revealed the seasonal effect as their January return is much lower than the market index. The negativity of January return was profound in high dividend yield December groups.

At chapter 2, the author explains that seasonality of dividend stock returns can be caused by the seasonal pattern of demand. Increased demand of dividend stocks at the year-end can push up the dividend stocks if the surge is available in terms of dividend aspect. But December stocks and March stocks can differ in pricing this seasonal demand to their stock prices. Though the seasonal demand can push up the prices of December stocks and March stocks, December stocks receive less advantage than March stocks. As three quarters of the year already passed, their prices priced in operating performances of the last three quarters and investors face less uncertainty in forecasting the dividends of December stocks than those of March stocks. Therefore, December stocks prices are less likely to be undervalued in the aspect of dividend to come. However, March stocks just passed two quarters and investors face greater uncertainty in forecasting their dividend of the year than those of December stocks. If so, March stocks' prices are more likely to have room that dividend factor can drive up their stock prices. Large stock returns of March stocks from November to February and December seasonality can be understood in this aspect.

In addition, dividend payment structure can explain the significant capital gain of March dividend stocks. As confirmed in table 1, March dividend stocks pay 99.7% of their total dividends in March while December dividend stocks provide 94.3% of their total dividends in December. As March stocks strictly follow the once-a-dividend payment scheme, they provide higher incentive for investors to have seasonal demand on March stocks. In non-dividend season, investors will find these stocks less interesting to buy but, when they start to focus dividends in their investment decision, dividend stocks will receive higher attention from dividend investors. In this sense, March stocks prices are more susceptible to the seasonal demand.

Seasonality of dividend stocks is also found in January and April. While December stocks did not reveal particular return distribution like March stocks, their January return significantly underperformed the market as expected from investors' behavioral pattern. At a 13 year period, group 1 of December stocks returns statistically significant, negative coefficient at a confidence level of 99%. At a 10 year period, the negative return of January was detected in three highest dividend yield groups. This decreasing demand after ex-dividend date is also detected in March stocks in April. At a 13 year period, the April dummy variable failed to reject the null hypothesis while many of them returned the negative coefficients. At a 10 year period, group 1 of March stocks returns statistically significant, negative coefficient at a confidence of 95%. This negative January and April return detected in highest dividend yield groups are the evidence of seasonal demand of dividend stocks.

The seasonal pattern found in non-dividend group of March stocks was not expected from this behavioral aspect. While I can not provide confident answer to this phenomenon, this zero dividend March stocks tend to follow the price movement of dividend paying

peers in same industry. As their peers in a same industry experience capital gains, their prices can go up together to reflect peer valuation.

V. Portfolio strategy

Table 1 and Table 2 indicate that higher dividend yield portfolios tend to outperform the lower dividend yield portfolios. In a 10 year time horizon, group 3 and group 4 yielded higher returns than group 1 in March settling stocks as an exception. Zero dividend yield group presented non-linear return payoff, as it achieved higher annual return than low dividend yield groups. But group 6 always yielded lower annual return than the highest dividend yield group. Therefore, it is expected that higher return will be available by investing highest dividend yield portfolio for a year than by holding the market portfolio for the same period. The recent experience of the last 13 years says that an investor can expect 28.2% from high dividend yield March stocks and 28.8% return from December stocks, both outperforming the equal weighted KOSPI index by more than 10%.

However, the seasonality of March and December stocks imply that additional returns can be captured if this seasonal pattern is utilized in portfolio management. As March stocks accumulate large capital gains from November to February than December settling stocks, it is advised to construct portfolio based on high dividend yield March stocks during this period. At the end of February, March stocks' portfolio is advised to be shifted to high dividend yield December stocks for the rest of the year from March to October to reap the capital gains from high dividend yield December stocks.

This strategy does not hold dividend stocks until it receives dividends from component stocks in two reasons. First, as dividend stocks reflect their expected dividend in their pricing, selling cum-dividend stocks is essentially equal to receiving dividends from these stocks. Second, capital gain seeking is actually a better option than dividend income seeking due to the tax structure in Korea. Korean tax regime imposes no tax on capital gains but 15.4% tax on dividend incomes that capital gain seeker can avoid the dividend tax by selling cum-dividend stocks.²

As long as this anomaly is continued, an investor can benefit from following above investment strategy. By holding high dividend yield March stocks for four months from November to February, he can expect 22.2% capital gains from this portfolio. For the remaining months of the year, he can make additional 15.9% capital gains by holding high dividend yield December stocks. Combining these figures, he can reap 38.1% return by shifting his portfolio from high dividend yield March stocks to high dividend yield December stocks. The expected return of 38.1% is much higher than one expected³ from holding highest dividend yield stocks an year without considering this seasonality.

² Korean tax regime imposes 15.4 percent as dividend tax in case a dividend beneficiary held the stock less than a year. If an investor holds a dividend stock more than a year and receives dividend from the stock, the dividend tax can be exempted up to KRW 40 Million of annual interest and dividend income. This exemption rule is adapted to promote long-term investment culture in 2007. If his annual interest and dividend income exceeds KRW 40 Million, he has to pay the dividend tax of 15.4% on that extra amount. However, no tax is applied to capital gains.

³ Expected returns used in this paragraph are based on the monthly return movement of past 10 years.

VI. Conclusion

This paper reports strong seasonality of March dividend stocks and comparatively weak seasonal pattern of December dividend stocks. Earlier studies indicated seasonality of dividend stocks in January in the US and January and April in UK, but this seasonality appeared after the ex-dividend dates and was not deemed caused by investors' seasonal demand of dividend stocks. On the contrary, in Korean equity market, high dividend yield stocks yielded large positive capital gains at near months before the ex-dividend dates and underperformed the market after ex-dividend dates. This seasonal return distribution was found particularly strong and vivid in March stocks but relatively weak in December stocks. But December stocks also illustrated the trait of seasonality as high dividend December portfolios returned negative returns in January, right after ex-dividend dates. This finding was consistent both in a 13 year time horizon and a 10 year time horizon.

This seasonality is thought to be caused by the seasonal demand of dividend stocks. As the fiscal year end approaches, investors become more attracted to high yield dividend stocks. As dividend factor weighs more than before at the fiscal year end, investors increase their position in dividend stocks and this pushes up the prices. After the ex-dividend dates, dividend factor becomes a less important factor in investment decision making and the investors reduce their demand on dividend stocks. As an evidence of this seasonal demand, the author provides monthly net cash flows to the Korean funds classified as dividend-seeking or dividend-oriented funds.

The author believes that sizable dividend payment due to the once-a-year dividend payment scheme is the inducing condition and that seasonal behavioral pattern of dividend investors is the necessary condition of the seasonality found in this paper. Therefore, it is cautiously expected that the seasonal pattern will be weakened if many Korean firms pay their dividends more frequently. For the further research, the author is interested in looking at seasonality of dividend stocks in Asian equity markets where dividend is paid in once-a-year scheme.

Regarding the differing seasonality pattern of December stocks and March stocks, the author believes that the timing of seasonal demand is the major cause. When investors were attracted to dividend factor at fiscal year end, December stocks already priced in most of their annual business results during the past three quarters and there is less room in their pricing to add incoming dividend factor. Meanwhile, March stocks have passed two quarters and dividend factor can play larger role in their pricing relatively.

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Appendix

Table 1. Dividend payment distribution of March stocks and December stocks

Unit: Percentage

Dividend distribution is calculated by dividing cash dividend paid at certain month by the total cash dividend provided during a year

Dividend distribution of March dividend stocks

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
March dividend (%)	100	100	99.8	99.8	99.6	99.5	99.5	99.5	99.5	99.5	99.6	99.7	99.7
June dividend (%)	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sept. dividend (%)	0	0	0.2	0.2	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3
Dec. dividend (%)	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Dividend distribution of December dividend stocks

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
March dividend (%)	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.2	1.0
June dividend (%)	0	0	1.3	2.6	4.0	3.7	3.7	7.0	7.3	6.7	5.6	5.0	4.4
Sept. dividend (%)	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.2	0.2	0.2
Dec. dividend (%)	100	100	98.7	97.4	96.0	96.3	96.3	93.0	92.5	93.0	92.8	93.6	94.3

Source: The data is obtained from Fnguide Dataguide Pro

Table 2. Monthly return of March settling portfolios, 1997-2009

Group 1	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	Jun	Sum
1997	-9%	-7%	13%	-17%	-34%	-10%	43%	-25%	-4%	-18%	-10%	-16%	-70%
1998	33%	-3%	-4%	26%	116%	142%	2%	-2%	7%	31%	-15%	-14%	728%
1999	3%	34%	-8%	22%	-2%	-23%	14%	-10%	9%	-36%	2%	12%	-5%
2000	2%	-2%	-5%	-21%	-4%	-9%	70%	9%	0%	1%	12%	-3%	33%
2001	-8%	3%	-2%	9%	42%	2%	13%	15%	7%	-20%	0%	-3%	59%
2002	-2%	6%	-11%	-2%	0%	-10%	-4%	0%	-6%	9%	3%	10%	-10%
2003	3%	-1%	-6%	-3%	-2%	3%	1%	6%	7%	-2%	-14%	2%	-8%
2004	4%	1%	9%	0%	0%	16%	18%	23%	0%	-6%	5%	16%	121%
2005	10%	0%	22%	3%	36%	9%	-8%	-1%	-3%	3%	-10%	-6%	59%
2006	2%	4%	6%	0%	12%	-2%	-4%	7%	0%	11%	21%	11%	92%
2007	11%	-2%	-2%	-2%	-7%	4%	-9%	9%	-3%	2%	-2%	-6%	-9%
2008	-4%	-8%	-7%	-31%	-4%	10%	15%	-6%	15%	8%	7%	0%	-13%
2009	9%	0%	-1%	-3%	-1%	6%	-1%	2%	4%	-2%	-2%	3%	14%
13 yrs	4%	1%	0%	-3%	7%	6%	10%	2%	2%	-3%	-1%	0%	28%
10 yrs	3%	0%	0%	-6%	6%	3%	7%	6%	2%	0%	2%	2%	27%
Group 2	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	Jun	Sum
1997	7%	-12%	0%	-10%	-45%	7%	43%	-7%	23%	-20%	-12%	-12%	-50%
1998	32%	-15%	-8%	39%	68%	55%	1%	-8%	23%	52%	-7%	7%	555%
1999	7%	7%	-6%	12%	-1%	-25%	8%	-12%	4%	-32%	9%	9%	-29%
2000	5%	-11%	-8%	-29%	-1%	-3%	73%	2%	-16%	12%	16%	-5%	7%
2001	-9%	0%	-7%	10%	24%	7%	15%	15%	14%	-22%	-5%	-4%	32%
2002	-2%	11%	-11%	6%	4%	-13%	-7%	3%	-8%	8%	11%	9%	8%
2003	2%	8%	-13%	5%	2%	-2%	4%	5%	1%	1%	-8%	1%	6%
2004	-1%	4%	7%	0%	4%	6%	18%	16%	-3%	-6%	7%	21%	97%
2005	13%	3%	25%	-2%	33%	11%	-6%	-4%	-8%	14%	-11%	-3%	72%
2006	-4%	13%	3%	-2%	15%	2%	-3%	6%	2%	6%	18%	6%	80%
2007	14%	-5%	-4%	-6%	-5%	9%	-9%	9%	-3%	0%	5%	-5%	-4%

2008	-9%	-4%	-7%	-30%	-4%	12%	10%	-7%	16%	20%	5%	0%	-10%
2009	8%	1%	0%	-4%	-3%	5%	-4%	1%	3%	-1%	-7%	4%	2%
13 yrs	4%	0%	-3%	-2%	4%	4%	9%	1%	3%	0%	1%	2%	26%
10 yrs	1%	2%	-2%	-6%	6%	3%	7%	5%	-1%	2%	3%	2%	24%
Group 3	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	Jun	Sum
1997	0%	-4%	-4%	-11%	-23%	-30%	71%	-20%	0%	-24%	-16%	-10%	-66%
1998	5%	13%	-2%	17%	20%	16%	8%	-10%	11%	14%	18%	-3%	168%
1999	-3%	18%	-23%	12%	-8%	-19%	12%	0%	10%	-27%	-2%	-1%	-35%
2000	-7%	11%	-7%	-19%	-9%	-5%	64%	-2%	-15%	16%	33%	6%	50%
2001	-12%	7%	-7%	10%	31%	3%	20%	6%	14%	-15%	3%	-14%	40%
2002	0%	14%	-18%	8%	5%	-15%	-2%	2%	-2%	10%	10%	7%	16%
2003	-3%	12%	-10%	5%	1%	1%	5%	3%	2%	-2%	-6%	-2%	4%
2004	-4%	6%	6%	4%	8%	10%	18%	28%	-6%	-6%	17%	27%	163%
2005	9%	12%	36%	-4%	34%	10%	-9%	-3%	-7%	5%	-8%	-3%	82%
2006	4%	9%	-2%	2%	8%	-3%	-11%	10%	-1%	16%	15%	17%	80%
2007	13%	-8%	-1%	12%	-11%	8%	-20%	4%	-3%	1%	-2%	-8%	-19%
2008	-5%	-9%	0%	-29%	-2%	10%	8%	-3%	22%	13%	0%	-2%	-8%
2009	8%	5%	-3%	-4%	-3%	4%	-1%	0%	4%	0%	-2%	4%	13%
13 yrs	0%	6%	-3%	-1%	3%	-2%	10%	1%	2%	-1%	4%	1%	20%
10 yrs	0%	6%	-1%	-2%	5%	2%	5%	4%	0%	3%	5%	3%	34%
Group 4	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	Jun	Sum
1997	-4%	-2%	-6%	-24%	-15%	17%	38%	-7%	-6%	-25%	-18%	-20%	-61%
1998	24%	-5%	-5%	22%	37%	46%	16%	-3%	21%	36%	-5%	-4%	368%
1999	-7%	-3%	-7%	-1%	-4%	-22%	14%	-10%	-3%	-21%	0%	13%	-45%
2000	-3%	9%	4%	-11%	1%	16%	19%	5%	-6%	7%	23%	1%	75%
2001	-17%	-2%	-16%	18%	29%	8%	8%	17%	7%	-13%	-5%	-11%	11%
2002	5%	11%	-20%	3%	8%	-19%	-8%	3%	-6%	19%	9%	3%	-1%
2003	-2%	5%	-12%	-1%	2%	-3%	6%	0%	-5%	1%	-11%	1%	-19%
2004	-4%	10%	3%	0%	9%	6%	9%	17%	-6%	-7%	10%	15%	75%
2005	16%	-4%	33%	3%	44%	7%	-4%	-4%	-9%	15%	-	-7%	83%

											11%		
2006	-2%	9%	1%	0%	6%	1%	-8%	7%	4%	15%	29%	11%	98%
2007	41%	-3%	-4%	27%	-15%	16%	-26%	7%	-5%	1%	2%	-9%	16%
2008	-7%	-13%	3%	-31%	13%	2%	2%	-2%	19%	17%	0%	-1%	-9%
2009	13%	3%	0%	-5%	-3%	3%	-4%	3%	6%	1%	-6%	4%	15%
13 yrs	3%	1%	-3%	-1%	7%	5%	4%	2%	0%	2%	0%	-1%	21%
10 yrs	3%	2%	-2%	-1%	8%	3%	-1%	5%	-1%	5%	3%	0%	28%
Group 5	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	Jun	Sum
1997	-3%	5%	-11%	-34%	-8%	-44%	106%	2%	4%	-26%	-21%	-11%	-65%
1998	17%	-7%	-18%	30%	23%	34%	8%	-6%	14%	17%	3%	19%	215%
1999	-9%	-9%	-9%	-2%	10%	-26%	18%	-12%	10%	-25%	-3%	17%	-41%
2000	-17%	8%	4%	-15%	15%	5%	30%	7%	-10%	24%	11%	-5%	55%
2001	-11%	-2%	-11%	31%	5%	-2%	5%	2%	7%	-2%	-12%	-6%	-5%
2002	-1%	3%	-6%	8%	-3%	-12%	-4%	-1%	-9%	5%	8%	7%	-8%
2003	1%	6%	-7%	-2%	-2%	-1%	3%	11%	-1%	-3%	-10%	-1%	-8%
2004	-5%	10%	3%	1%	5%	10%	34%	8%	-10%	-5%	11%	7%	84%
2005	7%	-2%	31%	-5%	27%	2%	-2%	-2%	-5%	3%	-10%	-2%	41%
2006	-3%	8%	4%	3%	10%	-1%	-3%	6%	1%	9%	16%	9%	73%
2007	24%	2%	1%	11%	-16%	4%	-18%	7%	-4%	6%	-4%	-12%	-6%
2008	-13%	-14%	-11%	-27%	5%	7%	5%	0%	25%	17%	3%	0%	-15%
2009	18%	0%	-6%	-7%	-5%	6%	-4%	1%	3%	3%	-8%	0%	-2%
13 yrs	0%	0%	-3%	-2%	5%	-3%	11%	2%	1%	0%	-2%	1%	8%
10 yrs	-1%	2%	0%	-1%	4%	2%	4%	4%	-1%	5%	0%	-1%	16%
Group 6	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Ma y	Jun	Sum
1997	-2%	-6%	-3%	-10%	-40%	-20%	79%	-22%	-6%	-27%	-19%	-27%	-78%
1998	86%	-17%	0%	42%	126%	90%	-4%	-3%	23%	42%	-11%	-9%	1135%
1999	3%	1%	-9%	7%	0%	-17%	0%	-6%	-5%	-21%	6%	2%	-35%
2000	6%	-2%	-3%	-15%	-9%	-7%	51%	0%	-15%	5%	20%	-5%	11%
2001	-10%	1%	-16%	13%	43%	1%	21%	2%	1%	-18%	-5%	-13%	6%

2002	4%	4%	-14%	0%	0%	-15%	-5%	-1%	-10%	6%	1%	10%	-21%
2003	0%	6%	-11%	-1%	-3%	6%	9%	9%	-1%	1%	-11%	-3%	0%
2004	-6%	10%	4%	-5%	9%	23%	10%	26%	-6%	-8%	6%	23%	114%
2005	14%	-2%	24%	-1%	19%	17%	14%	-1%	-10%	7%	-10%	-7%	72%
2006	1%	-2%	2%	-2%	6%	-2%	-7%	11%	-2%	8%	16%	16%	49%
2007	26%	13%	6%	12%	-18%	6%	-15%	4%	-13%	7%	5%	-1%	25%
2008	-10%	-9%	0%	-37%	-1%	9%	8%	-3%	19%	25%	-7%	-4%	-24%
2009	11%	4%	-6%	-4%	-4%	9%	-6%	0%	4%	2%	-10%	3%	2%
13 yrs	7%	0%	-3%	-2%	5%	5%	10%	1%	-2%	1%	-2%	-2%	18%
10 yrs	3%	2%	-2%	-5%	3%	4%	7%	4%	-4%	3%	0%	1%	17%

Table 3. Monthly return of December settling portfolios, 1997-2009

Group 1	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Sum
1997	5%	4%	4%	2%	-1%	-3%	-20%	-30%	-24%	41%	-11%	-3%	-43%
1998	-16%	-17%	-14%	14%	-3%	-1%	28%	63%	36%	-2%	-11%	27%	107%
1999	29%	1%	26%	6%	33%	-17%	7%	-5%	-12%	-9%	-2%	10%	67%
2000	-13%	-3%	6%	-4%	8%	-3%	-8%	2%	4%	3%	3%	-5%	-11%
2001	9%	15%	7%	-7%	4%	-1%	10%	14%	6%	7%	16%	15%	144%
2002	-8%	-3%	-4%	-2%	8%	-4%	3%	4%	0%	-6%	0%	-3%	-14%
2003	13%	8%	4%	2%	9%	-3%	6%	3%	4%	-1%	2%	1%	57%
2004	4%	-3%	0%	0%	6%	6%	7%	7%	0%	9%	29%	-2%	78%
2005	2%	2%	9%	8%	-1%	16%	3%	10%	-2%	-8%	-2%	3%	45%
2006	6%	-5%	-4%	0%	3%	3%	0%	11%	-1%	-5%	3%	6%	20%
2007	10%	17%	0%	15%	-2%	3%	-6%	-3%	0%	-11%	7%	-5%	23%
2008	4%	3%	-5%	-5%	-4%	-4%	-26%	-3%	11%	0%	-2%	14%	-21%
2009	20%	9%	0%	6%	5%	1%	-3%	-1%	7%	-6%	2%	5%	53%
13 yrs	4%	2%	2%	2%	5%	-1%	-1%	4%	1%	0%	2%	4%	29%
10 yrs	4%	4%	1%	1%	3%	1%	-2%	4%	3%	-2%	5%	3%	30%
Group 2	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Sum
1997	12%	3%	-1%	1%	-1%	-5%	-27%	-18%	-29%	51%	-4%	-3%	-34%
1998	-20%	-22%	-8%	18%	3%	-3%	19%	29%	13%	7%	-10%	19%	33%
1999	27%	3%	8%	5%	0%	-11%	-1%	-2%	-13%	-5%	-2%	7%	11%
2000	-13%	-10%	5%	-3%	7%	0%	-8%	3%	-1%	13%	7%	-5%	-9%
2001	3%	13%	4%	-10%	0%	-4%	10%	13%	5%	9%	12%	12%	89%
2002	-14%	-1%	-7%	-2%	5%	-8%	2%	4%	-2%	-7%	1%	-5%	-31%
2003	11%	7%	2%	1%	3%	-3%	3%	3%	4%	-1%	1%	1%	35%
2004	2%	-7%	1%	0%	5%	7%	4%	7%	1%	9%	24%	-3%	57%
2005	-2%	4%	9%	14%	-1%	17%	4%	10%	-1%	-5%	-2%	4%	60%
2006	7%	-6%	-3%	-1%	3%	4%	1%	10%	-1%	-5%	5%	11%	26%
2007	11%	17%	3%	13%	-2%	2%	-4%	-7%	0%	-11%	5%	-3%	21%
2008	6%	4%	-5%	-6%	-7%	-6%	-28%	-2%	10%	3%	-1%	13%	-24%

2009	19%	7%	-1%	7%	4%	-1%	-3%	-3%	8%	-4%	2%	7%	47%
13 yrs	3%	0%	0%	3%	1%	-1%	-3%	3%	-1%	3%	3%	4%	16%
10 yrs	2%	2%	1%	1%	2%	1%	-3%	4%	2%	0%	5%	3%	21%
Group 3	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Sum
1997	12%	2%	1%	1%	-3%	-4%	-30%	-6%	-31%	54%	6%	-6%	-25%
1998	-16%	-23%	-11%	16%	-2%	2%	15%	22%	49%	9%	-8%	18%	64%
1999	28%	-1%	14%	4%	0%	-11%	0%	-4%	-11%	-7%	-3%	10%	14%
2000	-11%	-9%	6%	-7%	10%	1%	-11%	-2%	-4%	15%	7%	-5%	-13%
2001	2%	12%	2%	-11%	-2%	-12%	12%	13%	2%	13%	12%	17%	72%
2002	-12%	-7%	-5%	0%	5%	-11%	2%	6%	-4%	-3%	1%	-6%	-31%
2003	10%	7%	1%	-2%	5%	-4%	3%	1%	5%	-3%	2%	1%	29%
2004	2%	-7%	-1%	-1%	8%	8%	5%	10%	-1%	8%	22%	-3%	57%
2005	-1%	3%	11%	8%	0%	17%	1%	13%	-2%	-4%	-2%	1%	52%
2006	7%	-9%	-4%	-1%	4%	4%	1%	10%	-3%	-5%	3%	7%	13%
2007	11%	17%	4%	15%	-2%	2%	3%	-9%	-1%	-11%	10%	-5%	34%
2008	5%	3%	-5%	-6%	-8%	-3%	-29%	-2%	10%	3%	-2%	15%	-25%
2009	20%	0%	0%	5%	2%	1%	-4%	-2%	8%	-5%	0%	5%	29%
13 yrs	4%	-1%	1%	1%	1%	-1%	-4%	3%	0%	4%	3%	3%	16%
10 yrs	3%	0%	1%	0%	2%	0%	-3%	3%	1%	1%	5%	2%	17%
Group 4	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Sum
1997	7%	-2%	0%	0%	-5%	-7%	-31%	-8%	-30%	53%	0%	2%	-36%
1998	-19%	-19%	-11%	14%	-4%	3%	11%	21%	96%	9%	-10%	19%	103%
1999	30%	6%	4%	9%	-2%	-8%	-3%	6%	-6%	-2%	7%	7%	54%
2000	-16%	-9%	9%	-8%	7%	-4%	-11%	3%	-5%	19%	5%	-6%	-21%
2001	1%	13%	4%	-10%	-3%	-11%	13%	11%	0%	14%	11%	15%	68%
2002	-13%	-5%	-9%	-1%	2%	-11%	2%	4%	-7%	-8%	0%	-7%	-42%
2003	12%	7%	3%	1%	4%	-8%	4%	5%	2%	-2%	1%	1%	34%
2004	0%	-10%	0%	-3%	8%	6%	0%	10%	0%	9%	14%	-2%	34%
2005	-7%	5%	11%	11%	-3%	18%	-1%	11%	0%	-1%	1%	1%	52%
2006	5%	-8%	-5%	-1%	5%	6%	3%	10%	0%	-6%	3%	8%	18%
2007	12%	18%	4%	14%	2%	6%	-2%	-8%	-3%	-10%	8%	-1%	40%

2008	5%	4%	-5%	-6%	-9%	-6%	-31%	0%	10%	7%	-5%	15%	-25%
2009	20%	3%	-3%	5%	4%	2%	-5%	-2%	7%	-6%	1%	6%	35%
13 yrs	2%	0%	0%	2%	0%	-1%	-5%	4%	2%	5%	3%	4%	16%
10 yrs	1%	1%	1%	0%	2%	-1%	-3%	4%	0%	1%	4%	3%	13%
Group 5	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Sum
1997	1%	1%	-1%	1%	-1%	-5%	-27%	-11%	-27%	54%	-1%	-3%	-33%
1998	-19%	-20%	-9%	13%	-4%	-1%	12%	34%	22%	11%	-10%	15%	34%
1999	27%	1%	11%	15%	31%	-16%	5%	3%	-9%	-5%	-1%	4%	75%
2000	-16%	-5%	6%	-11%	11%	-8%	-12%	2%	-7%	27%	4%	-9%	-23%
2001	3%	10%	2%	-9%	-2%	-9%	12%	16%	1%	11%	8%	9%	60%
2002	-10%	-6%	-6%	-2%	3%	-10%	1%	8%	-10%	-2%	-2%	-6%	-36%
2003	12%	8%	2%	3%	3%	-9%	6%	2%	2%	1%	2%	-1%	34%
2004	2%	-5%	-1%	-4%	6%	8%	0%	8%	-1%	10%	10%	-2%	33%
2005	-7%	7%	8%	8%	-4%	17%	0%	14%	2%	-1%	1%	0%	50%
2006	5%	-7%	-5%	-2%	7%	3%	1%	10%	-1%	-8%	2%	5%	7%
2007	9%	16%	1%	14%	0%	8%	0%	-6%	-3%	-10%	5%	-4%	29%
2008	10%	3%	-6%	-7%	-8%	-4%	-30%	3%	8%	3%	-3%	12%	-24%
2009	18%	2%	-2%	6%	2%	2%	-2%	-3%	6%	-5%	1%	7%	34%
13 yrs	2%	0%	0%	2%	3%	-2%	-4%	6%	-2%	5%	1%	2%	13%
10 yrs	2%	2%	0%	-1%	2%	0%	-3%	5%	0%	2%	3%	1%	12%
Group 6	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Sum
1997	11%	0%	-1%	-2%	-2%	-5%	-23%	-25%	-26%	40%	-1%	7%	-36%
1998	-24%	-20%	-21%	20%	5%	-7%	23%	76%	43%	22%	-11%	12%	112%
1999	17%	8%	9%	21%	26%	-14%	4%	-5%	-14%	0%	-4%	13%	64%
2000	-10%	-12%	5%	-2%	40%	-4%	-15%	2%	-7%	31%	9%	-11%	12%
2001	0%	18%	1%	-9%	-1%	-14%	15%	14%	-5%	20%	0%	13%	57%
2002	-8%	2%	-11%	2%	3%	-15%	4%	6%	-11%	-3%	1%	-12%	-37%
2003	11%	6%	7%	-2%	3%	-7%	1%	1%	1%	0%	1%	-1%	23%
2004	7%	-6%	-3%	-4%	10%	2%	2%	5%	-1%	18%	14%	-1%	48%
2005	-5%	6%	15%	22%	-7%	13%	6%	20%	0%	2%	1%	-1%	95%

2006	4%	-7%	-2%	-3%	5%	5%	-1%	6%	-6%	-3%	5%	7%	9%
2007	5%	15%	24%	9%	5%	11%	-4%	13%	-2%	-10%	7%	-5%	85%
2008	3%	5%	-2%	-8%	-11%	-6%	-32%	1%	6%	7%	4%	12%	-26%
2009	28%	5%	-3%	10%	3%	-1%	-4%	-3%	6%	-4%	3%	7%	50%
13 yrs	2%	1%	1%	4%	5%	-4%	-3%	7%	-2%	8%	2%	3%	26%
10 yrs	3%	3%	3%	1%	4%	-2%	-4%	6%	-2%	5%	4%	1%	24%

Table 4. Regression table for March settling stocks and December stocks, 1997 – 2009
(KOSPI index adjusted for ex-dividend dates in March and December)

March stocks	βp	$\alpha p1$	$\alpha p2$	$\alpha p3$	$\alpha p4$	$\alpha p5$	$\alpha p6$	$\alpha p7$	$\alpha p8$	$\alpha p9$	$\alpha p10$	$\alpha p11$	$\alpha p12$
Group 1	1.381	0.027	-0.003	-0.021	-0.044	-0.004	0.001	-0.003	-0.025	0.042	0.008	0.042	0.132
	14.71	0.77	-0.09	-0.60	-1.25	-0.13	0.04	-0.08	-0.71	1.19	0.22	1.20	3.78
Group 2	1.159	0.036	-0.006	-0.002	-0.001	0.012	0.019	0.009	-0.037	0.010	0.010	0.008	0.075
	17.04	1.40	-0.25	-0.09	-0.03	0.48	0.73	0.35	-1.45	0.38	0.40	0.31	2.94
Group 3	1.0593	0.0588	-0.0126	-0.0144	-0.0166	0.0426	0.0233	-0.0263	0.0654	-0.0031	0.0357	-0.0228	0.0112
	14.90	2.19	-0.48	-0.54	-0.62	1.61	0.88	-0.99	2.46	-0.12	1.35	-0.85	0.42
Group 4	0.9763	-0.0161	0.0069	-0.0264	0.0131	0.0076	-0.0073	0.0078	-0.0218	0.0056	0.0143	0.0314	0.0780
	14.769	-0.645	0.278	-1.067	0.530	0.308	-0.296	0.314	-0.880	0.226	0.581	1.260	3.155
Group 5	1.057	0.068	-0.004	-0.018	-0.008	-0.016	0.015	-0.033	-0.029	0.000	0.010	-0.006	0.005
	14.85	2.54	-0.14	-0.68	-0.30	-0.60	0.56	-1.24	-1.07	0.01	0.36	-0.23	0.20
Group 6	1.6235	0.0189	-0.0182	-0.0657	-0.0099	-0.0186	-0.0140	0.0656	-0.0015	0.0225	0.0405	0.0097	0.1072
	19.62	0.61	-0.59	-2.12	-0.32	-0.60	-0.45	2.12	-0.05	0.72	1.31	0.31	3.47

Dec. stocks	βp	$\alpha p1$	$\alpha p2$	$\alpha p3$	$\alpha p4$	$\alpha p5$	$\alpha p6$	$\alpha p7$	$\alpha p8$	$\alpha p9$	$\alpha p10$	$\alpha p11$	$\alpha p12$
Group 1	0.976	-0.053	0.006	0.014	0.026	0.011	0.022	-0.007	0.017	0.021	0.015	0.003	0.039
	28.38	-4.12	0.48	1.13	2.02	0.83	1.71	-0.53	1.32	1.62	1.19	0.21	3.07
Group 2	0.845	-0.014	0.011	0.012	0.016	-0.001	0.004	-0.001	-0.014	0.014	-0.009	-0.011	0.009
	28.04	-1.26	0.96	1.02	1.38	-0.13	0.39	-0.13	-1.29	1.20	-0.81	-0.97	0.84
Group 3	0.880	-0.009	0.018	0.007	0.021	-0.020	0.009	-0.013	-0.017	0.015	-0.014	-0.011	0.029
	23.21	-0.60	1.28	0.49	1.47	-1.40	0.63	-0.92	-1.18	1.08	-0.96	-0.81	2.04
Group 4	0.938	-0.003	0.010	0.011	0.003	-0.007	0.002	-0.014	-0.027	0.013	-0.024	-0.005	0.064
	16.71	-0.12	0.47	0.54	0.16	-0.34	0.09	-0.67	-1.27	0.64	-1.17	-0.21	3.06
Group 5	0.882	0.008	-0.005	-0.012	0.004	-0.008	-0.001	-0.012	0.004	0.006	-0.013	0.012	0.003
	28.85	0.68	-0.40	-1.02	0.32	-0.69	-0.09	-1.05	0.34	0.52	-1.15	1.03	0.24
Group 6	1.140	0.019	0.000	-0.007	0.001	0.004	0.014	0.003	0.025	-0.002	-0.001	0.025	0.009
	36.87	1.66	-0.02	-0.64	0.12	0.31	1.22	0.26	2.15	-0.14	-0.12	2.12	0.82

The first row of the table is the estimate of βp and αp_t ($t=1,2,\dots,12$) and the second row is the t-statistic of each estimate

Table 5. Regression table for March settling stocks and December stocks, 2000 – 2009
(KOSPI index adjusted for ex-dividend dates in March and December)

March stocks	βp	$\alpha p1$	$\alpha p2$	$\alpha p3$	$\alpha p4$	$\alpha p5$	$\alpha p6$	$\alpha p7$	$\alpha p8$	$\alpha p9$	$\alpha p10$	$\alpha p11$	$\alpha p12$
Group 1	1.190 13.71	0.057 2.57	0.016 0.71	0.008 0.36	-0.045 -2.03	-0.013 -0.60	0.016 0.74	0.017 0.79	-0.038 -1.71	0.018 0.81	-0.021 -0.97	0.021 0.96	0.035 1.60
Group 2	1.255 13.91	0.055 2.40	-0.005 -0.22	-0.016 -0.68	-0.019 -0.84	-0.007 -0.29	0.017 0.76	0.005 0.22	-0.020 -0.85	0.000 0.02	-0.021 -0.92	0.017 0.74	0.040 1.74
Group 3	1.3965 15.71	0.0327 1.45	-0.0140 -0.62	-0.0062 -0.28	-0.0195 -0.86	0.0201 0.89	0.0246 1.09	-0.0096 -0.43	0.0142 0.63	0.0119 0.53	0.0198 0.88	0.0034 0.15	0.0303 1.35
Group 4	1.3220 15.05	-0.0442 -1.98	-0.0010 -0.04	-0.0161 -0.72	0.0019 0.09	0.0000 0.00	-0.0015 -0.07	0.0286 1.29	-0.0177 -0.79	0.0077 0.35	0.0342 1.54	0.0369 1.64	0.0451 2.03
Group 5	1.142 13.96	0.013 0.65	-0.010 -0.47	-0.016 -0.77	0.008 0.39	-0.029 -1.41	-0.010 -0.48	-0.013 -0.61	-0.018 -0.87	0.016 0.77	0.024 1.17	-0.007 -0.33	0.024 1.14
Group 6	1.3525 16.39	0.0417 1.99	-0.0096 -0.45	-0.0478 -2.29	-0.0197 -0.93	-0.0347 -1.66	0.0113 0.54	0.0235 1.13	-0.0202 -0.96	0.0032 0.16	-0.0067 -0.32	-0.0158 -0.75	0.0541 2.60

Dec. stocks	βp	$\alpha p1$	$\alpha p2$	$\alpha p3$	$\alpha p4$	$\alpha p5$	$\alpha p6$	$\alpha p7$	$\alpha p8$	$\alpha p9$	$\alpha p10$	$\alpha p11$	$\alpha p12$
Group 1	0.803 18.55	-0.042 -3.69	0.023 2.00	0.020 1.74	0.027 2.38	0.016 1.46	0.004 0.39	0.004 0.33	0.009 0.77	0.023 2.06	0.004 0.39	0.010 0.89	0.032 2.89
Group 2	0.907 28.22	-0.027 -3.23	0.014 1.68	0.020 2.43	0.006 0.76	0.001 0.12	-0.001 -0.17	0.004 0.47	-0.014 -1.62	0.019 2.30	0.001 0.16	-0.002 -0.21	0.027 3.23
Group 3	0.973 31.53	-0.019 -2.43	0.011 1.32	0.015 1.94	0.009 1.08	-0.019 -2.41	0.000 -0.05	-0.008 -1.04	-0.010 -1.29	0.014 1.76	0.004 0.52	-0.005 -0.62	0.015 1.93
Group 4	1.016 35.12	-0.014 -1.81	-0.003 -0.41	0.018 2.34	-0.008 -1.05	-0.010 -1.39	0.001 0.13	-0.009 -1.26	-0.017 -2.20	0.010 1.28	-0.003 -0.41	-0.001 -0.14	0.008 1.01
Group 5	0.979 33.01	-0.004 -0.47	-0.013 -1.67	-0.002 -0.27	0.001 0.08	-0.006 -0.81	-0.010 -1.36	-0.015 -1.92	-0.014 -1.86	0.011 1.41	0.000 0.00	0.011 1.36	0.002 0.29
Group 6	1.170 24.29	0.025 1.98	-0.005 -0.37	-0.004 -0.35	0.005 0.42	-0.001 -0.11	0.021 1.71	0.003 0.28	0.014 1.09	-0.002 -0.17	-0.001 -0.11	0.016 1.30	-0.012 -0.93

The first row of the table is the estimate of βp and αp ($t=1,2,\dots,12$) and the second row is the t-statistic of each estimate

Business Cycles and Social Spending in Developing Countries: Implications for South Korea's Foreign Aid Strategy

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Abstract

The present paper contributes to the literature by providing arguments and evidence on volatility of government expenditure, especially social spending and the role of foreign aid. Empirical findings from government spending data for 27 countries between 1990 and 2008 suggest that social spending is procyclical and more volatile in developing countries, while it is countercyclical and less volatile in advanced economies. Because countries with volatile social spending rely more on foreign aids, donor countries need to concentrate more on social sector aid so that recipient countries can reduce their social spending volatility, and possibly respond to crises in countercyclical manners. South Korea has allocated about half of its foreign aids to social sector, but only with significant fluctuation across time – the coefficient of variation is the highest among donor countries. A steady flow of social sector aid would support the living condition of the poor in developing countries, providing protection when they need it.

JEL code: E62, F35, H50

Key Words: Social Spending, Foreign Aid, Volatility, Business Cycle, South Korea

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I. Introduction

Government spending has been considered as an effective policy tool to respond to business cycles. When government expenditure shows countercyclical behaviors, it can stabilize the economy against negative aggregate shocks, providing a stimulus through higher spending during bad economic times and contracting during good times. There is a large literature on the cyclical nature of government expenditure and its role as an automatic stabilizer, focusing on the channel of transmission and the multiplier effects (Blanchard and Perotti 1999; Fatas and Mihov 2001; Andrés and others 2008). Fiscal stabilization received renowned attention during the recent global crisis (Debrun and Kapoor 2010).

Theory is one thing and practice is quite another. There is a structural difference between country groups in the capacity to implement countercyclical measures. Lane (2003) pointed out that significant cyclical fluctuations have been more extreme for developing countries and exacerbated by inappropriately procyclical macroeconomic policies. Developing countries have difficulties to implement countercyclical measures in monetary or tax-based fiscal policies (Kaminsky and others 2005; Talvi and Végh 2005).

Empirical studies suggest that government spending in recessions seems procyclical in developing countries, while developed countries manage to have countercyclical spending. Lledó and others (2009) documented cyclical patterns of government expenditures in sub-Saharan Africa since 1970 and found that government expenditures were more procyclical in sub-Saharan Africa than in other countries. Manasse (2006) argued that observed differences between developing and developed countries is likely to be caused by different nature of the shocks, rather than different behaviors. For both groups of countries, policy is largely acyclical in bad times and procyclical in good times, but the shocks are typically much worse in developing countries, resulting in procyclical behavior in developing countries during recessions.

To make matters even worse, government spending in some developing countries increases economic volatility, rather than stabilizes. Carmignani (2008) compared government spending data for 34 African countries with those for 83 developing countries over the period 1990-2007 and found that fiscal policies in Africa behave either procyclically or acyclically, but practically never countercyclically. To the extent that fiscal policy is run procyclically, it causes greater output growth volatility.

The present paper contributes to the literature by providing arguments and evidence on volatility of government expenditure, especially social spending and the role of foreign aid. In this paper I concentrate on public social expenditure (or social spending) which is the provision by public institutions of benefits to households and individuals in order to provide support during circumstances which adversely affect their welfare, for instance, in education, health and social protection sectors. Social expenditure aims to support the poor and vulnerable against adverse shocks, but if it is cyclical and volatile, it is likely to fail to achieve its goal.

The main message of this paper can be summarized as follows. Findings from comparative statistics of annual government expenditure in 27 countries in the 2000s are consistent with the existing literature and suggest that social spending is procyclical and more volatile in developing countries, while social spending is countercyclical and less volatile in advanced economies. Volatile and procyclical social spending is not likely to achieve its goal- protect the poor against adverse shocks-, and donor countries need to concentrate more on social sector aid so that recipient countries can reduce their own social spending volatility. South Korea has allocated about half of its Official Development Assistance (ODA) to social sectors, but the social sector aid varies much across time. A higher share and a consistent flow of social sector aid is likely to contribute to support the living conditions of the poor in developing countries. Section 2 reviews literature on social spending, Section 3 provides empirical findings, Section 4 describes statistics of foreign aid committed by South Korea, and Section 5 concludes.

II. Review of literature on social spending

Social expenditure is one of the main instruments to achieve long term economic and human development. Evidence from developing countries between 1971 and 2000 suggests that social spending is likely to contribute to achieve the Millennium Development Goals (MDGs), promote long term economic growth, and reduce poverty (Baldacci and others 2008).

Social spending is also a key instrument to protect vulnerable people and stabilize the economy. Lustig and others (2000) noted that social spending is a very important countercyclical measure for the poor, because poor people cannot resort to self-insurance, informal insurance, or credit market to smooth their consumption effectively. Social spending can also be an automatic stabilizer. A means-tested cash transfer program, for instance, can operate as a stabilizer, as a declining economy would result in more people being eligible for the cash transfer. As the economy recovers from the crisis, fewer people qualify for the transfer and spending automatically decreases (World Bank and others 2001).

As theory predicts, social expenditure acts as an automatic stabilization policy for transitory shocks in developed countries. Strawczynski and Zeira (2009) tested 22 OECD countries over the years 1963-2006, and found that both expenditures and deficits are countercyclical to transitory shocks, mainly through public transfers and mainly in recessions. Darby and Melitz (2008) analyzed 21 OECD countries from 1982 to 2003 and found that age- and health-related social expenditure as well as incapacity and sick benefits all react to the cycle in a stabilizing manner. Furceri (2009) argued that social spending is able to smooth about 16 percent of a shock to GDP. Social spending targeted for the old and the unemployed contributes more to smoothing, with a more stabilizing effect than total government spending as a whole.

In developing countries, however, social spending often contracts during recessions, and is more volatile, as reported in a few countries. Ravallion (2002) found that there is little sign that social spending was protected from budget cuts in Argentina between 1980 and 1997. He found that there is a clear co-movement, and social spending was more volatile than other types of spending. Cutler and others (2002) also found that per capita public health expenditures in Mexico fell by 15 percent during the Tequila Crisis in the mid-1990s, partly contributing to a 5-7 percent jump of mortality rates during the crisis years (0.4 percent increase in mortality for the elderly and a 0.06 percent increase in mortality for the very young).

Lessons from the currency crisis in several East Asian countries in the late 1990s also suggest that government expenditure on social safe nets behaved procyclically in many places. Except for South Korea, none of the crisis countries had unemployment insurance or social safety net programs that automatically reacted to the changing social needs. Consequently, the Asian countries' fiscal response to the crisis was largely improvised and discretionary with significant time lags, and, as a result, social spending increased procyclically during recovery (World Bank and others 2001).

Developing countries attempt to protect social expenditure during recessions, but they are constrained by their fiscal space or nature of the shocks. Braun and Gresia (2003) found that Latin American countries face high economic volatility, which contributes to procyclicality of total spending and social spending. Social spending is also reduced during recessions, but proportionately less than other items of spending, suggesting that LAC countries are limited in their efforts to protect the poor by the need for fiscal adjustment.

III. Empirical evidence

This section provides some comparative statistics for cyclicity and volatility of government expenditure on social sectors. The primary data for public spending is the Government Finance Statistics (GFS) which contains detailed annual data on revenue, expense, transactions in assets and liabilities, and stocks of assets and liabilities of general government and its subsectors (IMF 2010). Other variables are obtained from World Development Indicators (World Bank 2010).

Data availability limits the extent of analysis on government expenditure on specific sectors. The most frequently used databases for fiscal policy are World Development Indicators (WDI) by the World Bank and World Economic Outlook (WEO) by the IMF. These databases include data for overall size of government expenditure and its fluctuation across time, so that analyses on government expenditure and its relationship with business cycle are feasible (see for instance, Lledó and others 2009). However, these databases have limited information on the government expenditure on specific sectors, such as education, health, and social protection. Between 1960 and 2009, WDI has 5,680 year-country observations for total government expenditure, while it has only 1,025 sporadic data for health, 2,096 for education expenditure, and none for social protection (calculated from World Bank 2010). Panel analysis for the cyclicity of health or education expenditure is often not feasible due to missing and sporadic observations, especially for low income countries.

GFS data include information on government expenditure on health and education sector, as well as social protection. In many cases, the data are available for a number of consecutive years, allowing for time series analyses. However, GFS data only covers 1990 and later years, and in many cases the data is available only for 2000s. The sample size and time dimension is limited to perform a full scale cross-country panel analysis, but the data is consistent enough for an analysis within country over time

To show correlation between social spending and business cycles, I estimate a simple fixed effect panel regression as follows:

$$F_{s,i,t} = \alpha_i + \beta_s G_{i,t} + \gamma F_{s,i,t-1} + e_{i,t} \quad (1)$$

where F measures the growth in the social spending in per capita term and G represents the growth in real GDP per capita. Subscript s denotes sector, such as education (e), health (h) and social protection (p). Subscript i denotes country and t represents time. The cyclicity of social spending is determined by the sign of the coefficient β . If β_s is positive, social spending in sector s is regarded as procyclical. If β_s is zero, it is acyclical. If β_s is negative, it is countercyclical.

Note that the estimation does not aim to find the causal relationship from the growth to social spending. The sample size becomes too small to conduct meaningful estimations, when I include other annual macro and institutional control variables which are commonly used in the literature on fiscal policy. Therefore, the coefficient estimate should be interpreted as a simple correlation between business cycle and social spending, controlling only for a lagged value of social spending and a country specific fixed effect.

Results of the regression analysis suggest that social spending in all sectors is negatively correlated with business cycles in OECD countries, but it is pro- or acyclical in developing countries. Table 1 presents the coefficient estimates for the growth rate of real GDP per capita, estimated from social spending data from 1990 to 2008. The result is

consistent with findings from regression analyses for OECD countries, and also case studies for developing countries in the literature.

Table 1 Cyclicalities of social spending, 1990-2008

	(1)	(2)	(3)	(4)
Sample	All	OECD	High Income	Developing countries
Dependent variable=growth in government spending in education per capita				
Real GDP growth	1.155 (0.774)	-2.992*** (0.965)	2.686 (4.822)	1.011** (0.424)
Lagged dep var	-0.169** (0.0827)	0.108 (0.176)	-0.155 (0.182)	-0.187** (0.0865)
Constant	0.135*** (0.0452)	0.231*** (0.0379)	0.167 (0.187)	0.118*** (0.0276)
Observations	161	18	39	122
R-squared	0.045	0.460	0.039	0.083
Number of countries	27	4	8	19
Dependent variable=growth in government spending in health per capita				
Real GDP growth	1.169 (0.864)	-3.370*** (0.804)	1.898 (5.059)	1.039* (0.562)
Lagged dep var	-0.130* (0.0751)	0.0737 (0.155)	-0.169 (0.182)	-0.0780 (0.0693)
Constant	0.151*** (0.0502)	0.226*** (0.0328)	0.207 (0.195)	0.127*** (0.0359)
Observations	161	18	39	122
R-squared	0.034	0.601	0.036	0.041
Number of countries	27	4	8	19
Dependent variable=growth in government spending in social protection per capita				
Real GDP growth	-1.728 (1.325)	-2.235** (0.826)	-10.27 (7.411)	-1.163 (0.776)
Lagged dep var	-0.268*** (0.0927)	0.0965 (0.158)	-0.341* (0.187)	-0.127 (0.102)
Constant	0.363*** (0.0757)	0.196*** (0.0338)	0.783*** (0.283)	0.262*** (0.0473)
Observations	146	18	39	107
R-squared	0.086	0.408	0.144	0.058
Number of countries	25	4	8	17

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Education expenditure is countercyclical in OECD countries, but procyclical in developing countries. The first panel of Table 1 shows that the coefficient estimate for the real GDP growth is negative and statistically significant (-2.992) in the OECD sub-sample while it is positive (1.011) in the developing countries sub-sample. It suggests that government spending in education co-moves with real GDP growth in developing countries while it moves countercyclically in OECD countries.

Health expenditure is also countercyclical in OECD countries, and procyclical in developing countries. The second panel of Table 1 displays that the coefficient estimate for GDP growth is -3.370 for OECD countries, and 1.39 for developing countries. Similar to education expenditure, government expenditure on health sector is positively correlated with business cycles in developing countries.

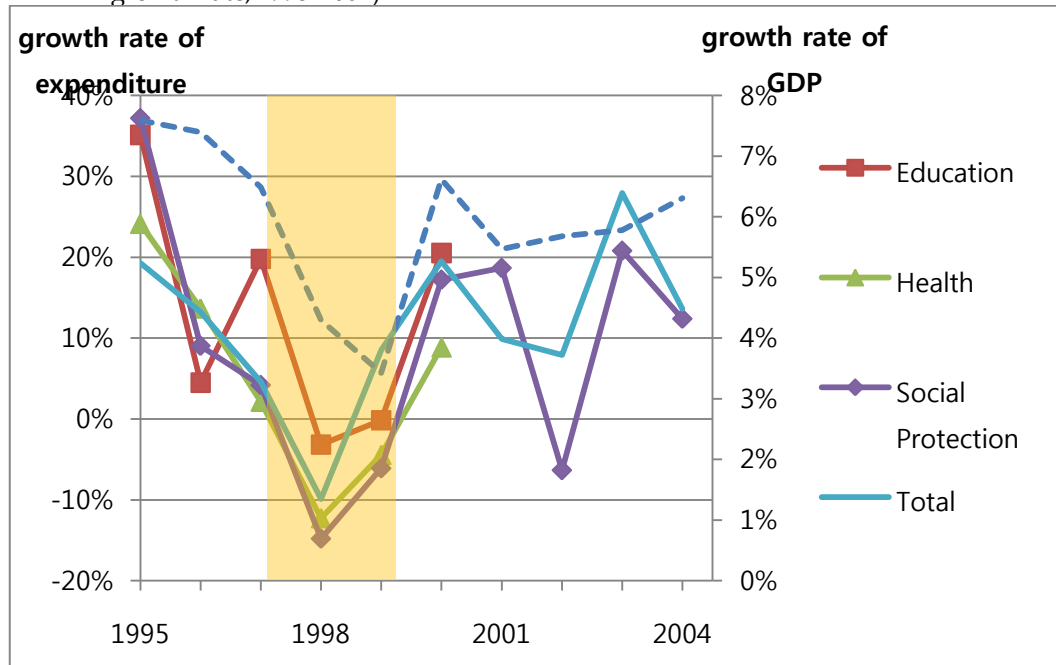
Social protection is expected to be larger during bad times so that the vulnerable are protected from adverse shocks, but there is no evidence that social protection is stabilizing the economy in developing countries. The last panel of Table 1 suggests that government expenditure on social protection is strongly countercyclical in OECD (the coefficient estimate for GDP growth is -2.235), but acyclical in developing countries (the coefficient estimate is statistically zero).

The signs of coefficient estimates are mixed across dependent variables, and across country groups. It is likely because of the small sample problem: There are only 4 OECD countries, and 8 high income countries in the sample. The results for OECD countries are consistent with other studies using a larger sample, but the results for high income countries are sensitive to sample selections and data.

Some country level examples from the data are also consistent with the literature, suggesting that government spending moves procyclically in developing countries. Figure 1 illustrates the growth rate of GDP per capita, and government expenditure on education, health and social protection in Vietnam between 1995 and 2004. The GDP growth rate fell from 6.5 percent in 1997 to 4.3 percent in 1998, and subsequently to 3.4 percent in 1999 when the currency crisis hit East Asian countries. Government expenditure decreased by ten percent in 1998. Then the growth rate of total government spending quickly rebounded to 8.5% in 1999 and stayed around 20% in 2000. The economy recovered to 6.6% of GDP growth in 2000, partly lead by fiscal responses.

Social spending in Vietnam was also procyclical and even more volatile than total spending. Government expenditure on education, health and social protection all showed negative growth rates in 1998 (-3.2, -12.3, and -14.8, respectively). Social spending decreased further in 1999 (-.2, -4.4, -6.1, respectively), while total government spending started to increase. Data for education and health expenditure is not available since 2000, but the expenditure on social protection remained volatile in early 2000s.

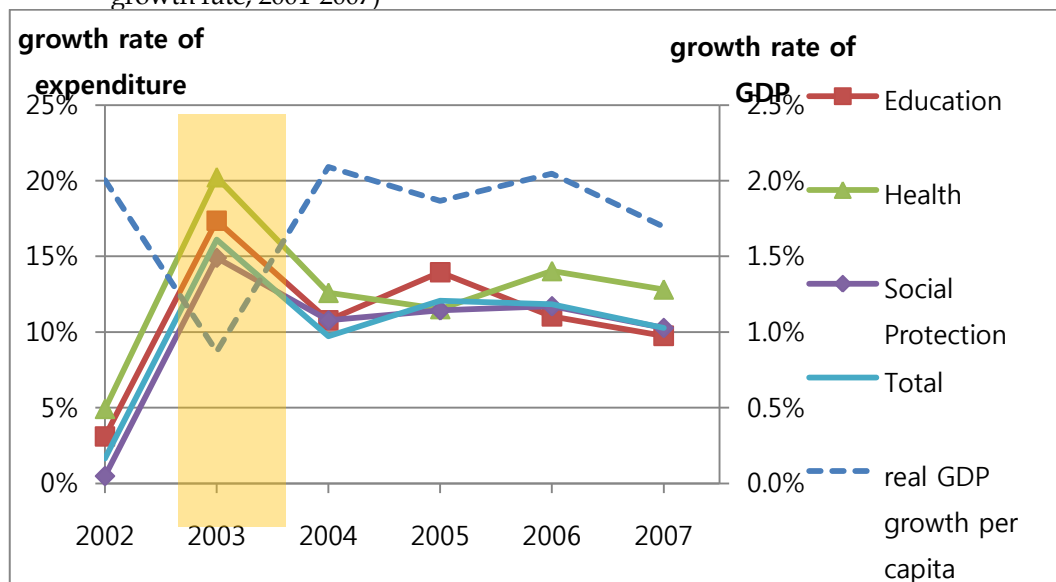
Figure 1 Government expenditure by function and real GDP per capita in Vietnam (annual growth rate, 1995-2004)



Source: author's calculation from IMF (2010) and World Bank (2010).

In contrast, government expenditure in high income countries, for instance, Canada, is clearly countercyclical. Figure 2 displays the growth rate of GDP per capita and government expenditure in Canada from 2002 to 2007. The GDP per capita growth is very stable around two percent throughout the period, but the GDP growth dropped to .8 percent in 2003. Although it was a mild slowdown of economy, the total government expenditure quickly rose to 16% in 2003. Social spending also moved countercyclically. Health expenditure growth rose to 20% in 2003, and then decreased to 12-14% thereafter. Education expenditure growth increased to 17% in 2003, and then came down to 10-13% in following years. Growth in social spending rose to 15% in 2003 and decreased to 10% for the rest of the time period.

Figure 2 Government expenditure by function and real GDP per capita in Canada (annual growth rate, 2001-2007)



Source: author's calculation from IMF (2010) and World Bank (2010).

Figure 1 and Figure 2 also suggest that social spending is likely to be more volatile in developing countries than in developed economies. In order to compare volatility of social and non-social spending within country, I use standard deviation of expenditure to measure volatility of government spending. Standard deviation would be meaningless if the series of indicators is non-stationary, because there would be no time-insensitive average for a series with unit roots. Dickey-Fuller tests reject the null hypothesis that the variable contains a unit root at 99% for most countries with more than five observations, which means that government expenditure indicators are stationary and standard deviation can be used as a measure for volatility. Because of the sample size, I used unconditional standard deviation rather than conditional standard deviation. The difference in volatility across country group can be captured in part by the unconditional standard deviation. Small sample size also might cause a few outliers in GDP per capita to play a role, thus this exercise should be only interpreted as to give an overall description of the patterns in volatility, not to analyze country specific patterns.

Volatility of government expenditure on social sectors is higher on average, compared to that of non-social government expenditure. Table 2 shows descriptive statistics of volatility measured by standard deviation of annual growth rates of government expenditure between 1990 and 2008. The average volatility of education expenditure is .21, while the volatility of non-social expenditure is .16. The average volatility of health expenditure (.22) and social protection (.31) are also higher than the volatility of non-social expenditure.

Majority of countries have higher volatility in social spending than in non-social government expenditure. Volatility of education expenditure is higher than that of non-social expenditure in 54% of countries as shown in the second panel of Table 2. For health, 57% of countries have higher volatility. In 58% of countries, expenditure on social protection is more volatile than non-social government expenditure.

Table 2 Descriptive statistics of volatility of government spending (1990-2008)

	Average volatility of growth rate	Number of countries
Education expenditure (VolEd)	.21	28
Health expenditure (VolHe)	.22	28
Social protection expenditure (VolSp)	.31	26
Non-social expenditure (VolNs)	.16	39
	Share of countries	Number of countries
High volatility in education expenditure (VolEd > VolNs)	54%	15
High volatility in health expenditure (VolHd > VolNs)	57%	16
High volatility in social protection expenditure (VolSp > VolNs)	58%	15

Source: author's calculation from IMF (2010).

Countries with volatile social spending is more likely to be poor than those with stable social spending. The first panel of Table 3 shows the average GDP per capita (in 2000 USD) for countries in which volatility of education (health or social protection) expenditure is higher (or lower) than volatility of non-social expenditure. The GDP per capita is \$3,146 in countries with high education spending volatility, while it is \$11,702 in countries with low education spending volatility. Using health expenditure, the GDP per capita is \$4,523 for countries with high volatility, while it is \$10,491 for those with low volatility. For social protection, the gap is smaller (\$5,505 and \$9,924, respectively).

Volatility of expenditure on social protection is clearly related to foreign aid received. The second column of Table 3 shows the average net ODA received (% of central government expense) for countries with high volatility and low volatility. The difference between country groups is largest in social protection: the net ODA accounts for 8.25% of central government expenditure for countries in which volatility of social protection expenditure is larger than volatility of non-social government expenditure. The ODA accounts for only 2.77% of central government expenditure for countries in which social protection expenditure is less volatile than non-social expenditure.

Statistics in Table 3 show that aid-dependent countries have volatile social spending and they are consistent with findings in the literature. In Sub-Saharan Africa, Lledó and others (2009) found that greater fiscal space, proxied by lower external debt, and better access to concessional financing, proxied by larger aid flows, seem to be important factors in diminishing procyclicality in the region. Aid flows seem to make overall fiscal expenditure less procyclical, but they do not seem to be related to reduction in social spending volatility.

Table 3 Comparative statistics of countries with high (and low) social spending volatility

Countries with	GDP per capita in 2008 (in 2000 USD)	Net ODA received in 2008 (% of central government expense)	Number of countries
High volatility in education	\$3,146	6.65	15
Low volatility in education	\$11,702	5.95	13
High volatility in health	\$4,523	6.11	16
Low volatility in health	\$10,491	7.51	12
High volatility in social protection	\$5,505	8.25	15
Low volatility in social protection	\$9,924	2.77	11

Note: High (or low) volatility means volatility of social spending is higher (or lower) than volatility of total government spending.

Source: author's calculation from IMF (2010) and World Bank (2010).

This result on ODA and social spending could be interpreted with caution. Due to the lack of data, it is difficult to test whether and how much of the social spending volatility is caused by the ODA volatility. And also, because money is fungible, it is difficult to identify how much of the ODA flow was channeled to the actual government budget in each sector. And there could be a bias in sample selection that middle income countries have more accurate data on this type of budget distribution than the low income countries.

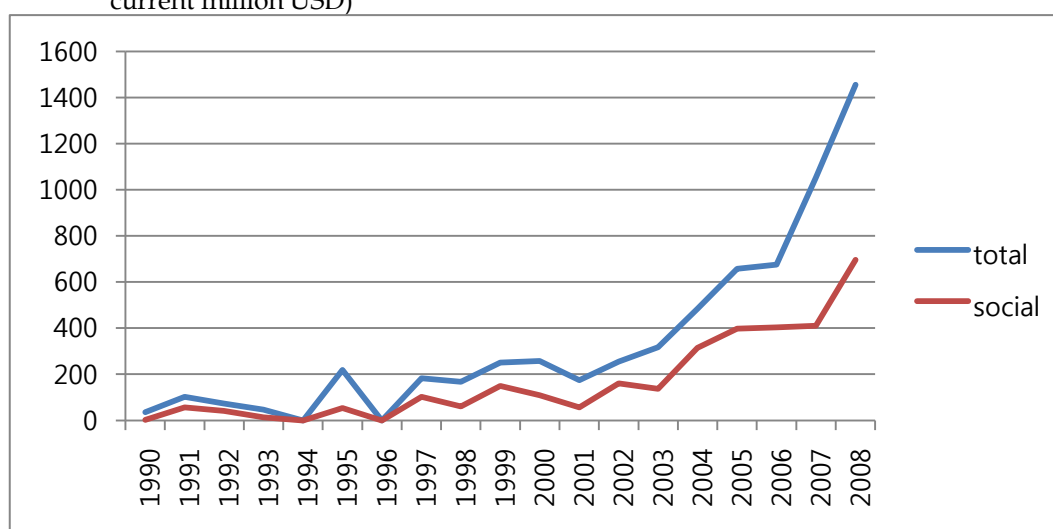
Literature on aids suggests that foreign aids have not been countercyclical enough to mitigate adverse shocks in developing countries. Kharas (2008) find that ODA is much more volatile than major macro variables and typically magnifies real business cycles in recipient countries. Bulír and Hamann (2001) examined 72 countries for which aid data were available for the period 1975-1997 and found that aid is more volatile than fiscal revenues—particularly in highly aid-dependent countries. These findings imply that the pattern of aid disbursements is welfare-reducing. Pallage and Robe (2001) also showed that for the vast majority of African recipients, aid flows are a major source of income that is highly volatile and overwhelmingly procyclical. Gupta et al (2004) examined the cyclical properties of food aid with respect to food availability in about 150 recipient countries, covering 1970 to 2000 and argued that food aid is not countercyclical, or sufficient enough to mitigate contemporaneous shortfalls in consumption.

In sum, expenditure on social sectors, such as education, health and social protection, is more volatile than non-social government expenditure on average. Comparative statistics suggest that countries in which social spending is more volatile than non-social government spending are more likely to be poor, and to rely more on foreign aids. And foreign aids do not seem to effectively decrease the volatility in social spending or offset negative impacts of adverse shocks.

IV. Implication for Korea as a donor

Korea has been increasing foreign aids significantly in recent years as shown in Figure 3. Between 2001 and 2008, the total ODA committed by South Korea has increased by more than 800% (from \$175 to \$1455 million). The ODA for social infrastructure and services has been increasing fast during the same period (from \$56 to \$696 million). The ODA for social infrastructure and services includes official bilateral aids committed to education, health, water supply, sanitation, government and civil society, etc (OECD 2010).

Figure 3 Official Bilateral Commitments by Korea (total and social sector, 1990-2008, in current million USD)



Note: Social spending denotes commitments on social infrastructure and services.

Source: author's calculation from OECD (2010).

Korea allocates a large share of its ODA to social sectors. Table 4 shows that the share of Korea's ODA for social sectors is 46% in 1990-2008 average, which is 15 percentage point higher than the overall average of Development Assistance Committee (DAC) members. The allocation of ODA in social sectors is about the same as that of countries with similar level of total ODA.

However, Korea's ODA in social sector varies significantly across time. The coefficient of variation in the third column of Table 4 shows that Korea has the largest variation in social sector assistance between 1990 and 2008. The coefficient of variation is a normalized measure of dispersion of a probability distribution, defined as the ratio of the standard deviation to the mean. I use the coefficient of variation instead of the standard deviation because the standard deviation of data must always be understood in the context of the mean of the data, but the coefficient of variation is a dimensionless number which is appropriate for cross-country comparison. The ranking of the coefficient of variation is not completely driven by the recent increase in Korea's ODA, because the result is very robust even when the time trend is controlled for. The variation across time is not entirely driven by the recent increase in total ODA. Korea is still the top country among DAC members in

terms of coefficient of variation, even when I use linearly detrended series of the social sector ODA.¹

Table 4 Total and social sector ODA commitment (DAC members, 1990-2008 average, in current million USD)

Country	Total ODA commitment	Share of social sector ODA to the total	Coefficient of variation (ratio of standard deviation to the mean)
Australia	1076	0.45	0.57
Austria	687	0.32	0.32
Belgium	806	0.35	0.62
Canada	1947	0.29	0.76
Denmark	1024	0.35	0.45
Finland	422	0.32	0.62
France	6538	0.37	0.25
Germany	6446	0.34	0.41
Greece	133	0.65	0.71
Ireland	286	0.51	0.99
Italy	1511	0.18	0.63
Japan	13980	0.21	0.23
Korea	377	0.46	1.03
Luxembourg	122	0.49	0.68
Netherlands	3180	0.29	0.82
New Zealand	127	0.43	0.53
Norway	1245	0.35	0.79
Portugal	254	0.43	0.52
Spain	1561	0.35	0.99
Sweden	1672	0.32	0.41
Switzerland	878	0.20	0.44
United Kingdom	3766	0.30	0.81
United States	14992	0.35	0.81
EC	9504	0.34	0.53
Czech Republic	74	0.38	0.66
Turkey	352	0.57	0.80
DAC Countries, Total	62716	0.31	0.51
G7, Total	49179	0.30	0.47
DAC EU Members, Total	28194	0.33	0.45

Source: author's calculation from OECD (2010).

¹ With a quadratic trend, Korea has the second highest coefficient of variation, following Greece. Coefficients for the linear and quadratic trend and statistics of residuals are available from the author.

Aid volatility has costs. Kharas (2008) measured the cost of aid volatility in terms of deadweight loss as 15-20 percent of the total value of aid. He argued that seven to 28 cents per every dollar of aids are wasted as volatility cost, and the loss can add up to about \$16 billion. More importantly, volatile aids generate massive negative income shocks to some developing countries which are burdened by poor and vulnerable people. Chauvet and Guillaumont (2009) examined international aid from 1970 to 1999 and found that aid is making growth more stable, while its volatility reduces this effect.

Foreign aid can be an important insurance for poor countries which are vulnerable to external and internal shocks. In order to sustain the living condition of the poor in developing countries, social spending is expected to be less volatile, compensating the loss of income in recessions. Since low income countries have limited fiscal space, especially during crises, foreign aid should provide resource for social sectors to weather adverse shocks. Korea has been increasing fast the total ODA and managed to allocate about half of the resource to social sectors. However, keeping the ODA in social sectors at a consistent level across time is likely to better support social spending in low income countries, providing protection for the poor when they need it.

V. Conclusion

There is empirical evidence from the literature and from the data that social spending is procyclical and more volatile than non-social government spending in developing countries, while social spending is countercyclical and less volatile in advanced economies. Because countries with volatile social spending rely more on foreign aids, donor countries need to concentrate more on social sector assistance so that recipient countries can reduce their social spending volatility, and possibly respond to crises in countercyclical manners. South Korea has allocated about half of its foreign aids to social sector with significant fluctuation across time. Less volatile foreign aid in social sectors is likely to provide better support for the living conditions of the poor in developing countries.

As the global economy slowly enters to a recovery phase, developing countries might have a good chance to expand fiscal policies, including social expenditure, to build a better automatic stabilizer. Blanchard and others (2010) pointed out that developing countries might have relatively larger fiscal space than developed countries for recovery. They argue that some advanced economies and emerging economies that entered the global crisis with high levels of debt and highly procyclical fiscal policies driven by consumption booms are now forced to cut spending and increase taxes despite unprecedented recessions. By contrast, many other developing countries that entered the crisis with lower levels of debt have a better chance to use fiscal policy more aggressively and in a sustainable manner.

However, implementing countercyclical policies might be still challenging for many developing countries. Calderón and Schmidt-Hebbel (2008) found strong empirical support for both institutional failures and credit constraints as determinants of countercyclical fiscal policy in emerging economies. Notably, their empirical study using the data for 136 countries over the period 1975-2005 found that countries are unable to conduct countercyclical fiscal policies if they have poor institutions or lack wide access to credit markets at home and abroad. Institutional factors seem to have a larger weight than financial variables.

Under these constraints, donor countries should put more emphasis in social sector aid. And also governments in developing countries put more emphasis on targeting programs, to maximize the effectiveness of their responses to the crisis. Government spending is likely to have the highest multiplier effects when its tax cuts and transfers are well targeted, as suggested by Spilimbergo and others (2008). When these transfers or taxes vary based on pre-specified triggers tied to the state of the economic cycle, governments would be able to improve automatic stabilizers to weather future adverse shocks (Blanchard and others 2010). Targeted programs should be carefully designed because the effectiveness of a particular targeting system varies in the country-specific economic or political context (Kanbur 2010).

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CHAPTER 18

**American Pattern Corporate Governance Reforms and Efficiency in
Non-American Economy**

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I. Introduction

The recent literature documents that corporate ownership structure and degree of investor protection differ across nations according to the national legal origin. In many emerging countries with weak shareholder protection, national economies are dominated by large family-controlled conglomerates [Claessens et al. (2000) and Johnson et al. (2000)]. Zingales (1994), Dyck and Zingales (2003), and Nenova (2003) argue that in such economies, controlling (dominant) shareholders enjoy significant private benefits by expropriating corporate resources from minority shareholders. Bebchuk (1999) further argues that when private benefits of control are large and control is thus valuable enough, the initial owner might elect to maintain a lock on control. La Porta et al. (1999) indeed presented empirical evidence that corporate ownership is more concentrated in weak shareholder protection countries than in strong shareholder protection countries.

La Porta et al. (1999) also indicated that, because the controlling shareholders extract corporate resources from minority shareholders, the firm values are discounted in such economies. Miller (1999) and Reese and Weisbach (2002) further reported that controlling shareholders forego cross-listing opportunities even if the cross-listings are expected to increase minority shareholders wealth, because the increase in share value associated with cross-listing comes at the expense of private gains to controlling shareholders.

It is expected that the policy makers in countries with concentrated ownership structure may reform corporate governance laws to recover the discounted valuation. This creates potential conflicts of interests between the government policy makers who want to protect minority shareholders interests and the controlling shareholder who want to maximize the private benefits from the corporate control by exploiting minority shareholders.

The American pattern of corporate governance systems is designed to mitigate agency problems, even if it does not offer perfect solutions to the agency problems. This paper notes that the ownership structure outside America is concentrated unlike in America. The conflict of interest thus does not exist between the professional managers and minority shareholders. The conflict of interest rather exists between the controlling shareholders and minority shareholders. Indeed, Enriques and Volpin (2007) reported that the effectiveness of American pattern corporate governance reforms in continental Europe is questionable.

This paper theoretically analyzes controlling shareholders reactions to the American pattern corporate governance reforms in a concentrated ownership economy. First, we develop the optimal capital investment model, where the controlling shareholders hold call options to exercise capital investment opportunities. The paper further develops corporate governance model which minimizes the conflicts of conflicts between the controlling shareholders and minority shareholders. The paper will offer corporate governance model that will produce efficient transfer of corporate control transactions.

II. The Real Options Model

1. Assumptions

- (1) The firm is operating in an economy where the national legal systems weakly protect minority shareholders' interests.
- (2) Since the national legal systems weakly protect minority shareholders' interests, the current business owners enjoy significant private benefits and privileges from the corporate control.
- (3) The pyramid ownership is allowed in the economy. So via pyramid ownership structure, the controlling shareholders control many affiliates even if they have insignificant cash flow rights.
- (4) As indicated by Bebchuk (1999), the original owners of the firm want to continue enjoying the private benefits for corporate control.
- (5) Controlling shareholders appoint corporate management team and corporate managers pursue the interests of controlling shareholders.
- (6) Therefore, unlike in the U. S. economy, there is no conflict of interests between managers and controlling shareholders in this economy. In this economy, conflicts of interests exist between the controlling shareholders and minority shareholders, where the controlling shareholders expropriate corporate resources from the minority shareholders.
- (7) In the U. S. corporate managers (agents) pursue their own utility as Jensen and Meckling (1976) presented. In this economy, we assume that corporate managers pursue the wealth of the controlling shareholders.

2. The Firm Valuation Model

Following Meyers (1977), we decompose the firm value in two parts; the value of the existing assets in the firm and the value of future investment opportunities.

- (1) Value of a Firm

$$V^* = V_A + V_G,$$

Where, V^* is theoretical value of a firm in the absence of valuation discount due to poor corporate governance.

V_A ; Value of the existing assets in the firm

V_G ; Value of future growth opportunities including owner-managers' private benefits.

Value of a firm in the economy where controlling shareholders can appropriate corporate resources before they disclose the actual cash flows to the firm can be expressed as follows:

$$V = V_A(1 - \beta) + V_G(1 - \beta)$$

Where V is the market value of a firm. We assume that the controlling shareholders can extract β fraction of future cash inflows from the existing assets in the firm, as well as cash inflows from new investment projects. V_G is the present value of future expected cash inflows from new capital investment. V_G can be regarded as options to grow in the future,

which is at the managerial discretions. The private benefits of corporate control exist due to the lack of corporate transparencies, accounting rules, corporate laws, poor corporate governance, and equity ownership structure. Therefore, the size of β can be country-specific and industry-specific as well as firm-specific (Bebchuk, 1994). In the countries where the legal protection of minority shareholders' interest is weak, and accounting rules allow opaque financial statement, the size of β is expected to be large. So the market value of the future growth opportunities will be smaller, *ceteris paribus*.

(2) Objective function for owner-managers

The objective functions for owner-appointed managers will be to maximize the wealth of controlling shareholders.

$$\text{Max. Owner's Wealth } (V_W) = f(V_B, V_G, \alpha)$$

Where,

V_B = Owners' private benefits from corporate control (invisible to minority stock holders); for business group owners ($\sum V_{B,i}$, Affiliate i)
 α = controlling shareholders' cash flow right (equity holdings in %)

(3) Conflicts of interests between policy makers and Controlling shareholders

The policy makers would realize that firm values in the economy are lower than theoretical values because the controlling shareholders extract corporate resources from the minority shareholders. They would device mechanisms to recover valuation discount caused by the controlling owners' private benefits. There are a variety of institutional mechanisms to minimize the private benefits accruing to the controlling shareholders. Improvements on corporate governance will be a key to minimize the private benefits to the controlling shareholders. This can be designed by improving internal monitoring or external monitoring. Internal monitoring can be improved by appointing independent outside directors who can monitor the controlling shareholders from extracting corporate resources from minority shareholders. External monitoring can be improved by facilitating active corporate takeover markets as suggested by Fama and Jensen (1983) and Grossman and Hart (1980).

(4) Abolishment of cross-shareholdings and corporate response to capital investment.

This paper assumes that the policy makers of a nation elect to abolish the cross shareholdings in the economy as an effort to improve on the corporate governance. The dominant shareholders enjoy the corporate control through cross-shareholdings even if they do not invest their own capital in the affiliated firms. The dominant shareholders are entrenched because they virtually have a lock in corporate control through cross-shareholdings. The policy makers enacted such a law with intentions to improve on corporate governance.

This paper develops theoretical models for managerial behavior when the controlling shareholders do not have a lock in corporate control and face threats of losing corporate control from an active corporate acquisition market. The analysis of paper focus on the impacts of the new law on capital investment decisions.

(5) Impacts on call option value of corporate capital investments

When owner-managers evaluate capital investment projects, they conduct the cost benefit analysis. The optimal level of capital investment will be reached when the marginal benefits equal to the marginal costs in the viewpoint of the owners. Based on the marginal analysis, the owner-managers will either take the investment project or pass up the opportunities.

The marginal benefits of the investment projects are in two parts. The first portion is private benefits the controlling shareholders can milk from the investment project before they disclose the cash inflow figures to the public [$V_G\beta$]. The second portion is α percent of value of total cash inflows from capital investments after the owners secretly steal β percentage of cash inflows from the public investors [$V_G(1-\beta)\alpha$].

Marginal costs of capital investment or the strike price of exercising options to grow may vary with the controlling shareholders' equity holdings (α). Assuming that decision is made on the controlling shareholders' viewpoint, the owners' share of capital investment cost is;

$$I_\alpha = I \times \alpha$$

Where, I = Total Capital Investment in a firm

α = controlling shareholders' equity holdings in %

Let $V_B = V_G\beta$, which is a unknown private benefit for a controlling owner and

$V_P = V_G(1-\beta)\alpha$, which is a known public benefit of investment from a controlling owner.

The total wealth of controlling owner depends on the two stochastic variables

V_B and V_G (i.e. it is a derivative) and on the amount invested by owner(I_α).

$$V_W = f(V_B, V_G, I_\alpha)$$

(6) Modeling Option Value of Future Capital Investment

Let $V_B = V_G\beta$, which is a unknown private benefit for a controlling owner and

$V_P = V_G(1-\beta)\alpha$, which is a known public benefit of investment from a controlling owner. So, the investment of controlling owner depends on the following two stochastic variables

V_B and V_P (i.e. it is a derivative) and on the amount invested by owner(I_α).

$$V_{NOV} = (V_B + V_P) - I_\alpha = V_{OV} - I_\alpha$$

V_{OV} is the option value of investment in the private benefit and the public benefit.

V_B corresponds to a private benefit with high volatility investment project and V_G to a

public benefit with lower volatility investment project. If V_{OV} is greater than 0, owner will attempt to maintain the controlling interests (shares). Otherwise, owner will give up controlling shares and instead he/she will focus on a firm's performance.

For simplicity, we introduce two step approach; the first step is option value of benefit and the second step is net option value included investment (cost).

The first part is owner's benefit, which consists of V_B and V_P . These two variables are defined as:

- $V_B = v_B \times B$ represents the portfolio for "private benefit" and
- $V_P = v_P \times P$ represents the portfolio for "public benefit"
- $V_{OV} = v_{OV} \times W$ represents the option value of owner's benefit

Where, v_B and v_P are amounts invested in each benefit

B and P are quantities invested in each benefit

$$v_{OV} = v_B + v_P$$

$$v_{OV}W - V_P = V_{OV} - V_P = V_B$$

We can write: $v_{OV}dW(B, P) = v_BdB + v_PdP$.

The relation $v_{OV}dW(B, P) = v_BdB + v_PdP$ can be rewritten as:

$$v_{OV} \frac{dW}{W} = v_B \frac{dB}{B} + v_P \frac{dP}{P}$$

One way to interpret this formula is to show owner's intention as the value of the option of investing for the private benefit and public benefit, and to treat $V_{OV} = V_B + V_G$ as the value of the premium that should be paid to remove the motivation to pursue owner's private benefit, *under the assumption of risk neutrality*.

$W(B, P)$ quantifies the maximum premium that should be paid to reduce the uncertainty associated with owner's activity. In other words, as long as the actual value of the premium paid for owner's activity is smaller than V_{OV} , it is more advantageous for owner to pursue a private benefit more.

Based on the above formula, $V_P = V_{OV} - V_B$ can be rewritten as:

$$\frac{V_B}{V_{OV}} \left(\frac{dV_P}{V_P} + \frac{dV_B}{V_B} \right) = \left(\frac{dV_{OV}}{V_{OV}} - \frac{dV_B}{V_B} \right)$$

Using Ito's lemma by expanding a Taylor series (The formal proof of this statistical property is beyond the scope of this article), the instantaneous rate of change of that derivative $\frac{dV_{OV}}{V_{OV}}$ can be written as:

$$\frac{dV_{OV}}{V_{OV}} = \beta dt + \gamma dz + \eta dq$$

Where,

$$\beta = \frac{1}{V_{OV}} \left\{ \mu V_B \frac{\partial V_{OV}}{\partial V_B} + \lambda \delta V_P \frac{\partial V_{OV}}{\partial V_P} + \frac{1}{2} \left[\sigma^2 V_B^2 \frac{\partial^2 V_{OV}}{\partial V_B^2} + 2\rho\sigma\delta V_B V_P \frac{\partial^2 V_{OV}}{\partial V_B \partial V_P} + \sigma^2 V_P^2 \frac{\partial^2 V_{OV}}{\partial V_P^2} \right] \right\}$$

$$\gamma = \frac{\sigma V_P}{V_{OV}} \frac{\partial V_{OV}}{\partial V_P}$$

$$\eta = \frac{\delta V_B}{V_{OV}} \frac{\partial V_{OV}}{\partial V_B}$$

β is simply the average of comprehensive effect of (main effect) of owner's total wealth, γ and η are the constantly changing independent effects (drift effect) of two variables, V_B (a private benefit) and V_P (a public benefit) after removing negligible variations (small drift).

Now we can analyze each variable, V_B (a private benefit) and V_P (a public benefit) including negligible variations, using the Geometric Brownian motion with drift, as follows. (We will meditate the validity of that assumption).

(1) A public benefit for owner's investment

$$\frac{dV_G}{V_G} = \lambda dt + \sigma dz$$

Where, λ is the average of public benefit and σ is a drift of λ

(2) A private benefit by owner's investment

$$\frac{dV_B}{V_B} = \mu dt + \delta dq$$

Where, μ is the average of private benefit and δ is a drift of μ

In general, the fact that private benefit has less variability than public benefit (i.e., performance) here could mean that: $0 < \sigma < \delta$.

To allow the possibility of correlations between this two stochastic value (V_B and V_P), we assume that: $\langle dz \cdot dq \rangle = \rho dt$, where $-1 \leq \rho \leq 1$.

Based on The coefficients of dt , dq and dz must separately satisfy the equation. Using the above equations:

$$\frac{V_B}{V_{OV}} = \frac{(\beta - \alpha)}{(\alpha + \mu)} = \frac{(\gamma - \sigma)}{\sigma} = -\frac{\eta}{\delta}$$

Together with $\frac{\gamma}{\sigma} + \frac{\eta}{\delta} = 1$ leads to:

$$V_{OV} = V_P \frac{\partial V_{OV}}{\partial V_P} + V_B \frac{\partial V_{OV}}{\partial V_B}$$

One key observation is that it can be satisfied by assuming (with $x = \frac{V_B}{V_P}$):

$$V_{OV}(V_B, V_P) = P \cdot v(x)$$

Another key observation is that;

$$(\beta - \alpha) = (\mu + \alpha) \frac{\eta}{\delta} = \mu \frac{V_B}{V_{OV}} \frac{\partial V_{OV}}{\partial V_B} + \alpha \left(1 - \frac{P}{V_{OV}} \frac{\partial V_{OV}}{\partial P} \right)$$

leads to:

$$\frac{1}{2} \left\{ \delta^2 V_B^2 \frac{\partial^2 V_{OV}}{\partial V_B^2} + 2\rho\sigma\delta V_B P \frac{\partial^2 V_{OV}}{\partial V_B \partial P} + \sigma^2 P^2 \frac{\partial^2 V_{OV}}{\partial P^2} \right\} = 0$$

This equation is a differential equation for the derivative $V_{OV}(V_B, V_P)$.

Using $x = \frac{V_B}{V_P}$:

$$\frac{V^2 x^2}{2} \frac{\partial^2 v(x)}{\partial x^2} = 0$$

$V^2 = \sigma^2 - 2\rho\sigma\delta + \delta^2$ represent the infinitesimal variance of x , from the definition of x

and Ito's lemma: $\frac{dx}{x} = [\mu - \alpha - \rho\sigma\delta + \sigma^2]dt + \delta dq - \alpha dz$

Let $T = \int_t^\tau V^2(s) ds$ be the cumulative uncertainty up until the time horizon τ .

By definition of T, $dT = -V^2(t)dt$:

$$\frac{x^2}{2} \frac{\partial^2 v(x, T)}{\partial x^2} = \frac{\partial v(x, T)}{\partial T}$$

Using the Kolmogorov backward equation for the stochastic process: $\frac{dx}{x} = d\zeta$.
($\langle d\zeta \rangle = 0$ and $\langle d\zeta^2 \rangle = dT$).

If one defines: $y = \log(x)$, $\frac{dx}{x} = d\zeta$ becomes: $dy = -\frac{dT}{2} + d\zeta$

The backward Kolmogorov equation for y is:

$$\frac{1}{2} \frac{\partial^2 h(y, T)}{\partial y^2} - \frac{1}{2} \frac{\partial h(y, T)}{\partial y} = \frac{\partial h(y, T)}{\partial T}$$

If $f(y) = v(y, T=0)$, the solution is: $v(y, T) = \frac{1}{\sqrt{2\pi T}} \int_{-\infty}^{+\infty} f(\xi) e^{-\frac{\left(y - \xi + \frac{T}{2}\right)^2}{2T}} d\xi$,

This can also be written as (with: $\eta = \frac{\left(\xi - y + \frac{T}{2}\right)}{\sqrt{2T}}$):

$$v(x, T) = \frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f\left(\log(x) - \frac{T}{2} + \eta\sqrt{2T}\right) e^{-\eta^2} d\eta$$

What should we use as boundary conditions $f(y) = v(y, T=0)$?

If we interpret $v(x, T)$ as the maximum premium that should be paid to invest in public benefit instead of private benefit, investing in high technology makes sense only if the premium actually paid ($V_B - I_a$ or $1-x$) is less than the value of $V_{NOV}(V_B, I_a)$. In terms of the variable x, this means that $v(x, T)$ must be larger than $1-x$.

This implies that in the zero uncertainty limit $v(x, T) = \text{Max}[0, 1-x]$.

Remembering that $y = \log(x)$, this implies that $f(y \leq 0) = 0$ and

$$f(y > 0) = e^y - 1 = x e^{\frac{\eta\sqrt{2T} - \frac{T}{2}}}{2} - 1$$

Substituting this form for f(z) eventually yields:

$$v(x, T) = \frac{x}{\sqrt{\pi}} \int_{\frac{\log(x) + \frac{T}{2}}{\sqrt{2T}}}^{+\infty} e^{-\eta^2} d\eta - \frac{1}{\sqrt{\pi}} \int_{\frac{\log(x) - \frac{T}{2}}{\sqrt{2T}}}^{+\infty} e^{-\eta^2} d\eta$$

Which can also be written as (this is our "basic formula"):

$$v(x, T) = x\Phi(d_1(x, T)) - \Phi(d_2(x, T))$$

With:

$$d_1(x, T) = \frac{1}{\sqrt{2T}} \left[\log(x) + \frac{T}{2} \right]$$

$$d_2(x, T) = \frac{1}{\sqrt{2T}} \left[\log(x) - \frac{T}{2} \right]$$

$$\Phi(d) = \frac{1}{\sqrt{\pi}} \int_{-\infty}^d e^{-\eta^2} d\eta$$

Notice: $v(x=0, T) = 0$.

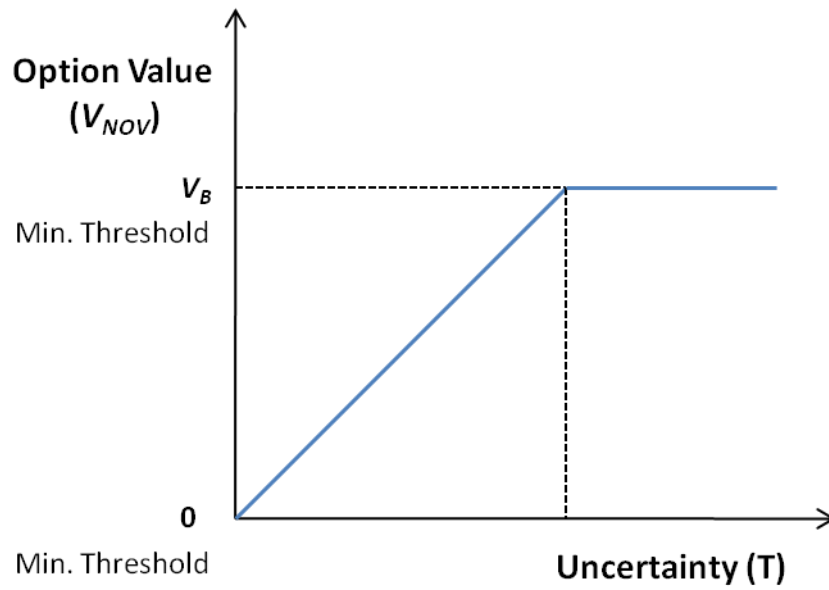
The form of $v(x, T)$ is very similar to Black-Scholes. It differs in at least two important ways: $x = \frac{V_B}{V_P}$ is dimensionless and the interpretation of $h(x, T)$.

The next step is to calculate net option value in owner's benefit compared to investment, which is defined as:

$$V_{NOV} = V_{OV} - I_\alpha$$

As a result, owner wants to maximize his/her net option value;

$$V_{NOV} = \text{Max}(V_B, 0)$$



The formula provides an expression for the equivalent of an option. V_{NOV} is the extra value of private benefit in risk neutral condition. If the controlling shareholders are risk neutral, premium associated with investment project is exactly equal to V_{NOV} . Under this condition, the controlling shareholders will not pursue private benefits from the new investment projects.

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