Ten Years after the Korean Crisis

Crisis, Adjustment and Long-run Economic Growth

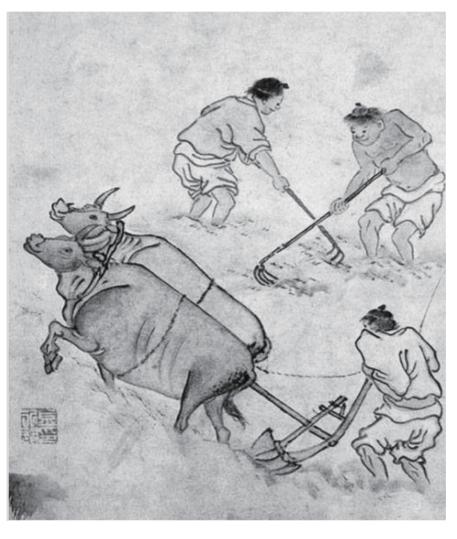


Edited by Meral Karasulu and Doo Yong Yang



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Preface

Most observers would consider the 1997 Asian crisis as the biggest challenge in the impressive economic development of Korea. The Korean economy went through a significant transformation to overcome the unprecedented shocks of the crisis. The resolution of the crisis acted as a catalyst to bring much needed structural change in the financial and corporate sectors. In the process Korea has adopted wide-ranging economic reforms, experienced substantial institutional change and significant improvements in its legal framework.

Notwithstanding this transformation, Korea faces many new challenges. Potential output growth has started to decline and would slow much further if current trends—an ageing population, decelerating capital accumulation, and falling productivity growth—continue. Reversing this trend would require new reforms in the financial sector, the service sector, and the labor market, as well as in social policies. The changes that took place since 1997 greatly enhanced the resilience of the economy, but they also define an economic environment exposed to new vulnerabilities.

In September 2008, ten years after the crisis, KIEP jointly with the IMF organized a conference in Seoul. The objective of the conference was to take stock of the structural and macroeconomic changes that took place since the financial crisis, discuss new challenges and emerging vulnerabilities facing the Korean economy and the policy agenda needed to address them. It was recognized that an exhaustive discussion of these topics over the course of one and half days would be impossible. Instead, the participants focused on selective topics that are likely to remain at the core of policy discussions going forward. We hope that the contributions will not only provide a basis for further discussions to ensure stable long-run economic growth in Korea, but also provide insights for other countries facing similar challenges.

The first section of this conference volume focuses on the major changes in the macroeconomic environment in Korea and the structural changes that took place in the last ten years.

Since 1997 Korea's international reserves grew by more than ten-fold, becoming the fifth largest in the world at end-2008. A similar reserve accumulation trend was observed for other crisis-hit Asian economies. Dooley, Garber and Folkerts-Landau interpret this development within the context of a new international monetary system they call Bretton Woods II. They point out the dramatic shift in the external position of emerging market economies, including Korea from being net importers of foreign savings before the crisis to becoming net exporters of savings after the crisis. They explain how "unnatural" capital flows from developing countries to developed ones can be sustained under the Bretton Woods II system. The authors argue that net capital outflows from developing countries provide collateral to support the far larger gross capital flows between economies of different stages of development and creditworthiness, when there is original sin. This collateral is generated by the free-implicit put offered by emerging market governments to maintain low interest rates in their domestic markets through financial repression and a one way bet on the exchange rate. The authors consider the rapid foreign reserve accumulation in Asian economies, including in Korea, and sustainability of managed floating exchange rate regimes in the region as the outcome of this process. They also offer a critic of arguments against the sustainability of Bretton Woods II.

Korea and many other emerging market economies adopted inflation targeting as their monetary policy framework over the last ten years, a period characterized with generally low and stable inflation rates. The second paper by Park and Wyplosz evaluates the effectiveness of monetary policy under the inflation targeting framework in Korea since 1998. The authors argue that the success of maintaining low and stable inflation rates was mainly due to the strong exchange rate and China's emergence as a low cost competitor, in spite of an expansionary monetary policy. They attribute the increase in real asset prices, in particular in real estate prices, to low interest rates at a time when real appreciation reduced competitiveness of an export driven economy and discouraged other productive investment shifting resources to real assets. They conclude that to continue conducting a credible and effective monetary policy, the Bank of Korea would need to pay more attention to asset prices and exchange rates within its inflation targeting framework.

The third paper by Harm focuses on the financial sector that has gone through a massive transformation over the last ten years. He discusses the

post-crisis consolidation and conglomeration of the Korean financial system, its slow transition from a bank-based to a market-based system and studies the impact of this evolution on profitability and riskiness of financial institutions and their resource allocation efficiency. Harm first points out that the improvement in bank profitability is linked to increased market power following the consolidation in the sector and the sharp fall in loan loss provisions since 2000 and thus may not be sustainable. He also highlights the higher scope for instability associated with increased conglomeration in the system due to increased interdependencies and risks of contagion. He draws evidence from post-crisis corporate financing patterns to highlight the risks of new lending patterns by banks. With increased reliance of large corporates on internal or market based funding and the reduced role of nonbank financial institutions in financial intermediation, banks' relative importance in intermediation has increased and shifted toward SME and household lending. Harm presents evidence that bank lending to SMEs has become more responsive to risk in the post-crisis period, suggesting better allocation efficiency in corporate lending, but warns of the risks associated with banks' larger exposure to highly leveraged household sector and the overall riskiness of SME lending. He also proposes an agenda for remaining reforms, including further development of capital markets to better price and diversify investment risk of a technology-based economic growth model, supervision and regulation of financial holding companies on a consolidated basis, better collaboration among the regulatory authorities, and stronger disclosure requirements to strengthen further market discipline.

Korea's corporate sector has also experienced dramatic changes since the crisis and is now facing new challenges, a topic Claessens and Kang investigate in their paper. They find that financial vulnerabilities in the domestic corporate sector have been largely addressed, although some of the pre-crisis problems, including corporate governance practices, barriers to entry for SMEs, and inefficiencies in the service sector continue to hinder potential growth. Despite the dramatic financial restructuring of corporate balance sheets, the authors highlight remaining concerns about relatively low investment and modest profitability, especially in the presence of new challenges including increased global competition, notably from China, a more appreciated real exchange rate, and declining labor supply. They conclude that all of these challenges point to a continued need to reform the overall business environment, labor and financial markets, and to adopt policies to foster innovation as Korea moves beyond an economic model of

export-led growth based on extensive factor inputs to a more knowledge-based economic model to compete with the most advanced countries.

The second session focused on the new challenges facing Korean economy. We had three papers in this segment on fiscal sustainability, household debt, and productivity of the Korean economy.

The first paper by Fevzioglu, Skaarup and Sved focuses on fiscal pressures that would emerge as Korea rapidly becomes an aging society and pension, health care and long-term care related spending balloons. In addition, the government's desire to increase social safety net spending to average OECD levels by 2030 and potential cost from reunification with North Korea may also put additional pressures on fiscal sustainability. The authors calibrate the IMF's Global Fiscal Model to Korea to analyze the impact of these fiscal pressures in a general equilibrium set-up. Their simulations show that in the absence of reforms, the fiscal deficit increases steadily, reflecting debt-financed expenditure increases and growing interest payments, and public debt rises sharply. This fiscal stance leads to other imbalances, as strong private consumption and investment growth, supported by large public spending, leads to a ballooning external current account deficit. The authors conclude that Korea's long-term fiscal challenges will necessitate reform in a number of areas, including tax base broadening, improved tax administration, pension reform, and expenditure reallocation. Moreover, the earlier these measures are taken, the lower the adjustment costs.

Karasulu and Schiff analyze the emerging risks from increasing household indebtness in Korea. Using both aggregate and household level data they argue that the decline in real interest rates and supply side factors, such as the competition by banks to extend retail market share appear to have played an important role in increasing household debt. Their analysis also suggests that most of the increase in debt can be attributed to above-median-income and older households and is closely linked to homeownership. The authors conduct a set of stress tests and conclude that an increase in interest rates of 100-300 bps could on average lead to about a 5-11 percent increase in distressed household debt. They point out that further improvement of risk management capacity of financial institutions, including a more pro-active approach in monitoring household lending would be needed to limit the risks from rising household indebtness.

Pyo's paper focuses on the productivity growth and structural changes before and after the Korea crisis based on a multi-sector growth accounting model. The paper examines the sources of the growth slowdown after the crisis and finds a reversal in respective roles of factor inputs and total factor productivity(TFP). While in the pre-crisis period of 1984-97 the key contributor to growth was capital intensity, in the post-crisis period TFP appears to be more important, as exemplified by developments in the ICT sector. Pyo also estimates potential GDP growth by explicitly accounting for capital utilization rates and natural rate of unemployment and finds that the slower growth of per capita GDP below its estimated potential in the post-crisis period is mainly due to sluggish demand.

The third section of this volume explores the agenda for the next ten years in the Korean economy.

A well educated labor force has been cited as a key contributor to Korea's success.

The first paper of this section by Kim looks at the changes in labor quality among new college graduates based on their labor market wages. After controlling for aggregate skill prices and market experience effect, the estimates indicate that the quality of male college graduates has fallen in Korea both absolutely and relatively. He explains this based on two hypotheses. First, the average ability of college graduates may have fallen as an increasing share of population goes to college. Second, Korea's education system, which has gone through many changes, may have not been as productive as in the past. Going forward, improving the efficiency of the education system would be needed to ensure human capital keeps up with the demands of a knowledge-based growth model.

Many emerging economies, including Korea, have adopted export-oriented economic growth models. However, despite a multitude of cross-country studies, the empirical relationship between trade and growth remains ambiguous. Sohn and Lee's paper incorporates new trade structure variables—adopted from theoretical trade models—to address some of the methodological problems in isolating the impact of trade on growth within the context of a dynamic panel estimation model applied to 66 countries and then to East Asia. They find that unlike in the rest of the world, trade structure appears to be less important for growth in East Asia, and instead, factor inputs, such as capital accumulation, natural resources and human capital are more important in explaining growth in the region. They also point out that free trade arrangements have not contributed significantly to growth, perhaps reflecting the loose trade integration of the ASEAN free trade area. It is safe to say that the sustainability of export-driven economic

growth model for the region will remain an important policy question.

Kwark, Rhee and Yang's paper compares the post-crisis macroeconomic adjustment trends in Korea with other post-crisis episodes, in particular in Latin America and other Asian economies. They find that Korea's and Asia's recovery was closely linked to a stronger current account adjustment following the crisis, but unlike Latin America, was also associated with lower investment rates. A growth accounting framework for Korea then looks at sectoral details of changing growth patterns, and confirms the importance of declining total factor productivity growth, especially in services sectors, in explaining lower post-crisis growth rates. The authorities point out the importance of services sector for future growth in Korea and based on cross-country analysis, conclude that deregulation would be essential to improve faster productivity growth in the services sector.

This volume would not have been possible without the contributions of many people. First of all we would like to thank the authors and the discussants for their contributions to this volume and insightful discussions during the conference. We also would like to thank Yeonsil Kim, Seunghwan Oh, and Jung Woon Kim of KIEP and Hyeon-Sook Shim of the IMF Seoul Office for their valuable assistance and support with the conference organization and this volume.

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Session I

The Korean Crisis and Economic Changes

Korea Ten Years after the Crisis: Collateral and Reserve Accumulation

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Many important changes in the Korean economy and the world economy since 1997 make an assessment of what we have learned in the past 10 years a difficult undertaking. In this paper we focus on the dramatic shift in Korea and in the aggregate of all emerging market countries from net importers of foreign savings from 1990 through 1997 to net exporters in the 10 years that followed the crisis. Because the United States has been the dominant net importer of savings from international capital markets since the crisis, conventional analysis suggests that this is an unnatural and unsustainable regime. The idea that capital should flow downhill from rich countries to poor countries seems to be an obvious theoretical result as well as appealing to normative opinions about the fair or proper role for international capital markets.

Nevertheless, the performance of the Korean economy and other Asian emerging markets in terms of economic growth, low inflation, and financial stability has been remarkable under this "unnatural" regime. In a series of papers we have tried to understand the origins of this success and the stability of what has come to be known as "Bretton Woods II." While our primary objective is to understand the current system, in a recent paper we have also begun to set out our doubts about the theoretical foundations of the conventional approach to international capital movements. These doubts spring from a fundamental question of fact about the incentives to repay international debt. We do not have much faith in the comfortable view that

creditors trust debtors to repay because failure to do so will trigger exclusion from future credits. That is not the way domestic credit markets work and we see no good reason to believe that international credit markets inspire greater trust.

The alternative enforcement mechanism is collateral. Specifically, we have argued that net capital outflows from poor countries provide collateral to support the far larger gross capital flows between economies of different stages of development and creditworthiness that are at the heart of successful development.¹⁾ In this framework, US current account deficits and reserve accumulation by emerging markets do not generate ever-rising global risks. To the contrary, the cumulating net *accounting* imbalances exist to preclude the *risk* imbalances that would otherwise cumulate to stifle the gross capital flows. We have proposed a unified theory of net and gross capital flows and a useful concept of imbalance based on the standard risk management arrangements of the financial markets.

Accounting imbalances taken alone are an arbitrary and unworkable metric of risk. Balanced trade in assets creates an imbalance of risks for residents of the rich and poor countries. The rich country is not likely to seize foreigners' assets on a populist whim. In fact, it probably got rich by respecting property rights. Governments of the poor countries often will be tempted to exercise their sovereign power to expropriate foreign investment for populist or geopolitical reasons. In the numerical example we set out below, part of this incentive simply reflects the much higher productivity of foreign investment in the poor country and its consequent large capital gains.

1. RESERVE ACCUMULATION AND COLLATERAL

In this section, we update and extend calculations that suggest that emerging market reserves are collateral for gross equity liabilities to nonresidents. We reproduce and extend data published in our 2004c paper;

¹⁾ At http://www.frbsf.org/economics/conferences/0502/index.html, see Dooley, Folkerts-Landau, and Garber, "The US Current Account Deficit: Collateral for a Total Return Swap" (September, 2004). Also, see (October, 2005) International Financial Stability, Chapters 5 and 9 at

 $http://econ.ucsc.edu/{\sim}mpd/InternationalFinancialStability_update.pdf\ .$

and we show that the near doubling of Chinese reserves from 2003 to 2006 is consistent with this collateral interpretation. This is an out of sample test because we use the same methodology and parameters as in our earlier paper. Moreover, we show that data for 49 emerging markets are consistent with the same methodology and parameters.

It is useful to compare the implicit contract between the center and the periphery to a standard derivative contract: a total return swap. A total return swap is a promise by one party to pay the total return (capital gains plus dividends) on the notional amount of an asset such as an equity or equity index for some future interval in exchange for receipt of fixed income on notional principle over the same interval. The interesting aspect of such contracts for our argument is that the less creditworthy party to the contract is required to post collateral for actual and potential mark to market losses. Failure to provide the collateral terminates the contract, effectively a cancellation of principal on both sides, and a taking of collateral to cover at least the current market value.

The application of this contractual arrangement to the international monetary system is straightforward. The emerging country receiving equity investment promises to pay the total return on the equity investment. Since there is a net capital outflow from the emerging country, the equity inflows are more than financed by a claim against the balance sheet of the rest of the world. In the simplest case, these claims take the form of fixed income liabilities of the rest of the world. This produces exactly the basic structure of a total return swap on equity.

The "original sin" of the emerging country is that it is born a credit risk and that the expected present value of the swap will have to be matched by collateral, as well as some additional coverage for future valuation risk. But how much collateral is needed, and what form does it take?

In typical private sector total return swaps, collateral is determined by multiplying potential volatility of the underlying asset over the next 10 days by a factor dependent on the credit risk of the counterparty. For a total return swap on a highly liquid US equity, a hedge fund (less creditworthy) would be asked for 15%; for the S+P index 10% collateral would be required; for swaps involving China equities 50% initial margin would be required.

But this is only the initial collateral required for new investment. If, as seems likely, the total return on direct investment exceeds the return on the fixed interest leg, 100% of the mark to market gain on private contracts must be collateralized every day. The implication is that, in addition to the

collateral required for the new flow of direct investment, the mark to market gain on the stock of direct investment requires additional variation margin.

The mechanical but important implication is that a successful development strategy—where investment pays off with large returns—generates capital gains on direct investment and therefore rapid growth of collateral balances.

We can get a feel for the economic importance of these effects by estimating what collateral would be required by private investors for direct investment in China and other emerging markets. The first row of Table 1 shows annual data for the cumulated flow of foreign equity investment into China from 1991 through 2006. Row 2 shows the mark to market value of cumulated FDI assuming a 10% capital gain on the previous year's stock of investment. Row 3 shows the new initial collateral that would be required for the flow of direct investment in each year assuming that the aggregate implicit contract carries the 50% collateral required for private total return swaps with China. Row 4 shows the new variation margin required each year for the net capital gain on the stock of equity investment. This assumes that there is 100% collateral required against mark to market gains.²⁾ The implied cumulated stock of collateral is shown in Row 5. In 2006 the stock of collateral would be about \$912 billion, an amount larger than the book value of direct investment because of capital gains.

The stock of international reserves is shown in Row 6. In 2006, the stock was about \$1,069 billion, clearly the right order of magnitude if we interpret the government's reserve assets as the primary measure of collateral.³⁾

Table 2 shows the same calculations for 49 emerging markets contained in the IIF database. The striking result is that once again there is a close correspondence between the level and growth of reserve accumulations for this diverse set of emerging markets and the collateral requirements for their inflows of gross foreign equity investments.

The nature of the social collateral is so obvious it is hard to see. If the center cannot seize goods or assets *after* a default, it has to import the goods and services *before* the default and create a net liability. If the periphery then defaults on its half of the implicit contract, the center can simply default on

²⁾ In our (2004c) paper, we did not include "gains on gains" in this calculation. This error is corrected here.

³⁾ See Dooley (2000) for a discussion of alternative measures of collateral against investments in emerging markets and the role of collateral in financial crises.

its gross liability and keep the collateral. *The periphery's current account surplus provides the collateral to support the financial intermediation that is at the heart of development strategies.* The interest paid on the net position is nothing more than the usual risk-free interest paid on collateral.

Table 1. Chian-Collateral and Reserves

	\$ Billion															
	<u>1991</u>	1992	1993	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	2000	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	2005	2006
FDI Cumulated Book	4	11	36	70	104	144	192	233	271	315	354	403	457	521	610	703
FDI - Mark to Market	4	12	37	75	117	169	233	298	365	446	529	631	749	888	1065	1265
50% Initial Margin	2	4	12	17	17	20	24	21	19	22	19	25	27	32	44	47
100% Variation Margin	0	0	1	4	8	12	17	23	30	37	45	53	63	75	89	106
CollateralTotal Stock	2	6	19	40	65	97	137	181	230	289	352	430	520	627	760	913
Reserve Stock	22	21	22	53	75	107	143	149	158	168	216	291	408	615	822	1069

Table 2. All Emerging Markets-Collateral and Reserves

	\$ Billion															
	<u>1991</u>	1992	<u>1993</u>	<u>1994</u>	<u>1995</u>	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>1999</u>	2000	<u>2001</u>	2002	<u>2003</u>	2004	2005	2006
FDI																
Cumulated Book	19	47	93	190	290	399	528	679	819	995	1166	1329	1458	1613	1813	208
FDI - Mark to Market	19	49	100	207	327	469	646	860	1086	1371	1680	2011	2341	2729	3202	3793
50% Collateral Initial Margin	10	14	23	49	50	55	65	75	70	88	86	82	65	77	100	135
100% Variation Margin	0	2	5	10	21	33	47	65	86	109	137	168	201	234	273	320
CollateralTotal Stock	10	25	53	112	182	269	381	521	677	874	1096	1346	1611	1922	2296	275
Reserve Stock	183	231	297	354	461	553	594	640	692	765	852	1033	1363	1804	2224	281

Source: IIF, Deutsche Bank Discrepancies due to rounding

2. BWII GOES ON AND ON AND...

The core predictions of the Bretton Woods II interpretation of the international monetary system remain intact. The large US current account deficit has been, and is generally expected to be, financed by dollar bloc

emerging market countries at low real interest rates for many years more, as indicated by low market long-term real interest rates. Low rates in the US and other industrial countries support asset prices that look high by historical standards at this stage of the business cycle but are fully consistent with the unusual combination of low market discount rates in a period of rapid growth, high profit, and low inflation. In this environment, credit risks are low on older projects, and credit spreads reflect this fact.⁴⁾

Indeed, the academic literature and financial press are now littered with discarded, once-authoritative opinions on how the system would soon end from its own weight. For many years, however, proponents of the conventional textbook theory have steadfastly maintained their adherence to the model. Early on, they claimed that the system would adjust naturally over the middle term with a large USD depreciation. When this failed to happen, they produced long lists of reasons: savings exporting economies would overheat, official sectors in either savings exporting or importing countries would react to the negative effect on their economies, private speculators would run the system, or protectionism or geopolitics would bring it to an end.

The idea that the system we describe is inherently unstable is logically flawed in our view and in any case has not been supported by the last four years' events. Central banks have not reduced the rate at which they have accumulated reserves, and they have not diversified out of dollars.

In this section, we will briefly summarize this list of once-looming catastrophes or rationales and comment on them. In most cases, our comments will be brief, and we will provide references to publications where we have discussed these issues in more detail. In the few cases of recent developments we will provide a more extensive critique.

⁴⁾ At a given high real interest rate, the marginal projects on the marginal efficiency of investment curve are risky by their nature. If the long term interest rate suddenly drops, they become infra-marginal, and an entire new range of projects that previously looked like losers become profitable and even low-risk. Spreads on previously undertaken projects would then narrow. Eventually, the infra-marginal projects would be exhausted, and a new crop of marginal risky projects would be undertaken at the low interest rate. The return of risk would be reflected in a return to wider credit spreads for these cumulating marginal projects. Of course, well-performing older projects can always be made riskier at lower rates by leveraging them up through buy-outs.

2.1. Precautionary Reserves from Asia Crisis

The initial rationale for the net export of savings was that Asian countries were building excessively precautionary war chests of foreign exchange reserves in response to the Asia crisis of 1997. Once they realized that they had accumulated more than enough they would stop, thereby eliminating the unnatural imbalances and reversing the low interest rates. When they maintained and even accelerated their reserve accumulation in recent years, this story faded away, although it is still heard as a secondary echo even now.

2.2. US Profligacy

This argument expressed the view that the US current account imbalances were driven by excessive US demands for foreign capital because of both declining private savings and the shift of the fiscal balance from a small surplus to a deficit.⁵⁾ Thus, it required only a shift in US fiscal policy to bring about the adjustment. If this were true, the result should have been a jump up in US and world interest rates, not the dramatic jump down that has persisted. So it is not a giant leap to conclude that, quite to the contrary, we have observed predominantly a savings supply phenomenon. Also, the US fiscal deficit was little different from those of the major EU countries and much better than Japan's in the face of a much better nominal and real growth performance over the past five years. Finally, as the US fiscal deficit fell significantly, the current account deficit widened. We do not hear this story so stridently pushed any more, but US fiscal policy tightening is still on the table as part of the global adjustment.

2.3. China Will Overheat

This argument was first test-marketed in 2003 when China's inflation was moving up from -0.8% in 2002 to above 3% by 2004.6 The argument is

⁵⁾ For a recent version, see Rogoff (February 2007).

⁶⁾ Goldstein and Lardy (August 26, 2003), (November 2004) discussed this in terms of the distortions in the financial system, difficulty in sterilization, and the inevitable boom, hard landing cycle that the undervaluation of the exchange rate was causing. Greenspan (June 2005) also made the argument in Congressional testimony, although not as urgently.

the standard one that sterilization of large foreign exchange intervention is imperfect and will eventually fail, leading to rapid inflation. This would then force the end of the policy. This has not happened in the four years since it was broached. With the most recent growth rate at 11% and the rate of foreign exchange purchases growing, warnings of overheating have appeared again in an attempt as a sequel. It seems that there is a four-year cycle on this song-book classic.

2.4. Since Japan has Different Motivations from China, the System will End when Japan Stops Intervening

This argument arose in 2003 and early 2004 when Japan intervened in the foreign exchange markets in record amounts in order to pull itself out of its recession and deflation. But when the Ministry of Finance did cease intervening after Q1 2004, the zero interest rate policy continued, and the private sector picked up the ball and continued exporting capital at a rate of 3.7% p.a. of GDP. Effectively, the intervention had put a floor on the yen, which made for a lower-risk carry trade. Again, the forecast demise of the system has proven premature.

2.5. Too Much Mark-to-Market Risk from Excessive Reserves

The inevitable appreciation of the Asian currencies will impose large domestic currency losses on central banks and finance ministries. Therefore, they will stop intervening soon rather than face this cumulating political and economic disaster. For some countries, e.g. Korea, the losses from allowing appreciation created political problems and forced a cessation in intervention, but not permanently, as it was realized that Korea was becoming less competitive. China, on the other hand, accelerated its reserve accumulation. In Japan, with the yen around 120, no losses have been realized on its 2003–2004 interventions; and the official sector itself has booked gains from the carry trade. Most Western macroeconomists with a voice have warned China of this problem and several National Bureau of Economic Research (NBER) China missions packed with top minds have been sent to inform those officials who still do not know. But this has not moved China; perhaps there are motives afoot that are greater than localized P&L optimization on the fx book.

2.6. China's Exchange Regime Change is the Beginning of the End

This shift from a hard fix to a crawling peg in July 2005 was regarded as the start of the inevitable break-up of the system. Since the initial 2.1% nominal appreciation, the renminbi has appreciated 5.8% more vs. the dollar, but the real trade weighted exchange rate has depreciated, and China has dramatically stepped up its foreign exchange interventions.

2.7. The Global Private Sector Will Run on the Central Banks that Support the System

Recognizing the one-way bet on appreciation, the private sector was expected to launch buying-in attacks on the central banks that were keeping their currencies weak via intervention. The pressure put on the central banks to sterilize and avoid overheating would be unbearable and the system would break. Evidently, the controls have been sufficient to prevent this or the central banks have been willing to maintain the system even at this additional cost.

2.8. Reserve Diversification

Eichengreen (May 2004) circulated an historical and game theoretic view of the pressure for reserve diversification among surplus countries. Since the dollar would inevitably depreciate, and soon according to the conventional view, the system was extremely fragile and would be pulled down by a first-out-the-door run by central banks themselves from the dollar to the euro or even the ven.

The financial press picked up this view and for a while a fashionable debating style at academic conferences was to wave fistsfuls of headlines announcing the imminent end of the era.⁷⁾ This actually was a self reinforcing activity—the financial press generally was quoting the opinions of those who waved the headlines.

All this talk of an impending dollar collapse reached a crescendo at the

⁷⁾ In our view, the current system does not suffer from the same source of instability as the original Bretton Woods System. In that system the US was obliged to exchange gold for dollars at a fixed price, a commitment that did lead to inherent instability. In the current system the alternative reserve asset, the euro, is not fixed artificially to the dollar.

end of 2004 with the euro at \$1.36. Two and a half years later, the central banks in general have still not significantly diversified, and collectively have accelerated their acquisition of reserves. The euro is again around \$1.36 because of the asynchronous business cycles, having fluctuated mostly between \$1.20 and \$1.28 in the previous two years. The yen has since depreciated by around 15% against the USD. Asian currencies, in particular the renminbi, have appreciated in nominal terms amidst record foreign exchange interventions, again mainly in USD. But except for the won, the real exchange rates have moved very little.⁸⁾

The reserve diversification argument has frequently been played side-by-side with the mark-to-market loss argument above. But if currencies like the renminbi actually do begin to appreciate dramatically, they are likely to appreciate strongly against currencies like the euro as well.⁹⁾ To us, the diversification fixation has the look of a marginal, if not a losing, game.

2.9. The High Price of Oil Will Break the System

Another popular claim among the proponents of the standard model is that the rise in the price of oil has masked the collapse of the Bretton Woods II regime because Asia is no longer the principal financial prop of the system. It is clear that a significant part of the US current account deficit in 2005 and 2006 was to pay for more expensive oil. It is also clear that the oil exporters accounted for more reserve accumulation than the other emerging markets in 2006. Our conclusion, identical to that of everyone else, is that the US and all the other oil importers must have financed part of their current account deficit from investments by oil exporting countries.

But this does not help to answer the question of what happens when oil prices stabilize. We think that nothing would happen to the Bretton Woods II system. We agree that OPEC countries will eventually start consuming their new wealth levels. When this occurs the US will have a smaller current account deficit and OPEC investments in dollar assets will also subside. We do not see how this would affect the relationship between the US and other

⁸⁾ Even so, there is a continuous, almost daily, effort by researchers to tease out the currency denominations of foreign exchange reserves and to find some deep meaning in them.

⁹⁾ On this point, see our analysis of the dynamics of the system, "Living with Bretton Woods II," Chapter 4 in our (2005d) paper.

emerging markets.

2.10. Using the Savings-Investment Identity to Make Behavioral Inferences

An important argument that has been used to support the conventional model is based on the savings-investment identity. A country's current account imbalance is identically equal to the difference between domestic investment and domestic savings. The world's current account is identically zero. It follows that it must be possible to explain any change in the pattern of current accounts by changes in saving and investment in each region.

In the past few years, the dominant change has been a fall in the Investment/GDP ratio in emerging markets and a fall in the savings rate in the United States. This certainly works in that an *ex ante* shift in the investment rate in emerging markets could be offset by an independent fall in savings in the United States. Moreover, income would not be affected in either region.

There are three flies in the ointment. First, it would be remarkably lucky for these events to occur independently. Given a fall in *ex ante* investment in emerging markets, economists in general would have expected a fall in income in these countries and a fall in *ex post* savings to balance things out. We would not have forecast a rise in net exports sufficient to offset the fall in investment at unchanged levels of output. But if there was a simultaneous and exogenous fall in US savings, and if this increased absorption fell entirely on EM exports, we could get the observed current account pattern at unchanged exchange rates. Thus, observers point to the fiscal deficit in the US and a bubble driven fall in household savings as an exogenous cause of the US current account deficit.¹⁰⁾ But notice that world savings and investment have not changed in this story, so the world interest rate should also remain unchanged.

To explain the fall in real interest rates, we need another story. There are two equally unconvincing versions. First, there could have been a world glut of savings independent of this redistribution of savings. That is a nice story, and has had the weight of the Fed behind it, but is simply inconsistent with the data. The world savings ratio has not changed, so we have to look elsewhere.

¹⁰⁾ Rogoff (February 2007).

¹¹⁾ Bernanke (March 2005).

What to do? When you run out of variables, invent a new one and call it "liquidity." Interest rates are low, it is argued, because the system is awash in liquidity. Embarrassingly, this is an argument frequently invoked these days by market professionals.

But what is it? Perhaps central banks create liquidity. It is true that central banks set the short term interest rates, but it doesn't help much to say "liquidity" means low overnight interest rates, and this accounts for low interest rates. This is more transparently circular than most arguments that we hear from market commentators. Is liquidity a stock like money? Central banks are not creating much money. And anyway, we used to look for inflation as the sure symptom of too much liquidity. But excessive inflation is exactly the phenomenon that we do not observe. ¹²⁾ Maybe liquidity means low risk premia and the narrow spreads we observe for what we might in the past have considered hare-brained projects. But again, we already have a variable called risk premia.

2.11. Shifting Tastes for Assets Fail as a Prop for the Conventional View

Some serious theoretical efforts have been made to adapt the standard model to make it consistent with recent evidence. The core predictions of the conventional model can be softened if we add to it an assumption that private preferences for US assets have changed. It is clear that private gross capital inflows to the US have been very large in spite of low real yields and rising perceived risks, and this seems to suggest that there has been a shift in private preferences toward US assets. As argued above, Caballero *et al.* (2007) propose private collateral as the reason for the shift toward US assets. Cooper (2004) has argued that innovations and rapid growth in US financial markets are behind the shift. Blanchard *et al.* (2005) do not provide a reason for the shift but analyze the consequences of such a shift if assets are not perfect substitutes in private portfolios.

Our approach does not depend on a shift in private preferences toward dollar or US assets. It depends on the distortion of private capital flows by

¹²⁾ Since lack of inflation is deadly to an "excess liquidity" view, its proponents often take a "shoot the data" position in arguing for new index construction to capture the inflation that is invisible to the old. After all, do not people pay much more for gasoline than they did a few years ago? Haven't asset prices like housing leaped also?

observed and expected government intervention to manage the exchange rate. Moreover, we provide a compelling reason for governments to shift their portfolios toward dollar and US assets. Observed private purchases of US assets are generated by the free-implicit put offered by emerging market governments to their own and the rest of the world's residents. It makes sense for private investors to hold dollar assets if emerging market governments maintain low interest rates in the home market through financial repression and provide a one way bet on the exchange rate. In markets dominated by government intervention and controls, there are no pure private capital flows. Each purchase of a US asset by a private nonresident is matched by an implicit government commitment to acquire that US asset in the event of trouble.

2.12. Finding Refuge in the Bubble Tautology

Having for many years run through the list of arguments for why the system will soon collapse and still with no success in sight, the proponents of the textbook theory have generally moved into bubble arguments.¹³⁾ The reason that the system has not yet collapsed is that market speculators have been too lazy or slow-minded to do the simple arithmetic that shows that it will collapse. Or they are working from the delusional belief that the emerging market central banks will continue to intervene for a long time, or from a different delusion that lightning will not strike from the protectionists or geopolitical events. In all these cases, the proponents of the textbook models know that assets in general are extremely overpriced.

Its proponents continue to embrace the correct conventional model and berate the asset markets that are delivering the wrong prices. "My theory's forecasts" plus "the extent of the asset markets' mispricing away from my theory's forecasts" is always identically equal to actual asset prices, i.e. a tautology. Arbitrary invocation of bubbles is always done to avoid facing the evidence that is undermining one's favored theory. Although often covered with a veneer of scientific jargon, it is authority's last bastion of denial in sustaining a seriously depreciated theory.

Most critics of the view stated in this section's first paragraph have by now become heavily invested in the bubble/liquidity glut/Wile E. Coyote interpretation of this reality.

¹³⁾ See e.g. Rogoff (March 2007).

That is, we have already run off the cliff and will crash when we realize that we are running on thin air.¹⁴⁾ We acknowledge the clarity of this approach: it recognizes that the conventional model of how the system works is simply unable to explain the core developments of the last five years. So, to carry on, they must resort to tautology by making untestable claims of market bubbles and then just wait for the inevitable.

Since the current situation is impossible according to the accepted model, it will vanish like a pleasant dream when the market wakes up into an unpleasant reality. The longer the dream lasts the more likely and more painful the morning after.

Our interpretation is just the opposite: the conventional textbook model is a dream and its practitioners will eventually snap out of it, as year-after-year the data refute it. We like this approach because all everyone has to do is wait to see who is dreaming; and in the interim, we can take positions on the difference of opinion. Over the past four years of global macro history, we have not been disappointed. We were strongly criticized in 2003 for claiming that the system would last for ten years, when academics and market practitioners alike claimed the end was imminent. The system is still on track for the last six of the ten.

3. CONCLUSION

The mechanism of modern large scale development is quite straightforward. Rapid industrialization requires a large inflow of direct and portfolio equity investment; and, in turn, a large current account surplus for the periphery is required to provide the collateral. Contrary to almost universal opinion, successful economic development is powered by net savings flows from

¹⁴⁾ Within Roubini's descriptions (e.g. May 2007), a persistent sprinkling of bubbles can be found on most pages referring to the failure of a wide swath of asset markets to price the massive risks in the system. Summers (December 26, 2006) provides a careful description of the conflicting views of market practitioners and academics on whether asset prices reflect such risks. But after guiding the reader through a number of large, seemingly undiscounted risks, he appears to swing over to the mispricing side with his closing quip: "perhaps the main thing we have to fear is lack of fear itself."

http://www.ksg.harvard.edu/ksgnews/Features/opeds/122606_summers.html

poor to rich countries. The current account imbalances of the rich countries do not pull the periphery along by providing global net aggregate demand; they push the periphery by securing efficient capital formation. Seemingly balanced shifts within a country's capital account actually drive its current account through a need to collateralize resulting risk imbalances. The US current account deficit is an integral and sustainable result of its role as the center country in the revived Bretton Woods system.

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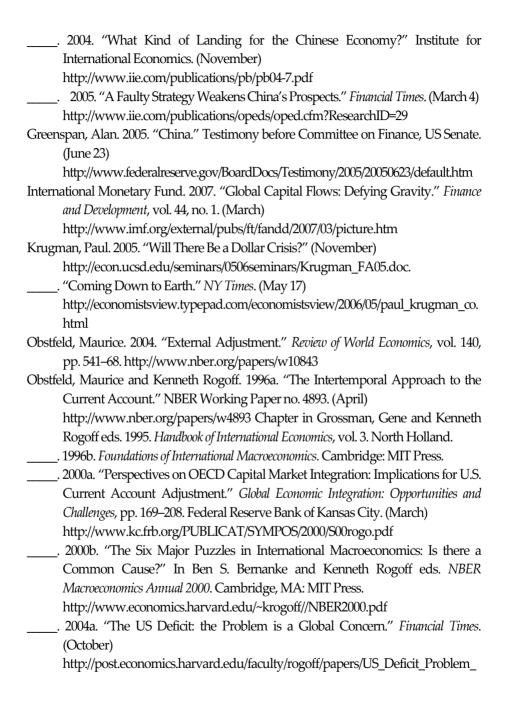
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Comments on "Korea Ten Years after the Crisis: Collateral and Reserve Accumulation": Two Crises of International Economics

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In brief, this paper focuses on industrialization and globalization. Emerging economies used to have very high savings, and these savings go to rich countries and current account imbalances increase. A large influx of direct and portfolio investment comes into emerging economies from rich countries and these large current account surpluses are required to provide collateral. Here Michael Dooley's point is presented from an Asian perspective.

Korea, China, and Japan have been accumulating trade surpluses. The inflow of USD comes to each country. Then these accumulations are in the central bank in the form of government and private savings. Government savings are mainly invested in US treasuries. Private savings go into stocks and bonds and US treasury securities as well.

Why do Asian government and private savings go to the US? The first is trust and security. In addition, US technology in financial allocation of assets is much more efficient compared to Asian institutions. This is why many Asians prefer to put their money into the US. Many Asian countries have weak financial institutions, asset allocations are not as good as in the US, and there is less of a variety of financial products compared to the US. In the US, there are plenty of financial products, from safe to risky assets. That is why portfolio allocation in Asia is less preferable compared to rich countries. Finally, skills and information acquisition of US financial institutions may be far superior.

Many Asian countries have more than 40% GDP savings. However, we also have a very high investment ratio to GDP. But the capital flows are not occurring within the region. The direction of portfolio investment is from

Asia to overseas. Portfolio investment from Asia to the US is 42.8% and 37% goes to Europe. Only 8.2% of Asian portfolio investment remains in Asia. Where do Asians raise money? From the US comes 37% and 30% comes from Europe. Only 8.9% comes from Asia. That means that in Asian countries, there are huge savings, but most of the savings go to the US or Europe as portfolio investment, then the financial institutions in the US reallocate those assets into Asia and all over the world. But Europe is different: 65.56% of European money is circulated within Europe. The financial flow from Asia to the US or Europe is very different from the European case.

The collateral and sovereign debt problems are interesting. Domestic financial institutions prefer to keep collateral. Of course, collateral plays a central role in the banking system, especially loans, but not in stocks and bonds investment. In addition, gross capital flows improve the efficient allocation of capital. That applies directly to Asian countries. Also, Asian countries do not prefer to circulate their money within Asia, but prefer to put it in the US because doing so will result in a much higher yield and more efficient allocation of capital.

Inflation Targeting in Korea: Success, Good Luck or Bad Luck?

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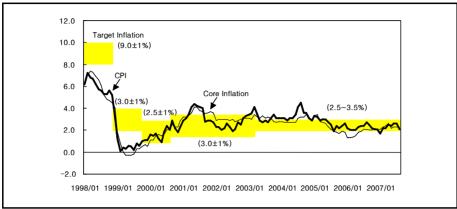
1. Introduction

Since the 1987–1998 Asian Financial Crisis, many emerging economies in East Asia have chosen price stability as the main objective and inflation targeting as the framework of monetary policy. Korea is no exception. Since 1998, the Bank of Korea (BOK) has managed a system of inflation targeting. Until 2006 core inflation was the target and the overnight call rate was the operating target (the BOK 2003). Since 2007, the Consumer Price Index (CPI) has replaced core inflation as the new target as consumer prices are more familiar to the general public and measure better changes in the cost of living. Currently there is discussion underway on the desirability of using the repurchase bond rate as the new operating target.

Inflation targeting rests on the recognition that for achieving sustainable growth "it is important above all else that inflation expectations.... should be stabilized" (BOK 2007). In order to achieve this objective, the BOK announces an explicit inflation target in terms of a range and implements monetary policy to induce inflation expectations of the general public to converge with the target. The current target for the 2007–2009 is set as a range of 3% plus or minus 0.5%. However, this price stability objective does not mean that the BOK ignores other policy goals such as employment and financial market stability. The Bank follows what it calls an eclectic approach; it establishes an order of priorities among its multiple goals and then sets policy on the basis of its judgment of the economic situation.

Figure 1. CPI, Core Inflation, and Inflation Targeting

(Year on Year Change, %)

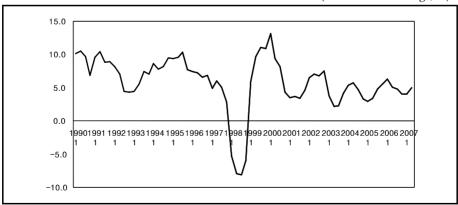


Sources: ECOS(Commission for Economic and Social Policy), Monetary Bulletin, Bank of Korea.

The procedure described by the BOK (2003) is as follows. The BOK first forecasts CPI and core inflation using an econometric model. The results are then supplemented by primary data linked to future inflation and various indicators that signal inflationary pressure. This determines whether policy changes are called for.

Figure 2. GDP Growth

(Year on Year Change, %)



Sources: ECOS, Bank of Korea.

Second, even if expected inflation is likely to move out of the predetermined target range, the Bank may not tighten credit conditions by raising interest rates for the sake of price stability alone. It takes into account developments in the real economy and the financial markets. Third, once it has been decided to adjust interest rates, the central bank determines the scale of the adjustment. It relies on econometric models for the adjustment but, well-aware of their limits, the BOK follows the "Greenspan's baby-step" and moves its instrument—the call money market rate—in steps of quarter of a percentage point when adjustment is advisable but not absolutely essential and in steps of half a percentage point when adjustment is deemed crucial.

A casual observation of the record of core inflation leaves little doubt that inflation targeting has been successful in Korea. Inflation has declined (Figure 1) while growth has partially recovered from the crisis (Figure 2). Arguably, good luck has provided a helping hand. Over the last decade inflation has subsided worldwide and growth has been robust over recent years. As a relatively small and increasingly open economy, Korea has undoubtedly benefited from this favorable environment. On the other side, not all is perfect and bad luck may have played a role too. Growth is still low by historical standards and productive investment has remained disappointingly low.

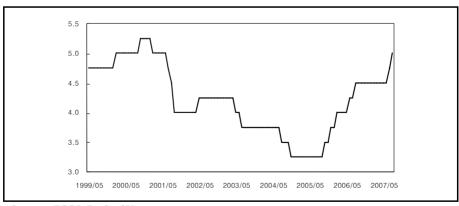


Figure 3. Target Call Rate

Sources: ECOS, Bank of Korea.

A significant real exchange rate appreciation has dented international competitiveness in a country long wed to the export led growth strategy. Real asset (shares, housing, and land) prices have risen to a disquieting level. Ample liquidity in world financial markets, possibly a consequence of generally low interest rates, is perceived as the root cause of asset price increases, which in some cases look like bubbles, in both developed and emerging market economies. Here again, Korea is not alone; interest rates have continuously declined since 1998, as seen in Figure 3. Could it be that the inflation targeting strategy has failed to deal adequately with asset price bubbles?

In the next section, we start by broadly reviewing the disinflation process and we argue that the BOK has benefited from favorable international conditions. We look at the details in Section 3. We first point out an apparent inconsistency between increasing share prices and a low investment ratio. The solution to this puzzle, we argue, is the low and declining rate of return on capital. This raises another puzzle: why, then, are share prices rising? We argue that both domestic and foreign investors have jumped on the bandwagon of capital gains in a process known to generate bubbles. Not only does this argument explain the continuous process of share price increases, it also explains the apparent contradiction between an expansionary monetary policy and an appreciating exchange rate.

Are these various arguments mutually consistent? Using an illustrative model in Section 4, we show that they indeed are. Estimating a Taylor rule in Section 5 we further find evidence that the BOK has not reacted to the real asset price bubble, but that it has been lowering the real interest rate in response to the real appreciation. In our interpretation, this may have strengthened the process running from low interest rates to rising share prices and to exchange rate appreciation, with no positive effect on growth and productive investment. The last section presents our views on how the BOK has implemented the inflation targeting strategy.

2. INFLATION

As noted, inflation has been brought under control in Korea. Yet questions have been raised as to the extent to which inflation targeting has contributed to the observed stability. As Kim and Park (2005) note, when other microeconomic developments such as the sustained appreciation of the

won-dollar exchange rate, weakness of domestic demand, and stability of international prices of tradables are taken into account, it is rather difficult to give entire credit to inflation targeting for price stability. Shin (2007) shows that the Bank of Korea has been more responsive to the output gap than the inflation gap. In fact, his estimation of a Taylor equation shows that the coefficient of the expected inflation has a negative sign. A BOK's reaction function estimated by Kwon (2007) suggests that monetary easing in the face of an output contraction has been larger than monetary contraction when confronting an output expansion of the same magnitude and that monetary policy has been more responsive when the actual rate of inflation falls below the target rate than rising above it.

Indeed, changes in the call rate since the introduction of inflation targeting had been adjusted downward until October 11, 2005 when it was raised to 3.50%. By any standard, monetary policy has by and large been expansionary, although it has taken a tighter stance since late 2005 (Figure 3).

2.1. Principles

The path of inflation can be decomposed in three main phases. First, inflation rose as Korea recovered from the 1997–1998 crisis. This can be the natural implication of a much-depreciated exchange rate and a return to normalcy after very low, even negative inflation. The second phase, which lasted about five years, corresponds to a plateau, with inflation around the target of 3%. Since 2005, inflation has declined toward 2%, the last phase that indicates that price stability is almost achieved.

How was it achieved? Current theory explains inflation as driven by a Phillips curve equation as follows:

(1)
$$\pi_t = \alpha E_t \pi_{t+1} + \beta m c_t + \varepsilon_t$$

where pt is the inflation rate and mct is marginal cost of production. Clarida *et al.* (1999) show that, under some conditions, mct can be approximated by the output gap, but under other conditions, it may also depend on other variables such as imported inflation. This formulation implies that inflation is driven by three factors: production costs, which broadly capture production and demand conditions; random inflation shocks, here represented by the last term et; and inflationary expectations Et pt+1.

The logic of inflation targeting is accurately captured by equation (1). In

order to bring down inflation, a central bank can either engineer a slowdown to act on production costs—possibly inducing an exchange rate appreciation that reduces imported prices—or affect expectations. Since slow economic growth is painful, and may have to be sustained for a long period of time if inflation is sticky, working through expectations is quite appealing. As noted by Svensson (1999), inflation targeting should really be called expected inflation targeting. Once inflation has been brought to its desired level, by anchoring Et pt+1, an inflation-targeting central bank can stabilize the inflation rate as it fluctuates in response to marginal cost and other inflation shocks.

The question, then, is how was inflation brought under control and then stabilized in Korea. Was inflation targeting successful in shaping expectations or did it have to win credibility the hard way? And are expectations now well anchored? Unfortunately, we cannot estimate equation (1) because we do not have inflation expectations observations.

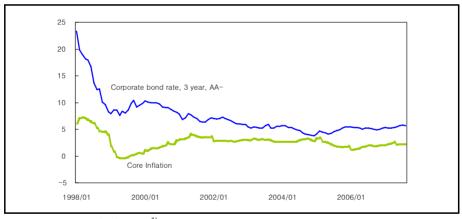


Figure 4. Interest and Inflation Rates

Sources: ECOS; Bank of Korea. 1)

We are left with the search for circumstantial evidence. Figure 4 displays the three-year nominal interest rate, which can be decomposed into the real rate, the risk premium and expected inflation three years forward.

¹⁾ The BOK publishes its own forecast, but this is not necessarily always the same as market expectations.

Under the assumption that the real rate and the risk premium vary little—a reasonable approximation in normal times—the evolution of the nominal interest rate is driven by expected inflation.

With core inflation essentially flat, the gradual decline of the nominal interest rate, spread over about four years, may be seen as evidence that it has taken that much time for markets to accept the BOK's target. In the same way, the subsequent stabilization of the nominal rate along a path that broadly parallels the evolution of the core inflation rate suggests that inflationary expectations are well-anchored since 2004. This assessment is corroborated by a recent estimate of the Phillips curve (Oh 2006), which suggests a flattening of the curve as in other inflation-targeting countries. It is of course too early to assess whether this flattening is temporary, owing to special circumstances, or long lasting.

2.2. Output costs

As is well known, Korea recovered fast from the crisis, but the recovery has not been complete. As Figure 2 illustrates, growth has been quite variable and the post-crisis mean (5.7% over 1999–2006) is significantly lower than before (7.7% over 1990–1997). The average over the period of 2001–2007, not including the two years of recovery after crisis, was much lower at 3.9%. Productive investment, in particular, has been surprisingly sluggish, an issue to which we return below.

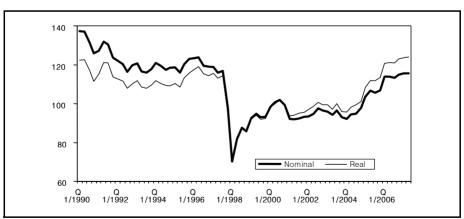


Figure 5. Nominal and Real Effective Exchange Rates

Sources: IMF and BIS.

One reason for the slow growth is that the fight against inflation has taken its toll in output. This may be so, but growth has not been markedly lower during the sharp disinflation period that followed the crisis than during the most recent period of reasonably stable inflation. In fact, growth surged in the early bounce-back of recovery precisely when inflation fell most rapidly.

This observation suggests that the era of fast growth has come to an end since the crisis. One possible reason for the slow growth is that the Korean economy was anyway reaching the end of its catch-up phase. In this view, low investment is merely a symptom of economic maturity, which may have been concealed in the pre-crisis period by a continuation of the catch-up pattern maintained by misguided growth-boosting policies inherited from earlier times. Another interpretation is that Korean firms have been discouraged by the consequences of the new monetary policy regime. According to this view, which is examined in detail in Section 3, monetary policy has generated an exchange rate overvaluation and a stock price bubble. Firms have not taken advantage of the favorable level of stock prices because the overvaluation has led them to invest abroad, a change of strategy further encouraged by the emergence of China as a low-cost producer to which labor intensive processes can be outsourced. Firms have also acquired financial as well as real assets, logical given the low rate of return on capital, and some have bought back their own shares, probably on the expectation that their price would continue increasing. This may have been illusory, and we will build on this observation in Section 4 below.

2.3. Imported Inflation Stability

Good luck, we noted, could have provided a helping hand in achieving and maintaining a low inflation rate. Generally low world inflation and the pressure from China, in this view, played a crucial role. This is true only if the exchange rate is reasonably stable, or if it is appreciating. Figure 5 shows that the nominal exchange rate in fact has continuously appreciated since the crisis. It also shows that the evolution of the real exchange rate has been quite similar, which indicates that Korea has undergone approximately the same inflation rate as its partners included in the baskets used to compute the effective exchange rates. On this basis, it seems logical to conclude that inflation targeting has succeeded because it has led to a tight enough policy to generate an exchange rate appreciation.

This interpretation faces two objections, however. First, as Figure 4

shows, the interest rate has been brought down during most of the post-crisis period. This is not the trademark of a tight policy stance. Second, the real appreciation mostly represents a correction of the exchange rate collapse during the crisis. In this sense, the anomaly is the depreciated exchange rate in the aftermath of the crisis and the ensuing real appreciation simply represents a return to equilibrium bound to occur independently of monetary policy. This is a first basis for the good luck interpretation that disinflation was, partly at least, imported.

120 - 100 - Export prices in won (2000 = 100) | Import prices in won (2000 = 100) | 1990 | 1992 | 1994 | 1996 | 1998 | 2000 | 2002 | 2004 | 2006

Figure 6. Import and Export Price Indices

Sources: ECOS; Bank of Korea.

Another piece of interesting evidence is provided by Figure 6, which displays the prices of exports and imports measured in won. Up until the crisis, export and import prices tended to rise together, reflecting the catch-up process whereby Korea has been climbing the quality ladder in both production and consumption. Since the crisis, while import prices have continued to rise, export prices have been declining. The decline in export prices reflects the exchange rate appreciation along with stable dollar prices of exports. It suggests an intensification of competitive pressure as seen by the rising importance of China as a competitor and trading partner. Between 1999 and 2007, exports to China have risen from 9.5% of total Korean exports to 21.5%, while the import share increased from 7.4% to 17.6%. The emergence of China could well have been the second good luck factor as far as taming inflation is concerned.

3. MONETARY POLICY

3.1. Flexible Inflation Targeting with Good Luck

The evidence so far supports the views presented by Kim and Park (2005) and Shin (2007) that, after accounting for the sustained appreciation of the won-dollar exchange rate, the weakness of domestic demand and stability of international prices of tradables, price stability has been, partly at least, driven by a favorable combination of events that occurred outside of Korea.

This does not deny that monetary policy has also played a role. Indeed, the inflation targeting strategy implies that the policy stance is optimally set to incorporate all factors susceptible to affecting price stability. When the circumstances are favorable, as they were, monetary policy should take advantage of the situation.

This interpretation is consistent with the observed decline of the call rate since the introduction of inflation targeting, which has been reduced until October 11, 2005 (Figure 3). An intriguing potential implication is that the BOK has actually been able to preside over the inflation decline and consolidation at a low level while conducting an expansionary monetary policy. Why should it have done so and for so long?

An obvious reason would be the diminished growth performance and the poor rate of investment. This would be perfectly consistent with flexible inflation targeting as defined by Svensson (1999). This strategy involves adjusting the interest rate to hit the inflation target within a two to three year horizon but at the same time using this rather distant horizon to also account for the growth objective. The normal prescription is that, when inflation forecasts exceed the target, the pace at which the interest rate is raised is designed to spread the impact on growth as smoothly as possible.

In the case of Korea, the post-crisis situation was different from the standard one considered in the previous example. Inflation was very high because of the collapse of the exchange rate and sudden plummet in growth. It was foreseeable that the massively undervalued real exchange rate would recover, exerting a disinflationary influence that would in effect compensate for the inflationary impact of the crisis depreciation. The bigger challenge was to revive the economy. This, in turn, called for restarting investment, which had ground to a halt.

The question, then, was how to use the flexible inflation targeting strategy to take advantage of the impending disinflation and to help the economy to return to growth. Obviously, a misguided monetary policy could easily have transformed an inflation blip into continuously high inflation, as has often been observed in similar circumstances in Latin America. The BOK deserves credit for not having fallen into this classic but ominous trap. But did it succeed in using its good luck to revive investment and growth?

3.2. The Investment Puzzle

If order to answer the previous question, we first examine how the BOK could have boosted domestic demand. In principle, monetary policy affects demand through various channels.

The first channel is the cost of borrowing and the returns from savings. Low interest rates discourage saving and should encourage spending on durable goods and productive investment. There is indeed some evidence that savings have declined in Korea. On the other hand, one perplexing feature of the years since the crisis is that investment has remained low by historical standards. It was initially believed that high investment rates in the previous years had left a legacy of excess capacity. But after a few years of depreciation, this explanation cannot hold.

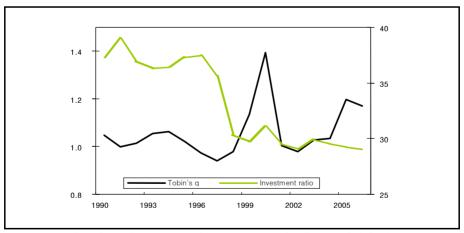


Figure 7. Tobin's q

Source: Sungbin Cho at the Korea Development Institute kindly provided the data.

Another channel of monetary policy is stock prices. If low interest rates lead to rising share values, firms have an incentive to acquire fixed assets. Figure 7 shows the evolution of Tobin's q, the relevant measure of share prices. Ignoring the dot-com inspired spike in 2000, Tobin's q has indeed risen in tandem with declining interest rates. The puzzle is that investment has not responded.

More recent evidence, however, seems to help solve that puzzle. According to a recent study by Seo and Ha (2007), the rate of return to capital declined to 7.8% in 2005 from 12.0% in 1996 (growth accounting) and from 9.4% to 7.2% (Solow model). As a result of this decline, the net return adjusted for the cost of capital plummeted to 1.3% during 2000–2005 from 4.2% during the 1991–1996 period. While this decline in the rate of return may help explain the poor investment performance, it opens up another puzzle: the apparent inconsistency between the strong performance of stock prices and the poor rate of return to capital.

(%, %p) 25 20 The rate of return to Capital (A) A weighted average of the cost of 15 internal and external financing (B) 10 The difference (A-B) 5 0 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004

Figure 8. Difference between the Rate of Return to Capital and the Cost of Financing: All Industries

Note: the shaded area indicates the crisis period of 1997–1998.

Source: Seo and Ha (2007).

Expansionary monetary policy is expected to lower the cost of borrowing and to increase the supply of credit. The ample availability of cheap credit, which encourages firms not to raise money by issuing new shares even if stock prices are high, might help explain the apparent disconnection between Tobin's q and investment. Of course, it only deepens the mystery because abundant and cheap credit, which encourages firms to borrow, also failed to revive investment. Instead, the availability of low cost credit has induced firms in the manufacturing sector to accumulate financial assets rather than to augment productive capacity.

According to Seo and Ha (2007), the total amount of financial assets including cash held by manufacturing firms stood at a little over 100 trillion won at the end of 2000. Five years later, this figure soared to 176 trillion won. As a result, the ratio of total financial assets to fixed investment almost doubled from 1.3 to 2.5 over the same period. Another piece of evidence from flow of funds tables also confirms a similar development: almost 60% of external funds the business sector raised was used for the financing of fixed investment in the early 1990s but after the crisis, in particular during the 2001–2005 period, the percentage fell to below 40%. As a result, a larger share of investment in the business sector was financed by its internal saving.²⁾

In retrospect, this development is not surprising in that the margin between the rate of return to capital and the cost of capital measured by a weighted average of internal and external financing was over 5% in the early 1990s before the crisis. After the crisis, the margin has fluctuated between 1% and 2% (Figure 8). As part of the corporate restructuring after the crisis, the government brought pressure to bear on firms, in particular large ones, to pare down their excess capital and to lower their debt-equity ratio. Under these circumstances, it would have been difficult to induce firms to undertake new investment by providing cheap capital. Simply put, initially at least, the usual channels of monetary policy through productive investment were not operative.

A few other developments have also depressed investment demand. The duration of the business cycle has become shorter, and at the same time uncertainty of cyclical fluctuations has increased due in part to economic liberalization and globalization. The remnant of industrial policy where the government was ready to subsidize those firms in export-oriented or strategic industries before the crisis has been phased out, thereby increasing further risks involved in long-term investment.

²⁾ The deficit (investment–saving) of the business sector declined on average to about 47% of its total saving during the 1999-2005 period from well over 100% before the crisis, suggesting that larger shares of funds the sector has mobilized from financial institutions and markets have been invested in financial assets.

3.3. The Stock Market Puzzle

While we can see why expansionary policy, benefiting from favorable conditions, did not succeed in raising the investment ratio, we still have to explain the apparent contradiction between rising share prices and low rates of return from capital. In order to shed light on this issue, we can start by asking what Korean firms have done with their savings.

The starting point is to note that it makes sense for firms not to invest in productive equipment whose rate of return is low. It may not come as a surprise that, with ample cash at hand and high share prices available for use as collateral, Korean firms have bought properties, riding the housing price bubble. It makes less sense to buy back shares on the assumption that their prices will keep rising, but there is some evidence that firms did so.

Another observation is that Korean firms have been investing outside of Korea, and particularly in China. There is no available hard data in this respect, but a large number of press reports have described how Korean firms have sought to respond to competition from China by outsourcing their production operations. Even though the total amount involved is believed to have been small, it is growing relatively fast. Importantly, investment abroad must also have been made more attractive by the exchange rate appreciation. Put differently, Korean firms have responded to high share prices and abundant credit by investing, but not in Korea. The reason is the emergence of China and the increasingly strong currency.

3.4. The Exchange Rate Puzzle

Having provided possible interpretations of the investment and stock market puzzles, we are facing yet another intriguing question: why has the lower interest rate been accompanied by an exchange rate appreciation? We have argued above that, initially, the exchange rate recovered from a massive undervaluation.

This may explain the 1998–2006 pattern visible in Figure 5, but not the second round of nominal and real appreciation since 2004.³⁾

The combination of a declining interest rate and an appreciating real exchange rate is odd. It could be that monetary policy was not being relaxed,

³⁾ In 2006, foreigners' net investment in domestic equities was negative whereas their demand for bonds issued by domestic residents rose sharply. Although it is too early to judge, this development is often attributed to the rise in the market interest rate.

(Unit: US\$ bn.)

after all. This would be confirmed by the continuous decline of the inflation rate and the disappointing rate of investment. But it would not fare well with the continuous rise in share prices unless the latter could be explained by rising expected capital productivity. So far at least, as shown in the previous section, capital productivity has remained at historical lows.

100 Nonbank external asset
Nonbank external liabilities

80

60

40

20

1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006

Figure 9. Nonbank External Assets and Liabilities

Sources: ECOS, Bank of Korea.

If instead we see monetary policy as expansionary until 2005, we have to account for the path of real appreciation and for the low investment rate. In the previous section, we have argued that the real appreciation may explain the low investment rate, but can it explain the real appreciation? One possibility is that the rise in share prices has attracted foreign investors. Figure 9 documents the rapid increase in external liabilities of the non-bank sector. This evolution may not have been restricted to share acquisition. Housing prices too have been quickly rising. It is not known whether foreign investors have been active in this market as well; at any rate, this is compatible with the fact that the financial account has been in constant surplus since 2000.

4. SYNTHESIS

4.1. An Unusual Combination of Stylized Facts

Since 1998 and until 2005, the BOK has brought the call money rate down, while bringing inflation down first and then maintaining it close to the announced target. Was monetary policy tight, as suggested by the inflation record, or expansionary as suggested by the declining rate of interest? In order to interpret the inflation targeting record, we have assembled a number of stylized facts: the real exchange rate has appreciated, stock and other real asset prices have been rising, and investment has remained subdued, reflecting a GDP growth rate far below its pre-crisis average.

We have tried to explain this unusual combination of events by arguing that the monetary policy stance was, in fact, expansionary, which would explain rising real asset prices. This in turn could explain the observed capital inflows and, therefore the exchange rate appreciation. As it undermined external competitiveness, the exchange rate appreciation has discouraged productive investment in Korea and led firms to invest abroad. In this view, the inflation success is due to the strong exchange rate and China's emergence as a low cost competitor, in spite of an expansionary monetary policy. The question, then, is whether these different bits of interpretations fit together. To that effect, we now present a simple model.

4.2. An Illustrative Model

The model is bare bones. It relies on two standard equations and two non-standard assumptions. The central bank sets the nominal interest rate, as all inflation targeting central banks do. Less realistically, we assume that the central bank sets the real interest rate r (a real target overnight call rate instead of the nominal call rate in Korea). In order to separate out the nominal and interest rates, we would need to introduce inflation. This would increase the size of the model and preclude a graphical or analytical solution. While it might be worthwhile to do so, and resort to simulations to explore the model's predictions, we believe that the main points can be made more transparently with this stripped-down model.

Further assuming purchasing power parity, the uncovered interest parity condition can be written in real terms as:

$$(2) \quad r = r * + \lambda$$

where r^* is the foreign real interest rate, assumed to be zero for simplicity, and $\dot{\lambda}$ is the expected rate of real exchange rate depreciation (defined such that an increase in λ , the log of the real exchange rate, represents a depreciation).

Next we assume that financial markets arbitrage between the real interest rate and the return on stocks, overlooking the maturity aspect. Stock returns are decomposed into real dividend yields d and the expected increase in the real value Q of stocks (which is an approximation of Tobin's q). Denoting q=ln Q, this arbitrage relationship is described as follows:

$$(3) \quad r = d + q$$

Where q is the expected rate of change of real stock prices.

While (2) and (3) are standard, we adopt a special characterization of the behavior of dividends d. We assume that most of the shares are those of export firms. As a consequence, dividends depend on the country's export performance and therefore on the real exchange rate λ . Thus we posit:

(4)
$$d = \alpha \lambda$$

Equations (2) to (4) constitute a dynamic model that we study under rational and quasi-rational expectations. Both variables λ and q are forward looking and can jump in response to news. All variables are defined as deviations from the steady state, which is therefore characterized by \cdot

$$\lambda = q = 0$$
 and by $\lambda = q = r = 0$.

Figure 10 shows the corresponding phase diagram. It is drawn under the assumption that the economy starts from a steady state equilibrium at point 0 and that the central bank then lowers the real interest rate to r < 0 and keeps it there. Obviously, it is impossible to keep forever the real interest rate away from a steady state; as we will see, this sets the economy on an unstable path. Our second non-standard assumption is that the markets may be "quasi-rational" in the sense that they assume that r will remain below its steady-state level for the indefinite future, until they realize that it is impossible and revise their view. This is meant to capture the widely held view in Korea that the effects of the crisis would be felt "for a long period of time."

If the markets are rational, they know that at some point in time the central bank will have to bring the interest rate back to a steady state. Since λ and q cannot be expected to jump, except initially when r is unexpectedly lowered, the unexpected implementation of the low interest rate policy implies an immediate jump from point 0 to point A, followed by a movement towards point B which is reached when the central bank brings back the real interest rate to zero. Then, the economy converges back to 0. This is the standard result: the real exchange rate initially depreciates and share prices are immediately raised. Exports and investment spending increase. This is not what happened, however.

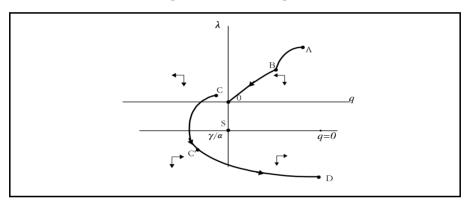


Figure 10. Phase Diagram

Consequently, we now assume that the markets are quasi-rational, i.e. that they initially believe that the interest rate is low "forever." This implies that they (mistakenly) consider that the new steady state is represented by point S. In this steady state, the real exchange rate is appreciated, which lowers exports and, therefore, dividends. This is indeed what is needed to bring down the rate of return on productive investment to a lower level required by (3).

As is well-known, most models with forward-looking variables allow for multiple equilibria, and this also applies to the present model. We examine a particular solution and will then comment on other possible paths. We consider that, when the interest rate is unexpectedly lowered, the economy jumps to point C and then travels along CD under the mistaken belief that the interest rate will stay low. The unstable nature of this assumption is captured by the fact that both λ and q increase in absolute

value without any apparent bound. The real exchange rate keeps appreciating while share prices rise in a fashion that is reminiscent of a bubble.

This is not sustainable, so sooner or later, markets must realize that the central bank will have to start tightening monetary policy. To capture this idea, we consider that the period of quasi-rationality is temporary. Having believed for a while that the interest rate would remain low "forever," the markets eventually recognize that this is impossible. At some point, say when point D is reached, presumably troubled by the continuous appreciation and the share price bubble, the market consensus unexpectedly shifts. Later on, as now expected, the central bank normalizes the interest rate to set r = 0.

The sudden revision of market expectations means that it is being recognized that the steady state is represented by point 0, not by point D, as previously believed. It also means that λ and q jump to settle on a path that will seamlessly lead the economy to the rational expectations convergence path B0 once the interest rate is raised back to its steady state level. For simplicity of exposition, we represent this as a jump from point D to point A, from which it travels to point B, which is reached when the central bank indeed brings back the interest rate to its steady-state level. Thereafter, the economy returns to its steady state along B0. Other solutions are possible due to the existence of multiple equilibria.

For our purposes, the multiplicity of the equilibrium path should not be troubling.⁵⁾ Instead of jumping to point C, the economy could jump to a point like C', or anywhere else, depending on how financial market operators coordinate their expectations. In any case, following this initial jump, the economy will travel a long a path similar to CD, with a continuous real exchange rate appreciation and ever-increasing share prices. It is this aspect of the model that is of interest here. It captures the possibility that an expansionary monetary policy triggers an asset price bubble while the exchange rate appreciates. Similarly, when markets realize their mistake, the jump does not have to lead to the same point A as under rational expectations. At the time of expectation revisions, the real exchange rate is

⁴⁾ Another possibility is that inflation sets in. As previously noted, adding inflation would increase the size of the model and preclude a graphical solution.

⁵⁾ The relevant literature is sizeable. For a simple and short introduction, see Evans and Guesnerie (2003).

bound to appreciate but share prices may go either way. The burst of the bubble does not necessarily take the form of a crash; share prices simply stop rising and eventually revert to their steady state level (q = 0).

Suppose the economy moves along CD. The price of real asset q rises and the currency appreciates continuously. What would be the effects of these changes on the output gap and inflation? More importantly from the perspective of this paper, how would the central bank respond to these changes in managing monetary policy? The Phillips curve equation and the Taylor rule are not integrated into the model, but it is easy to see that when the economy travels along the CD locus, CPI can remain roughly stable. This is because the increase in q which will feed into CPI inflation with a lag through a higher rent on real estate can be canceled out by the appreciation of the currency. Because of this offsetting development, a rough guess of what an expanded model would deliver is that the changes in q and r do not change much the output gap and the expected rate of inflation. Stable prices of goods and services may then lead the central bank to conclude that there is no need to change the expansionary policy stance. This is what happened in Japan in the 1990s and also during the 1998–2005 period in Korea.

This exercise is meant to illustrate the importance of central bank signals. If monetary policy is ill-specified in the sense that the central bank is perceived to maintain its low interest rate policy for the indefinite future, unstable developments follow. Of course, the central bank will not make such an unreasonable statement but, in the case of Korea, one can argue that markets expected the low interest policy to be maintained until the economy recovered from the crisis. Traveling along CD implies that the economy is not recovering because of the exchange rate appreciation.

Indeed, along CD, as the exchange rate appreciates, dividends of exporting firms deteriorate: see (4). For the rate of return to be maintained according to (3), there must be expected capital gains, hence the share price bubble. With investment approximately unchanged and exports declining, the interest rate reduction may thus have a contractionary impact.

A puzzling implication is that foreign investors acquire domestic shares to "ride the bubble." Even though Korean firms can easily raise funds from the markets, they do not invest at home, because of the on-going real appreciation. They may well exploit the abundance of resources to invest abroad, outsourcing operations that are becoming too costly because of the real exchange rate appreciation. These are the stylized facts that we presented above and the model offers an interpretation of the puzzling

experience since the crisis. This analysis backs our assertion that the way in which the inflation targeting strategy was applied led to an expansionary policy stance, which did not quite deliver. Good luck led to the elimination of inflation while bad luck prevented the return to rapid growth and strong investment. This is in line with the view of many international financial institutions and market researchers that predicted that Korea would take a long time to return to the pre-crisis growth path, and they were right.

4.3. Taylor Rule: An Interpretation

There remains the question of why the BOK has pursued for so long a policy of easy money which was not delivering the desired growth and investment revival while arguably fueling a bubble-type behavior in real asset (shares, housing, and land) prices and, paradoxically, sustaining continuing exchange rate appreciation. Of course, this uncommon combination of events is not easy to interpret as our accumulation of puzzles in Section 3 illustrate. Based on our reading of the evidence, we have concluded that policy was too tight but, seeing the won appreciate and investment linger, the BOK could well have concluded that its policy stance was too tight and therefore decided to repeatedly lower the call-money rate. Even with some hindsight—and the episode is still under way—our conclusion is by no means the only possible one, so we fully accept the possibility that the BOK was reacting rationally to a difficult-to-interpret situation.

It remains to be seen what the BOK was actually doing. The now-standard way to examine this question is to estimate a Taylor rule of the following form:

(5)
$$i_t = \rho i_{t-1} + (1-\rho)(r + a(\pi_{t+12} - \pi_t^*) + by_t + cx_t)$$

where i_t is the call money rate, p_{t+12} is the expected inflation rate twelve months ahead, $\frac{\pi}{r}$ is the inflation target, r is the natural rate assumed to be constant, y_t is the output gap and x_t can include several variables as discussed below.

As previously noted, other authors have already estimated Taylor rules. Shin (2006) finds that the Bank of Korea has exclusively focused on the output gap rather than the inflation gap. Kwon (2007) reports asymmetric responses to deviations in inflation from target and to the output gap, depending on the sign of these terms. Our interest is to examine whether the

BOK has also responded to the exchange rate and to real asset prices. To do so, we use as x_t in (5) the following variables: the real effective exchange rate, the stock price index (KOSPI) and the ratio of real asset prices to the CPI, and we also look at the deviation of the unemployment rate from its time-varying trend. Using a GMM estimator, we allow for various lags of x_t and we instrument the future inflation rate with 24 lags of all the right hand-side variables.

We find that none of the variables that we investigate as x_t enter significantly, with the exception of the nominal and real exchange rate, respectively noted e_t and λ_t in the following table that presents our estimates:

	Coefficient	t-value		Coefficient	t-value
Q	0.95*	88.8	Q	0.95*	90.6
r	3.57*	33.1	r	3.52*	26.4
a	0.33	0.9	a	0.88*	4.2
b	0.08*	3.0	b	0.13*	4.7
cet	-8.8	-1.5	cλt	39.31*	3.5
cet-3	-14.55*	-3.4	cλt-3	45.26*	3.7
cet-6	-20.94*	-3.0	cλt-6	-4.92	-0.8
cet-12	-3.72	-1.1	cλt-12	14.46*	3.1

Table 1. Taylor Rule Estimation

Note: 1) Sample period: January 2000-May 2007.

Taylor rule estimates provide a rather crude interpretation of central bank behavior and must always be taken with a grain of salt. With this caveat in mind, our results indicate that the BOK has followed a traditional flexible inflation targeting strategy. It has not responded to the bubble-like behavior of many real asset prices. In our interpretation of the stylized facts, in doing so, the BOK may have inadvertently fueled capital inflows, hence the exchange rate appreciation, and encouraged Korean firms to invest in financial and real assets and also in fixed assets abroad.

Both the diversion of corporate resources to uses other than productive investment and the real exchange appreciation have acted as a brake on growth. Our results show that the BOK has been concerned by the real exchange rate appreciation. In addition to the massive accumulation of reserves (from US\$52 billion at the end of 1998 to US\$255 billion at the end of

^{2) *} indicates that the coefficient is significant at the 1% level.

August 2007), it seems to have lowered the interest rate quite forcefully.⁶⁾

Since in our interpretation the real exchange rate appreciation is a consequence of the rise of real asset prices, we conclude that the BOK acted on the symptom not on the cause of what was defeating its attempts to support growth. Worse, by keeping the interest rate too low, the Bank may have strengthened the real exchange rate. Indeed, the low interest rate has been feeding the rise of share prices, which has attracted foreign investors.

5. CONCLUSIONS

The Korean economy recovered rather swiftly from the 1997–1998 crisis, but beginning in 2000, it has slowed down again, growing less than 4% a year on average. There is no clear prospect that it will recover its pre-crisis dynamism any time soon. Faced with this poor performance, and in the absence of any strong inflationary pressure, the Bank of Korea may have found room, and may have been justified, for expansionary policy. In retrospect, however, this policy decision appears to have been unwarranted.

This study does not argue that the BOK has erred in implementing monetary policy; indeed, it would be unfair to criticize the conduct of monetary policy on the basis of information and data we have now but the Bank did not have at the time when it was assessing the economic situation. Nevertheless, if the Bank had taken the eclectic approach of looking at everything as it says it does, our view is that it could have done better by pursuing a more neutral policy.⁷⁾ Several pieces of information back up our assessment.

There has been a sharp decline in the rate of return to capital largely due to massive capital accumulation in the run up to the crisis while risks involved in long term investment have been growing. A careful assessment of these structural changes could have dissuaded the BOK from following an expansionary monetary policy. The Bank may not have fully appreciated these developments, but even if it had, it could not have been seen unconcerned about the economic slump by insisting on neutral policy. On

⁶⁾ Our estimates show that the real interest rate has been raised in response to nominal appreciation, which is puzzling.

⁷⁾ Cecchetti *et al.* (2000) explains how inflation-targeting central banks can look at a wider menu of indicators.

top of the growing current account surplus, much of which was sterilized and added to domestic liquidity, the Bank continued to lower the policy rate until late 2005. As a consequence, liquidity grew at a double-digit rate between 2000 and 2002 before falling to about 7% a year on average for the next three years. Since then it has resumed a double-digit expansion again.

There is no evidence that low interest rates and ample liquidity in the economy have been conducive to stimulating domestic demand. One can always argue that the economy would have fared worse had the Bank stood firm with a neutral or tighter monetary policy. In the absence of any counterfactual evidence, one may argue that this view does not hold water. However, our view does not need counterfactual exercises to convince the skeptics; it stands up if one takes into consideration that the expansionary policy has brought on a boom in real estate and equity markets, which may come back to haunt Korea's policymakers when it cools off.

Other things being equal, a lower interest rate raises prices of real estate and equities. If monetary policy is expected to be expansionary as was the case in Korea as a result of the economic slowdown after the crisis, investors form the expectation that prices of real assets including equities would continue to go up. Households borrow from financial institutions to invest in housing and other types of real estate. Firms invest their surplus funds in real estate and stocks instead of expanding their productive capacities. They also invest abroad to avoid the loss of competitiveness implied by exchange rate appreciation. The expectation of the boom in real asset markets then keeps market interest rates higher than otherwise and also induces foreign portfolio investments in equities, adding further to liquidity of the economy and strengthening the currency. Bubbles may emerge in real asset markets and if indeed they do appear, eventually the economy moves along the boom-bust cycle.

According to official statistics published by the Ministry of Construction and Transportation, the average price of land rose by more than 88% between 2003 and 2006. The officially assessed prices of housing and other real estate are known to underestimate their actual market prices. If market prices are used, the market value of the total land of Korea is likely to have more than doubled over the four-year period. Housing prices have also been on a steep rise. Concerned about the real estate market boom, and in order to prevent real estate bubbles, it has imposed stringent taxes and other administrative restrictions on holding, transactions in, and transferring housing and other types of real estate on seven different occasions since 2003.

These measures have been effective in suppressing the demand for real estate, although there is the risk that they could discourage housing investment to choke off the incipient recovery. Inevitably, the suppression of the real estate demand has shifted investors from real estate to the stock market. Stock prices began climbing in 2004 after the first of the seven real estate market stabilization measures was implemented in 2003. Since then the stock price index (KOSPI) has almost tripled. In the end, Korean policymakers have pursued a combination of expansionary monetary policy intended to revive aggregate demand and contractionary tax policy to contain the real asset market boom for which monetary expansion has been responsible. The two contradictory policies may have cancelled each other out.

Our analyses in the preceding sections make it clear that effects of monetary policy are largely transmitted through the markets in foreign exchanges and real assets including real estate and stocks. Real estate markets are in many cases heterogeneous and segmented. They also tend to be volatile. For example in the housing market, on the demand side housing has become more like a tradable asset due to lower transaction costs and higher market liquidity while the supply is rather unresponsive to its price changes in the short run. There are many pieces of anecdotal evidence showing that the markets in various types of real estate are prone to speculation and bubbles and hence they are highly susceptible to the boom-bust cycle. There has also been a significant increase in the volatility of the nominal exchange rate since the adoption of free floating or a more flexible exchange rate system in Korea.

These characteristics of real asset and foreign exchange markets imply that effects of monetary policy could be unpredictable, certainly more so than before in Korea. If firms and households realize this uncertainty, they will be less attentive to changes in monetary policy. The BOK will then find it difficult to bring down, stabilize, and anchor the expected rate of inflation. One of the main implications of our analyses is therefore that the Bank will have to earn credibility the hard way: it will need to pay more attention than before to developments in real asset and foreign exchange markets in its eclectic approach to the implementation of monetary policy.

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Comments on "Inflation Targeting in Korea: Success, Good Luck or Bad Luck?"

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Can inflation targeting (IT) in Korea be considered a model of success? According to research by Kim and Park (2006), there were four major conclusions: a) there was lower and less volatile inflation during the IT regime than before the crisis, b) the lower volatility is not due to smaller inflation shocks but rather to a less volatile transmission mechanism, c) inflation has been less persistent during the IT period than prior to it, and d) inflationary expectations are less dependent on actual inflation during the IT period than they were prior to its introduction. At face value, the IT regime seems like a model of success, but is this a valid evaluation?

There are other factors which must be taken into account before a full evaluation can be made. During the IT period, wage increases have been modest, domestic demand has been weak, external conditions have been favorable, and the Korean won has appreciated which prevents imported inflation. Wage increases may be the consequences of successful IT, IT is supposed to prevent excessive domestic demand pressure, rampant external inflation would have presumably appreciated the won further, and appreciation is the endogenous response to the IT regime. So it is difficult to provide any definite conclusions.

Park and Wyplosz pick up on the theme provided by Kim and Park and add another element: the relationship between the IT regime and asset price bubbles. As you may know, expansionary monetary policy leads to a stock market boom, which leads to capital inflows and currency appreciation, resulting in low investment and, ultimately, low growth.

Empirical evidence presented by Kim and Park through a VAR analysis shows that a monetary contraction leads to a period of below trend output growth and investment, which are conventional results contrary to those proposed by Park and Wyplosz. Park and Wyplosz intend to illustrate the

nexus between the real exchange rate, real stock prices, and the real interest rate which, while very interesting in itself, does not present much in the way of a model of monetary policy. There are other factors which also may play a role, such as capital inflows, inflation-focused monetary policy in itself, and feedback from the monetary policy to the exchange rate.

Park and Wyplosz's hypothesis is that an expansionary monetary policy will not lead to a depreciation of the currency as per the usual money/bond/capital flows model, but rather increase stock prices, attracting capital inflows and appreciating the currency. Therefore, an expansionary monetary policy could be contractionary in reality. This hypothesis is intriguing but requires empirical testing (e.g. an application of the methodology proposed by Rigobon *et al.*) and theoretical background (e.g. a relatively *ad hoc* portfolio-balance model or a finance perspective with the pricing of bonds, equity and foreign exchange in a macro context).

Ten Years after the Crisis: Financial System Transition in Korea

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1. INTRODUCTION

As Korea's outmoded financial sector was blamed for causing structural vulnerability at the onset of the 1997 economic crisis, subsequent resolution efforts have focused on the reconstruction of its financial system. In the 10 years after the crisis, remarkable progress has been made in Korea's financial sector reform. Capital adequacy and profitability of financial institutions have substantially improved, and capital markets have expanded both in size and depth. In the process, the structure of the Korean financial system has been rapidly transformed. Initially driven by the government restructuring program, financial consolidation, conglomeration, and internationalization have caused a dramatic change in the market structure as well as financial risks embedded in the financial system.

However, despite this apparent progress, one cannot yet ascertain whether or not Korea's financial system has successfully transformed into one that is efficient, sound and more suitable for sustainable economic growth. Financial development has central implications on economic growth and stability.¹⁾ An efficient and thriving financial sector can promote economic

¹⁾ While economic growth leads to financial sector development, a solid body of research indicates that the causality may also run from finance to growth. The initial hypotheses of Goldsmith (1969), McKinnon (1973), and Shaw (1973) on the linkage between finance and growth have been revisited recently with the emergence of endogenous growth theory. For theoretical discussions on the role of finance in economic growth, see, for instance, Greenwood and Jovanovic (1990), and Bencivenga and Smith (1991). For empirical evidence, see King and Levine (1993), Levine and Zervos (1998), Levine (1998), Beck, Levine and Loayza (2000) among others.

growth by facilitating better allocation of financial resources and by providing risk sharing opportunities. An efficient financial system can also reduce monitoring and transaction costs by exerting better corporate governance.

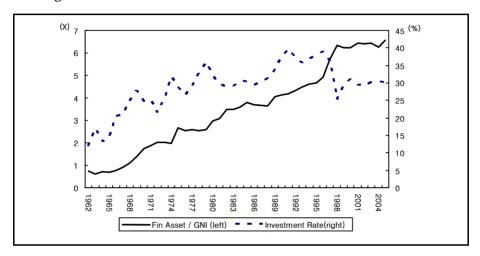


Figure 1. Financial Interrelation Ratio and Gross Investment Rate

Moreover, the presence of a sound and robust financial system can minimize the incidence of financial disruptions, and also promote economic stability by absorbing adverse shocks and dampening their propagations.²⁾ Thus, positive consequences are anticipated from the post-crisis financial reform.

However, the prolonged stagnation in corporate investment is worrisome as the financial system's functions of intermediation and risk diversification may have substantially weakened after the crisis. As shown in Figure 1, despite the continued expansion of the financial sector as measured by the financial interrelation ratio, the gross investment rate (which fell sharply in

²⁾ Beck *et al.* (2001) investigated the relationship between financial intermediary development and growth volatility. They presented a theoretical model in which real shocks are dampened by well-developed financial intermediaries while monetary shocks are magnified by financial intermediary developments. See Beck *et al.* (2001) for the related literature.

1999) has remained stagnated throughout the post-crisis period. This widening disparity between real and financial sector developments may suggest that the post-crisis financial system is not fully functional yet.

This paper, from both the perspective of the macro flow of funds as well as the perspective of micro credit allocation, endeavors to characterize the post-crisis financial system transition in Korea. The paper proceeds as follows: Section 2 will describe post-crisis financial sector consolidation and conglomeration, and will study their impact on the profitability and risks of financial institutions. Section 3 will investigate the post-crisis corporate financing pattern and asset allocation behavior of banks and households based upon the flow of funds data. Section 3 will also characterize the evolution of the financial structure after the crisis. Section 4, by employing disaggregated firm-level data for Korean SMEs, will evaluate the post-crisis structural shift in corporate lending behavior and resource allocation efficiency of financial intermediaries. Finally, Section 5 will discuss policy implications and conclude the paper.

2. FINANCIAL CONSOLIDATION AND CONGLOMERATION

Since 1997, the Korean government has conducted drastic structural reform with the goals of establishing institutional foundations and reconstructing a more market-based financial system. During the restructuring of 1997–2003, a total of 160.4 trillion Korean won of public funds, approximately 30% of Korea's GDP in 2000, was spent on financial restructuring. The number of financial institutions decreased from 2,103 in 1997 to 1,315 by the end of 2006, and a total of 899 insolvent financial institutions were closed or merged in the restructuring process. As shown in Table 1, as an outcome of drastic consolidation, both the profitability and capital adequacy of financial institutions have substantially improved. Despite losses from massive sell-offs of non-performing assets, the BIS capital ratio of commercial banks and the capital-asset ratio of insurance and securities companies have increased remarkably alongside recovery in profitability.

Table 1. Capital Adequacy and Profitability of Financial Institutions

		1995	1997	1999	2001	2003	2005	2006
Banks ¹⁾	BIS Capital Ratio	9.3	7.0	10.8	10.8	10.4	12.4	12.3
	NPL Ratio ⁴⁾	5.2	6.0	13.6	3.3	2.7	1.3	0.9
	ROA	0.3	-0.9	-1.3	0.8	0.1	1.2	1.1
	ROE	4.2	-14.2	-23.1	15.9	2.2	20.3	15.6
Insurance	Capital-Asset Ratio	0.1	-0.1	-5.4	1.2	6.5	8.3	8.3
Companies ²⁾	NPL Ratio	-	1	-	5.3	4.1	3.4	3.0
	ROA	-0.1	-0.1	-4.4	-0.5	1.8	1.1	0.9
	ROE	-114.8	91.2	122.3	-111.4	34.1	13.7	12.9
Securities Companies ³⁾	Capital-Asset Ratio	45.7	36.3	33.3	20.5	17.8	30.9	36.8
	NPL Ratio	-	-	-	-	29.4	11.9	5.6
	ROA	2.0	-2.0	2.1	-0.8	-1.7	0.1	3.4
	ROE	5.0	-5.7	9.3	-3.3	-7.3	0.3	14.3

Notes: 1) Based on domestic banks, including trust accounts.

- 2) Based on life insurance companies.
- 3) Based on domestic securities companies.
- 4) Non-performing loans (NPL) include loans classified as "substandard" or below.

Sources: Financial Statistics Information System, Financial Supervisory Service.

2. 1. Consolidation and Market Concentration

While the government-led restructuring program appears promising thus far as evidenced by the rapid balance sheet recovery, it is not yet clear whether the improvement in management performance will be sustainable in the future. Assessment of its sustainability requires understanding the factors underlying the recent recovery in the profitability of financial institutions.

The consolidation process has brought about higher market concentrations in the commercial banking and insurance industries. Figure 2 shows the

Herfindahl-Hirschman Indices (HHI) for major financial industries in Korea.³⁾ The HHI in the commercial banking industry increased from 707 in 1996 to 1,454 in 2006, transforming the industry from a "competitive" to a "moderately concentrated" industry. The market concentration in the insurance industry, already high in 1997, increased further as the industry saw a reduction in the number of smaller-sized companies. The HHI in the insurance industry then exhibited large fluctuations with the acquisition of some domestic companies by foreign insurance companies. As for the securities industry, a sizable number of new entrants helped maintain a fairly competitive market structure despite exiting of a number of firms.

This evidence suggests that the recent recovery in profitability may have resulted at least partially from increased market power. Financial concentration may not always create market power for large institutions.

Even with few participants, financial markets can be sufficiently contestable.⁴⁾ In the case of the Korean banking industry, the empirical evidence on market power seems to be mixed. For instance, Lee and Lee (2004) estimated H-statistics for the Korean banking industry and found that the banking market exhibited monopolistically competitive behaviors both before and after the crisis, and that the degree of competition weakened after the crisis.⁵⁾ However, utilizing the Bresnahan and Lau methodology, Kim

³⁾ The HHI was calculated by summing the squares of the individual percentage market shares of all the participants in an industry. Total assets were used in computing the market share. Regulators often rely on the HHI as a measure of market dominance. For instance, the US Department of Justice divides the spectrum of market concentration into three categories: "competitive" (HHI below 1,000), "moderately concentrated" (HHI between 1,000 and 1,800), and "highly concentrated" (HHI above 1,800).

⁴⁾ G10 report (2001) suggests that the consolidation of US banking organizations had only minor effects on market power because most M&As did not increase local concentration in a significant way, and because factors such as antitrust authorities, potential market entrants, deregulation and advances in technology increased the degree of competition. Claessens and Laeven (2003) found that bank concentration was only weakly correlated with the degree of competition as measured by H-statistics, and argued that it was foreign bank participation and low entry barrier that fostered competitive pricing.

⁵⁾ Financial intermediation cost is the cost incurred in deposit-taking and loan-making businesses and is computed as the sum of operating expense, loan loss provision, taxes, and other expenses.

(2003b) found that the degree of competition did not fall after the crisis despite the increase in market concentration in the banking industry.

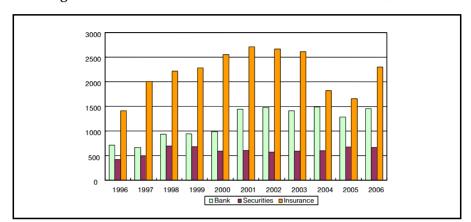


Figure 2. Market Concentration of Financial Industries (HHIs)

One simple and indirect indicator of the change in market power is net interest margin (NIM) of the banking industry. The NIM increases with market power, as the spread between lending and funding rates tends to increase with increasing market power of banks. The NIM shown in Figure 3 has increased since 2002, implying that a source of the recent recovery in bank profitability is the increase in market power. Another major factor contributing to the improved profitability of Korean banks is the reduction in financial intermediation cost. As the decomposition of the financial intermediation cost to asset ratio in Figure 4 reveals, the consolidation in the banking industry lowered operating costs immediately after the crisis. However, most notable is the large fluctuation in the loan loss provision. And, especially, the sharp fall in loan loss provision after 2000 contributed much to the recent recovery in bank profitability.

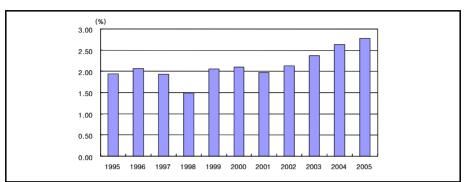
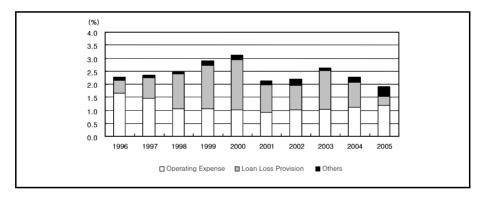


Figure 3. Net Interest Margin of Commercial Banks

Figure 4. Financial Intermediation Cost to Asset Ratio of Commercial Banks



The above discussions suggest that the improvement in bank profitability may not be sustainable. While the concentration of financial savings in relatively safe bank assets during the restructuring period has led to the increase in bank net interest margins (NIM), financial saving has begun flowing into capital markets with the development of collective investment vehicles such as mutual funds. Moreover, there is not much scope for further reductions in operating cost or loan loss provision, especially given the growth of competition in the SME loan market as large companies become increasingly dependent upon internal and direct sources of financing as described below.

2. 2. Conglomeration and Financial Risks

Along with financial consolidation among institutions that belong to the same financial sector, there has also been increasing financial conglomeration across different financial sectors. Prior to the crisis in Korea, there existed two types of financial groups. One is the pure financial group consisting of only financial institutions in a parent-subsidiary structure. The other is the mixed conglomerate, which includes financial as well as non-financial subsidiaries. However, since non-financial industrial capital such as *chaebols* could not own more than 4% of commercial bank shares by bank ownership regulation, the mixed conglomerate typically owned by industrial capital consists of only non-bank financial institutions. After the crisis, the financial holding company, a third form of financial group, was introduced in order to facilitate the restructuring of the financial industry.

Table 2 summarizes the progress in financial conglomeration in major financial industries in Korea. The asset share of financial institutions that belong to financial conglomerates has grown substantially from 56.4% (329.9 trillion won) in 1996 to 87.8% (1,117.1 trillion won) in 2006. Among financial conglomerates, the asset share of financial holding company groups has increased most notably, indicating that the introduction of financial holding companies in 2000 has been instrumental in the post-crisis conglomeration process in Korea. Across financial sectors, the advance in conglomeration of the banking sector is most notable, while the degree of conglomeration in insurance and securities industries was already high even before the crisis.

While the fundamental nature of financial risks must change in the new financial regime, there is no clear-cut relationship between financial conglomeration and financial stability. Financial conglomeration may increase or decrease risks of individual financial conglomerates. On the one hand, large financial conglomerates may be able to enhance profitability with economies of scale, economies of scope, and increased market power, thereby reducing financial risks. But on the other hand, complexity in operations and incentives to take on more risks based on a "too-big-to-fail" assumption may turn out to increase financial risks.

Table 2. Progress in Financial Conglomeration

(units: trillion won, %)

											fillion won, %)							
		1996			2000			2003				2006						
		No. of Asset Firms Size		No. of Firms		Asset Size		No. of Firms		Asset Size		No. of Firms		Asset Size				
			No.	%	Amo unt	%	No.	%	Amo unt	%	No.	%	Amo unt	%	No.	%	Amo unt	%
Bank		Holding company	0	-	-		-	,	-	-	6	42.9	254.2	36.2	7	53.8	504.8	57.8
	Gı	Parent-subsidiary	6	24.0	233.5	49.4	7	41.2	396.9	76.5	3	21.4	327.2	46.7	2	15.4	263.0	30.1
	Group	Mixed	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Subtotal	6	24.0	233.5	49.4	7	41.2	396.9	76.5	9	64.3	581.4	82.9	9	69.2	767.8	87.9
	Non-group		19	76.0	239.1	50.6	10	58.8	122.0	23.5	5	35.7	119.9	17.1	4	30.8	106.0	12.1
		Total		100	472.6	100	17	100	519.0	100	14	100	701.3	100	13	100	873.8	100
		Holding company	0	-	-	-	0	-	-	-	2	6.1	3.5	1.6	3	9.4	7.9	2.5
Insurance	Gr	Parent-subsidiary	4	9.8	16.4	20.5	4	12.5	29.0	20.2	3	9.1	36.0	16.4	4	12.5	58.9	18.8
	Group	Mixed	22	53.7	56.2	70.1	13	40.6	86.7	60.5	14	42.4	163.7	74.4	13	40.6	213.3	68.2
		Subtotal	26	63.4	72.6	90.6	17	53.1	115.7	80.7	19	57.6	203.2	92.3	20	62.5	280.1	89.6
		Non-group		36.6	7.6	9.4	15	46.9	27.6	19.3	14	42.4	16.8	7.7	12	37.5	32.5	10.4
		Total		100	80.2	100	32	100	143.3	100	33	100	220.0	100	32	100	312.6	100
Securities		Holding company	0	-	-		-	-	-	-	3	8.8	5.0	11.1	5	16.7	28.6	33.9
	Group	Parent-subsidiary	10	30.3	6.8	26.8	6	17.6	7.8	18.9	3	8.8	5.5	12.3	3	10.0	11.5	13.6
	qp	Mixed	18	54.5	17.0	66.6	12	35.3	22.0	53.1	11	32.4	21.2	47.5	8	26.7	28.1	33.3
ities		Subtotal	28	84.8	23.8	93.4	18	52.9	29.8	72.0	17	50.0	31.7	70.9	16	53.3	68.2	80.9
		Non-group		15.2	1.7	6.6	16	47.1	11.6	28.0	17	50.0	13.0	29.1	14	46.7	16.1	19.1
		Total		100	25.5	100	34	100	41.3	100	34	100	44.7	100	30	100	84.3	100
		Holding company	0	-	,	,	0	,	-	,	3	7.1	0.1	8.7	6	14.0	0.4	21.0
Ass	Group	Parent-subsidiary	0	-	,	,	6	18.8	0.3	22.9	6	14.3	0.3	18.8	6	14.0	0.3	14.2
et ma	oup	Mixed	0	-	,	,	9	28.1	0.4	35.1	9	21.4	0.4	27.5	5	11.6	0.3	16.4
Asset management		Subtotal	0	-			15	46.9	0.7	57.9	18	42.9	0.8	55.0	17	39.5	1.0	51.6
	Non-group		3	100.0	6.66	100.0	17	53.1	0.5	42.1	24	57.1	0.7	45.0	26	60.5	0.9	48.4
		Total		100.0	6.66	100.0	32	100.0	1.2	100.0	42	100.0	1.5	100.0	43	100	2.0	100
Total		Holding company	0	-	,	,	0	,	-	,	14	11.4	262.7	27.2	21	17.8	541.7	42.6
	Group	Parent-subsidiary	20	19.6	256.9	43.9	23	20.0	434.0	61.6	15	12.21	369.0	38.1	15	12.7	333.7	26.2
	quo	Mixed	40	39.2	73.2	12.5	34	29.6	109.1	15.5	34	27.6	185.3	19.2	26	22.0	241.7	19.0
		Subtotal	60	58.8	329.9	56.4	57	49.6	543.1	77.1	63	51.2	817.1	84.5	62	52.5	1117.1	87.8
	Non-group		42	41.2	255.0	43.6	58	50.4	161.7	22.9	60	48.8	150.4	15.5	56	47.5	155.5	12.2
		Total		100	584.9	100	115	100	704.8	100	123	100	967.5	100	118	100	1272.6	100

Source: Updated from Hahm and Kim (2006).

Financial consolidation and conglomeration may also increase the potential for systemic risk by undermining incentives of financial market participants and regulatory authorities in monitoring and supervising large conglomerates. Even if individual conglomerates are able to benefit from diversification, interdependency and mutual exposure among large financial conglomerates may substantially increase the potential for systemic risk as they share homogeneous business portfolios and asset structures.

Some recent studies examine the risk implications of financial consolidation in Korea. Hahm and Hong (2003) provide a diagnostic analysis on various channels through which financial consolidation and conglomeration influence financial stability. They find that the scope for financial risk reductions from geographic and cross-industry diversifications is limited for Korean financial conglomerates. They also find that increases in direct and indirect interdependencies, from post-crisis consolidation, have increased the potential for systemic risk. Kim (2003a) also studies the risk implications of financial consolidation. He finds that while no significant relationship exists between asset quality indicators and bank sizes, stock price volatility is positively related with bank size. This supports the hypothesis that large banks are risk takers. Oh *et al.* (2007) investigates the systematic and idiosyncratic components of risks (measured from stock prices of Korean banks) and finds that financial conglomeration tends to stabilize financial risks.

Hahm and Kim (2006) study the z-score index and its risk components for financial conglomerates in Korea. In their panel regressions, they find that, during the post-crisis period of 2001–2003, the asset size variable is significantly positively related with profitability and significantly negatively related with risk measured as the standard deviation of return on assets (ROA). However, they find no significant conglomeration effects on the profitability and risk after controlling for the size effect. Table 3 updates Hahm and Kim's study to include more recent data of 2004–2006. Note that the evidence is mixed. In the case of the banking industry, conglomerate groups show a higher z-score index relative to independent banks, implying that conglomeration reduces financial risks. However, both the z-score index and profitability of conglomerate groups are lower for insurance and securities industries than for independent institutions, implying that the positive consequences of conglomeration have not yet been realized in the case of insurance and securities industries industries.

Table 3. Risks of Financial Conglomerates: Z-Index and Its Components

_			1992–1996			2001–2003				2004–2006							
			No. of Firms	Z-Sco re	ROA (%)	Capital- Asset Ratio (%)	ROA Std. Dev.	No of Firms	Z- Score	ROA (%)	Capital- Asset Ratio (%)	ROA Std. Dev	No. of firms	Z- Score	ROA (%)	Capital- Asset Ratio (%)	ROA Std. Dev
		Holding company	0	-	-	-	-	5	57.29	0.76	4.52	0.18	7	70.87	0.90	5.64	0.25
	Gr	Parent-subsidiary	6	50.13	0.39	5.26	0.18	4	14.72	0.11	4.20	0.62	2	16.48	1.06	6.40	0.47
Bank	Group	Mixed	0	-	1	1	-	0	1	1	-		0	-	-	-	-
ıļ.		Subtotal	6	50.13	0.39	5.26	0.18	9	38.37	0.47	4.38	0.38	9	58.78	0.93	5.81	0.30
		Non-group	18	42.66	0.33	7.94	0.24	5	12.73	0.44	4.47	0.49	5	42.33	0.88	5.68	0.32
		Total	24	44.53	0.35	7.27	0.22	14	29.21	0.46	4.41	0.42	14	52.91	0.91	5.76	0.31
	Group	Holding company	0	-	-	-	-	1	1.39	2.31	-0.21	1.51	2	22.48	1.48	8.95	0.46
		Parent-subsidiary	4	9.18	-2.47	1.83	3.36	3	7.77	1.04	-1.35	0.99	4	11.73	0.69	6.18	0.89
Insurance		Mixed	22	8.94	-1.39	5.45	2.50	13	8.28	1.21	5.52	1.02	13	16.24	0.61	7.24	0.81
ance		Subtotal	26	8.98	-1.56	4.90	2.63	17	7.78	1.05	3.97	1.22	19	15.95	0.71	7.19	0.79
		Non-group	15	6.36	-1.63	16.20	3.84	14	5.50	0.14	2.57	3.22	13	57.49	1.15	10.26	0.59
		Total	41	8.03	-1.59	9.03	3.07	31	6.75	0.75	3.34	2.03	32	32.82	0.89	8.44	0.71
		Holding company	0	-	-	-	-	2	19.37	2.50	48.43	2.66	2	18.73	0.50	25.65	2.98
	Group	Parent-subsidiary	10	23.18	0.73	40.02	2.08	4	17.93	1.88	38.45	2.58	4	23.85	2.29	30.20	1.60
Securities	quo	Mixed	18	19.72	0.78	37.40	2.22	12	16.48	-1.71	24.24	4.11	9	13.99	1.09	31.61	3.81
rities		Subtotal	28	20.96	0.76	38.34	2.17	18	17.12	-0.45	30.09	3.61	15	17.25	1.33	30.44	3.11
		Non-group	5	38.50	2.37	44.42	1.60	16	20.01	1.18	40.93	3.95	16	28.93	2.40	45.34	3.47
		Total	33	23.62	1.01	39.26	2.08	34	18.48	0.32	35.19	3.77	34	23.28	1.88	38.13	3.30
		Holding company	0	-	1	1	1	2	41.79	6.62	90.60	2.79	5	705.6	9.51	93.00	1.44
Ass	Group	Parent-subsidiary	0	-	ı	-	ı	5	23.03	11.30	89.62	4.84	5	241.5	11.00	93.86	5.52
Asset management		Mixed	0	-	-	-	-	10	54.12	4.30	91.49	4.39	8	30.64	-2.07	92.80	14.30
nagem		Subtotal	0	-	ı	ı	ı	17	43.52	6.63	90.84	4.33	18	223.1	4.50	93.16	9.15
ent		Non-group	3	-1.37	-0.70	-7.69	7.31	22	31.69	4.41	92.21	6.72	21	42.03	10.43	91.46	7.94
		Total	3	-1.37	-0.70	-7.69	7.31	39	36.85	5.38	91.61	5.68	39	120.3	7.78	92.22	8.46

Source: Updated from Hahm and Kim (2006).

3. Transition of the Financial Structure

3.1. Flow of Funds Analysis

It is still debatable as to how far the extensive set of financial reform measures has subsequently affected the structure of the Korean financial system. Hahm (2004) investigates the post-crisis transition of Korea's financial structure by comparing the financing behavior of corporate firms and asset allocation behavior of commercial banks before and after the financial crisis. This section updates Hahm (2004) to illuminate the structural transition of the Korean financial system during the last 10 years from the perspective of financial fund flows.

3.1.A. Corporate Financing Pattern

The post-crisis corporate financing patterns can be summarized as follows:

An Increasing Share of Internal Financing

The first notable pattern is the increased use of internal funds as a source of investment financing. As shown in Table 4, the share of internal financing in total corporate financing has increased from 29.3% prior to the financial crisis to 62.7% in 2004. In part, this reflects the temporary decline in corporate investment in the face of heightened uncertainty. But the change also reflects a long-term structural change, specifically the shift in attitudes in the corporate sector toward the perceived risks of relying on external financing.

Table 4. Corporate Financing Volume and Sources

(Unit: trillion won, %)

				(Ont. th	111011 WOII, 70)
	1990–97 average	1998	2000	2002	2004
Total Financing Volume	115.9	59.6	128.7	167.2	176.6
Internal Financing	33.9 (29.3)	31.6 (53.0)	62.9 (48.9)	83.9 (50.2)	110.8 (62.7)
External Financing	82.0 (70.7)	28.0 (47.0)	65.8 (51.1)	83.3 (49.8)	65.8 (37.3)

Note: Numbers in parenthesis show percentage shares.

Source: SERI Economic Focus, No. 112.

Stagnation of Direct Financing, but Improved Maturity Structure

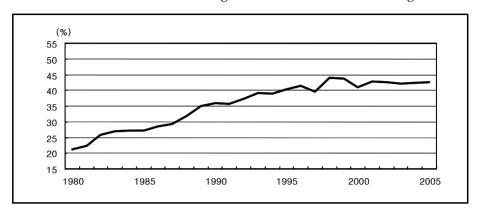
As shown in Figure 5a, there have been substantial fluctuations in the share of direct financing in total corporate external financial liability: a decline in 1997 followed by a sharp rise in 1998 and another fall in 2000. With the collapse of the merchant banking industry came a paralysis of the commercial paper market in 1997. Faced with a credit crunch, corporations, especially ailing chaebols, issued a large volume of bonds to address their liquidity problems. The policy of allowing bond financing through investment trust companies (ITCs) while restructuring the banking system intended to prevent a severe credit crunch and the failure of solvent firms. However, the sequential approach to financial restructuring-"banks first, ITCs later"-not only postponed the resolution of insolvent corporate firms but actually magnified the restructuring cost. In the end, with the collapse of Daewoo group in 1999, the corporate bond market again became paralyzed. And with the subsequent slowdown in corporate investment, the share of direct financing remained stagnate. However, as corporate borrowers redeemed commercial papers by issuing corporate bonds and stocks, the maturity structure of direct financing improved and the share of short-term debt in total direct financing fell sharply as shown in Figure 5b.

The Fall of NBFIs and Re-emergence of Banks in Indirect Financing

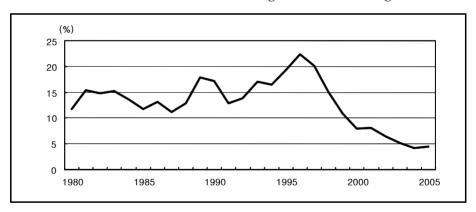
Also with post-crisis restructuring, the commercial banking industry has regained its share in financial intermediation. As argued by Hahm (2003), the sharply rising share of non-bank financial institutions (NBFIs) during the 1990s reflected unbalanced regulations favorable to NBFIs and *chaebols'* dominance in the NBFI industries. As financial markets began to respond to inherent risks of NBFI products and massive failures of insolvent NBFIs, the 50% plus share of NBFIs fell substantially in the post-crisis period as shown in Figure 5c. Depositors' preference for safety helped the commercial banks to reclaim their share of the market, especially once they succeeded in restoring the adequacy of their capital, with the help of the government's bank recapitalization program.

Figure 5. Corporate Financing Patterns

a. Share of Direct Financing out of Total External Financing



b. Share of Short-term Financing in Direct Financing



(%) 60 50 40 30 1980 1985 1990 1995 2000 2005

c. Share of Non-bank Financing in Indirect Financing

3.1.B. Bank Asset Structure

The financial crisis also gave rise to a set of noticeable changes in the balance sheet of commercial banks, summarized as follows:

Substitution between Securities and Loans during the Restructuring Period

A notable change in the post-crisis bank asset portfolio is the rise in the share of securities out of total domestic bank assets, most of which came from an increase in government securities but also which came from, albeit to a lesser degree, an increase in corporate restructuring-related securities (such as stocks and convertible bonds obtained through debt-equity swaps). As shown in Figure 6a, this increase accelerated immediately after the crisis as banks attempted to increase their Bank for International Settlements (BIS) capital adequacy ratios with safer and more liquid assets. The large and prolonged decline in the share of loans after the crisis also reflects the effects of restructuring, heightened uncertainty and rising default risk. As banks have gradually restored their capital adequacy ratios, substitution between loans and securities has receded. Consequently, the share of loans in total bank assets has gradually regained its pre-crisis level. However, the development of capital markets and greater involvement of banks in capital markets (such as increased securitization of bank loans) has resulted in a greater share of securities relative to its share in the pre-crisis period.

The Surge in Consumer Loans and Declining Share of Corporate Loans

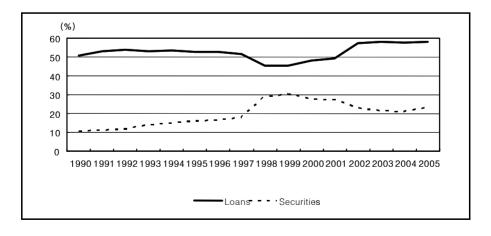
Household loans have gained a greater share, relative to corporate loans, of total bank loans. This continues a trend evident before the crisis (as shown in Figure 6b). The share of household loans increased further in the post-crisis period, and increased from 20% in 1996 to over 50% in recent years. This structural shift reflects both the increasing availability of direct financing for firms with good credit, and the change in the risk appetite of commercial banks towards more diversified and profitable consumer loans.

Dominance of SME Loans in Corporate Lending

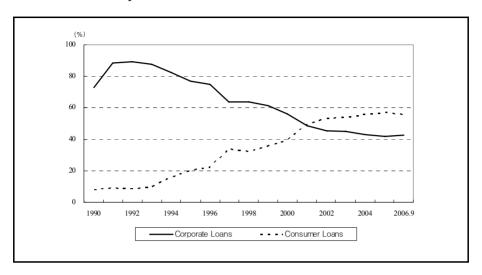
The pre-crisis increase in the share of SME loans in total corporate loans was reversed after the crisis, as banks were subject to severe capital constraints. However, the share of SME loans recovered in 1999 and 2000, and further increased to almost 90% in recent years. The dominance of SME loans reflects decreasing demand of corporate bank loans from relatively large and good credit firms as they become more dependent on internal and direct sources of financing. While improved risk management capability and risk-based pricing have increased commercial banks' lending capacities for SMEs, the surge in SME lending implies that bank balance sheets have greater exposure to business cycle risk and moral hazard and adverse selection problems.

Figure 6. Commercial Bank Portfolio Structure

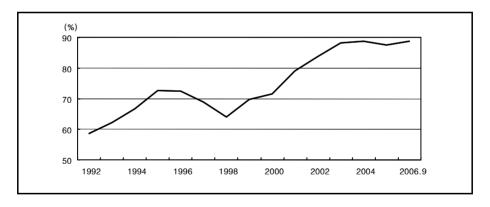




b. Share of Corporate and Consumer Loans in Domestic Loans



c. Share of SME Loans in Corporate Loans



3.1.C. Household Balance Sheet

Lastly, the changing financial behavior of households can be summarized as follows:

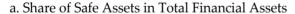
An Increase in the Share of Safe Assets

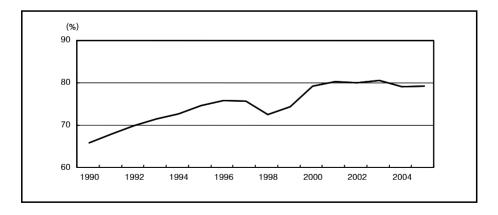
Figure 7a shows the share of relatively safe assets (cash, deposits, and insurance and pension products) in total financial assets of individuals, which temporarily decreased in 1998 and 1999 but increased to 80% in 2000 reflecting the low risk appetite of households. However, it is only recently that individuals have begun to place a greater share of their financial savings into capital markets through indirect investment vehicles such as mutual funds. The financial assets of fund industries (including mutual funds and ITCs) have increased from 174 trillion Korean won in 2002 to 258 trillion won in June 2007, a 48% increase, whereas commercial bank deposits have increased from 503 trillion won to 629 trillion won, only a 25% increase, during the same period. Hence, households' preference for safe assets shown in Figure 7a may not be sustainable as households gradually recover their risk appetite and gain easier access to capital market instruments.

Rapid Increase in Household Debt and Deterioration of Debt Service Capacity

While the phenomenon of "flight to quality" has dominated household assets, households also borrowed heavily to finance their consumption and housing purchases through credit card and housing loans. The low risk appetite in financial investment combined with the strong preference

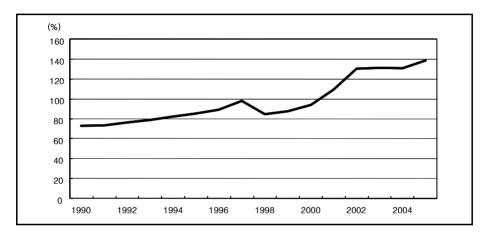
Figure 7. Financial Assets and Liabilities of Individual Sector





for real estate investment has deteriorated household balance sheets. As shown in Figure 7b, the debt to disposable income ratio of individuals increased rapidly after 2001 indicating the deteriorating debt service capacity of households. These household balance sheet deteriorations have made the banking sector particularly vulnerable to potentially serious disruptions from possible real estate bubbles and increases in loan interest rates.

b. Financial Liability to Disposable Income Ratio



3. 2. Capital Market Reform and Transition toward a Market-based System

As opposed to the direct government intervention in the restructuring of financial institutions, capital market reforms were relatively more focused on infrastructure building. Immediately after the crisis, restrictions on capital accounts and foreign exchange transactions were comprehensively repealed, substantially opening up Korea's capital markets with virtually no barriers to foreign investors. In addition, various reform measures have been implemented to strengthen corporate governance, and accounting and disclosure procedures. Such capital market reform measures include requirements for outside directors and audit committee systems, tightening internal control and compliance systems, repeal of M&A related regulations, and strengthening of minority shareholders' rights, among others.

As summarized in Table 5, along with these reform measures, the Korean capital markets have expanded substantially. As for the equity

market, the combined market capitalization of the Korea Stock Exchange and KOSDAQ has increased almost 10 times (from 77.9 trillion Korean won at the end of 1997 to 776.7 trillion won at the end of 2006). The total outstanding volume in bond markets has also increased rapidly during the last 10 year period (from 185.7 trillion won to 718.8 trillion won). Specifically, government bonds grew relatively fast whereas corporate bonds grew relatively modestly, as we discussed above in Section III 1: B.

Table 5. Capital Markets in Korea

(Unit: Trillion Korean Won)

	_	ı				
	1997	1999	2001	2003	2005	2006
Korea Stock Exchange:						
Market Capitalization	70.9	349.5	255.8	355.4	655.1	704.6
- Foreign Share (%)	(14.6)	(21.9)	(36.6)	(40.1)	(39.7)	(37.3)
Transactions Value	162.3	866.9	491.4	547.5	786.3	848.5
No. of Listed Firms	776	725	689	684	702	731
KOSDAQ:						
Market Capitalization	7.0	98.7	51.8	37.4	70.9	72.1
Transactions Value	1.1	106.8	425.2	266.4	446.4	427.5
No. of Registered Firms	359	453	721	879	918	963
Bond Markets:						
Outstanding Volume ¹⁾	185.7	277.8	369.8	523.5	646.4	718.8
- Government Bonds	28.5	61.2	82.4	135.8	222.9	257.8
- MSBs	23.5	51.5	79.1	105.5	155.2	158.4
- Bank Debentures	43.6	45.5	53.9	94.9	125.8	168.2
- Corporate Bonds	90.1	119.7	154.4	187.4	142.5	134.4
Transactions Value	282.9	2,183.1	2,924.4	2,826.0	3,992.3	4,131.9

Note: 1) Computed as a sum of the outstanding volumes of government bonds, monetary stabilization bonds (MSBs) issued by the Bank of Korea, bank debentures, and corporate bonds.

Sources: Money & Banking Statistics; Bank of Korea.

When measured by market capitalization on the Korea Stock Exchange, the share of foreign investors in Korean capital markets has increased substantially during the post-crisis period from 14.6% at the end of 1997 to 40.1% at the end of 2003 (although it decreased slightly to 37.3% in 2006). As the capital market has expanded, capital market instruments have become substantially diversified. New instruments include collective investment tools such as mutual funds and real estate investment trusts (REITs) as well

as various asset backed securities (ABS) such as collateralized bond and loan obligations. The development of financial derivatives markets also contributed to the deepening of capital markets.

Along with reform and development of capital markets, Korea's financial structure has also evolved.⁶⁾ It can be argued that the Korean financial system is undergoing a transition from a bank-based (relationship-based) to market-based (arm's length) system. Although there is no consensus as to which of these two models is generally superior, the literature suggests that different systems may be better suited (in other words, have a comparative advantage) at different stages of economic development. Rajan and Zingales (1998) argue that although the relationship-based system may be superior in less developed countries where contracts are hard to enforce and productive investment opportunities are relatively abundant, that system becomes increasingly conducive to massive resource misallocation as the economy grows and capital becomes abundant. This is because allocation is not based upon price signals.

The market-based system has advantages in periods of technological uncertainty when investors need to take bets on competing technologies, while the bank-based system has advantages when technological uncertainty is low and growth depends mainly upon the mobilization of savings for investments in known technologies. A bank-based system would perform well when capital accumulation is more important for development and the economy depends upon extensive growth. However, a market-based system would perform better as the economy increasingly depends upon intensive growth such as in post-crisis Korea where innovation and flexibility are critical, and there is more technological uncertainty.

Indeed, as described above, Korea has pursued a capital market oriented reform with a view to transplanting a more market-based financial system.

Figure 8 shows the evolution of Korea's financial structure as measured by the size, activity and efficiency indices of Demirguc-Kunt and Levine (2001),⁷⁾ which suggest that the Korean system is slowly evolving toward a

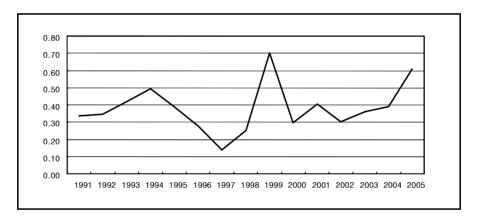
⁶⁾ The comparative financial systems discussion in this section is drawn from and updates Hahm (2004).

⁷⁾ Demirguc-Kunt and Levine (2001) constructed the size, activity and efficiency indices of financial structure to characterize financial systems of various countries. The size index was the ratio of domestic stock market capitalization to deposit money bank

more market-based system. However, these measures are significantly affected by the fluctuation in stock prices, fluctuations which crucially depend on secondary market activities. As we have already seen in the corporate financing pattern and household balance sheet structures, the share of direct financing has stagnated in the corporate sector. And, it has been only recently that households have started to prefer capital market instruments (such as mutual funds) over their traditional preference for safer bank assets and real estate investments. Hence, it remains to be seen whether the household savings flow into capital markets is a permanent shift in household asset structure and whether the transition toward a more market-based system is in appearance only.

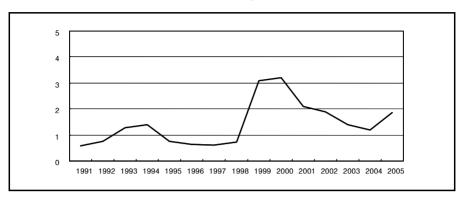
Figure 8. The Comparative Index for Market-based Financial System

a. The Size Index

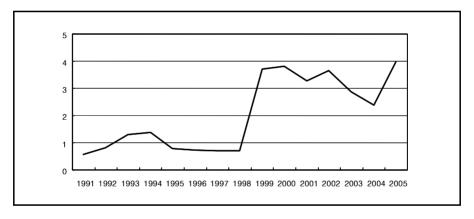


domestic assets, and the activity index was the ratio of total value of stock transactions to deposit money bank private credit. They used two measures of efficiency index: total value of stock transactions/GDP multiplied by bank overhead cost, and total value of stock transactions/GDP multiplied by bank net interest margin which we report in Figure 8. Note that, for all three indices, the higher the index value, the more the financial system is deemed to be market-based rather than bank-based.

b. The Activity Index



c. The Efficiency Index



4. CREDIT ALLOCATION BEHAVIOR OF FINANCIAL INTERMEDIARIES

The financial crisis was a catalyst for major institutional reforms, which brought about fundamental changes in the behavior of financial market participants. Based upon firm level credit allocation empirical data, this section explores the shifting relationship between providers and users of funds following the crisis.

4.1. Determinants of Corporate Lending

Credit allocation is a primary channel through which the financial sector can promote real economic development. This section investigates the changes in the credit allocation behavior of financial intermediaries using the Korea Information Service (KIS) data for externally audited firms during 1990–2005. To identify determinants of corporate lending, two regression equations were estimated using the pooled OLS methodology:

$$(L/TA)_{i,t} = \beta_0 + \beta_1 SIZE_{i,t-1} + \beta_2 PROF_{i,t-1} + \beta_3 TANG_{i,t-1} + \beta_4 CRED_{i,t-1}$$

$$+ \beta_5 (L/TA)_{i,t-1} + \sum_{i=1}^{l} \gamma_i IDDUM_{i,t} + \sum_{k=1}^{N} \delta_i YRDUM_{i,t} + \varepsilon_{i,t}$$

$$(1)$$

$$\Delta(L/TA)_{i,t} = \beta_0 + \beta_1 SIZE_{i,t-1} + \beta_2 PROF_{i,t-1} + \beta_3 TANG_{i,t-1} + \beta_4 CRED_{i,t-1}$$

$$+ \beta_5 \Delta(L/TA)_{i,t-1} + \sum_{j=1}^{I} \gamma_j IDDUM_{i,t} + \sum_{k=1}^{N} \delta_k \gamma_k TDUM_{i,t} + \varepsilon_{i,t}$$
(2)

The *L/TA* term refers to borrowing from financial intermediaries to total asset ratio, *SIZE* refers to log sales turnover, *PROF* refers to ordinary profit to total asset ratio, and *TANG* refers to tangible asset to total asset ratio. *CRED* refers to the credit score evaluated by the KIS credit assessment service, and *IDDUM* and *YRDUM* refer to industry and year dummy variables, respectively.

Note that the L/TA ratio represents the degree of financial leverage, which is determined jointly by credit demand and credit supply. If there exists an optimal level of financial leverage and this ratio is only slowly evolving over time, the yearly change in this ratio in equation (2) would be more driven by credit supply factors. We also restrict our sample to SMEs that are more likely to be credit constrained. Hence, their borrowing to asset ratio is more likely to be driven by credit supply of banks. We also included a lagged dependent variable and all explanatory variables were lagged by one year to control for potential endogeneity problems.

The regression results are summarized in Table 6. Note that in the pre-crisis period, financial borrowing to asset ratio is positively related with firm size and negatively related with profitability. However, after the crisis, the ratio is less sensitive to firm size and positively associated with profitability. The tangible asset ratio has yet to be a significant factor in the determination of financial borrowing, while credit score is negatively associated with the borrowing to asset ratio. This negative association of

credit score to borrowing to asset ratio seems to be driven by the fact that highly leveraged firms tend to get a lower credit score and that many SMEs with relatively high credit risks (lower credit scores) still tend to rely upon bank loans. Table 6b shows the changing nature of the credit supply behavior of financial intermediaries. After the crisis, the financial borrowing to asset ratio becomes more sensitive and positively associated to profitability and credit score, indicating that financial intermediaries have become more

Table 6. Determinants of Corporate Loans: Externally-audited SMEs a. Dependent Variable: Financial Intermediary Loans-to-Total Assets Ratio (L/TA)

	Whole Sample	Before	After		
Explanatory	Period	Financial Crisis	Financial Crisis		
Variable	(1990–2005)	(1990–1996)	(1999–2005)		
SIZE (t-1)	-0.0010(-1.52)	-0.0003(-0.31)	-0.0023**(-2.36)		
PROF (t-1)	0.1673***(38.04)	0.0128(0.88)	0.1845***(36.29)		
TANG (t-1)	-0.0149***(-4.88)	-0.0014(-0.27)	-0.0247***(-6.18)		
CRED (t-1)	0.0003***(5.91)	0.0008***(8.66)	0.0002***(2.60)		
\triangle L/TA(t-1)	-0.0143***(-14.11)	-0.0400***(-9.21)	-0.0132***(-11.60)		
No. of	53,782	13,957	33,594		
Observations	22,702	10,701	22,371		
Adjusted R ²	0.05	0.02	0.06		

b. Dependent variable: Changes in Loans-to-Total Asset Ratio (Δ(L/TA))

Explanatory Variable	Whole Sample Period (1990–2005)	Before Financial Crisis (1990–1996)	After Financial Crisis (1999–2005)		
SIZE (t-1)	0.0105***(16.25)	0.0049***(4.56)	0.0121***(13.98)		
PROF (t-1)	0.1230***(30.93)	-0.0454***(-3.25)	0.1351***(30.12)		
TANG (t-1)	0.0369***(13.16)	0.0245***(4.76)	0.0356***(10.03)		
CRED (t-1)	-0.0029***(-46.88)	-0.0010***(-9.88)	-0.0035***(-41.51)		
L/TA (t-1)	0.6507***(210.17)	0.7821***(138.52)	0.6029***(153.11)		
No. of Observations	53,783	13,957	33,595		
Adjusted R ²	0.62	0.73	0.58		

Notes: 1) ***, **, * indicate coefficient estimates are statistically significant at 1%, 5%, 10% levels.

²⁾ Industry and year dummies were included in the regressions but coefficient estimates are not reported to save space.

prudent in their lending decisions with respect to debt service capacity and default risk of SMEs.

4.2. Determinants of Corporate Loan Interest Rate

In reality, it is difficult to flexibly adjust the quantity of loans in response to changing credit risk of borrowers since, for most SMEs, a failure to refinance existing loans can lead to loan default. Hence, financial intermediaries often choose to adjust their loan exposures by re-pricing lending rates when refinancing existing loans. Equation (3) estimates the determinants of average borrowing interest rates of SMEs, where INTR refers to the ratio of interest expenses to financial borrowings. A dummy variable *SBSD* was also included to control for the effect of SME government

Table 7. Determinants of Corporate Loan Interest Rates: Externally-audited SMEs

Dependent variable: Average Interest Rate on Loans from Financial Intermediaries

	Whole Sample Period (1990–2005)	Before Financial Crisis (1990–1996)	After Financial Crisis (1999–2005)		
SIZE (t-1)	0.0040***(16.98)	0.0004(0.73)	0.0050***(18.86)		
PROF (t-1)	-0.0168***(-11.15)	-0.0090(-1.26)	-0.0161***(-11.47)		
TANG (t-1)	-0.0141***(-13.83)	-0.0221***(-8.55)	-0.0085***(-8.01)		
CRED (t-1)	-0.0001***(-8.00)	0.0001***(3.28)	-0.0003***(-13.86)		
INTR (t-1)	-0.000004(-0.83)	-0.000005(-0.75)	-0.000002(-0.36)		
SBSD (t)	-0.0695***(-105.15)	-0.0977***(-47.29)	-0.0614***(-84.63)		
No. of Observations	50,694	13,148	32,046		
Adjusted R ²	0.39	0.21	0.32		

Notes: 1) ***, **, * indicate coefficient estimates are statistically significant at 1%, 5%, 10% levels.

²⁾ Industry and year dummies were included in the regressions but coefficient estimates are not reported to save space.

loan subsidies. We assume that an SME loan is subsidized by the government if the interest rate is less than 4%.

$$INTR_{i,t} = \beta_0 + \beta_1 SIZE_{i,t-1} + \beta_2 PROF_{i,t-1} + \beta_3 TANG_{i,t-1} + \beta_4 CRED_{i,t-1}$$

$$+ \beta_5 INTR_{i,t-1} + \beta_6 SBSD_{i,t} + \sum_{i=1}^{l} \gamma_i IDDUM_{i,t} + \sum_{k=1}^{N} \delta_k YRDUM_{i,t} + \varepsilon_{i,t}$$
(3)

Table 7 reports estimation results. After the crisis, the profitability and credit score variables are significantly negatively associated with the borrowing interest rate, which implies that more profitable and lower credit risk firms tend to obtain loans at lower interest rates. Collateral value, as measured by the tangible asset ratio, remains an important factor throughout the crisis. The coefficient of firm size variable becomes significantly positive after controlling for the profitability and risk variables.

4.3. Corporate Lending and Subsequent Profitability of Firms

This section tries to assess credit allocation efficiency of financial intermediaries by investigating the relationship between borrowing from financial intermediaries and subsequent changes in profitability:

$$PROF_{i,t} = \beta_0 + \beta_1 SIZE_{i,t-1} + \beta_2 PROF_{i,t-1} + \sum_{s=1}^{3} \theta_s (L/TA)_{i,t-s}$$

$$+ \sum_{i=1}^{I} \gamma_i IDDUM_{i,t} + \sum_{k=1}^{N} \delta_i \gamma_i PDUM_{i,t} + \epsilon_{i,t}$$

$$(4)$$

Table 8 reports the estimation results of regression equation (4). After controlling for size and lagged profitability effects, the borrowing to asset ratio was significantly negatively related to subsequent profitability before the crisis. However, the relationship becomes positive after the crisis. The coefficient of the borrowing to asset ratio is significantly positive when only the first lagged variable is included. When we include more lagged borrowing ratios, the sum of coefficients is still positive albeit not statistically significant.

This section's empirical evidence indicates noticeable improvements (albeit somewhat slow in progress) in post-crisis credit allocation behavior of financial intermediaries. However, the evidence must be interpreted cautiously, since the credit flow of financial intermediaries has been

increasingly diverted away from the corporate sector towards consumer and housing sectors as previously discussed. Hence, despite improvements in credit allocation efficiency of corporate loans, we cannot conclude that credit allocation efficiency of financial institutions has improved across the board after the crisis, especially when we consider more productive uses of financial capital for the economy as a whole.

Table 8. Corporate Loans and Profitability of Firms: Externally-audited SMEs

Dependent Variable: Profit to Asset Ratio

Explanatory Variable	Wh Sample (1990-	Period	Financi	ore al Crisis -1996)	After Financial Crisis (1999–2005)		
SIZE (t-1)	0.0052*** (4.49)	0.0057*** (7.31)	-0.0018*** (-3.21)	-0.0018*** (-2.66)	-0.0091*** (5.18)	0.0107*** (9.37)	
PROF (t-1)	0.3893*** (48.67)	0.3957*** (70.01)	0.5164*** (68.18)	0.5067*** (53.78)	0.3716*** (35.31)	0.3820** *(52.93)	
L/TA (t-1)	0.0014 (0.25)	0.0326*** (5.48)	-0.0293*** (-9.89)	-0.0741*** (-11.93)	0.0215** (2.53)	0.0712** *(8.67)	
L/TA (t-2)		-0.0337*** (-5.02)		0.0796*** (12.07)		-0.0607*** (-6.50)	
L/TA (t-3)		-0.0076 (-1.44)		-0.0377*** (-7.47)		-0.0028*** (-0.38)	
Sum of L/TA (t-1,t -2,t-3)		-0.0087		-0.0322		0.0076	
F-statistics (P-value)		5.14** (0.0234)		11.53*** (<0.0001)		1.83 (0.1764)	
No. of Observations	53,783	37,697	13,957	9627	33,595	23,475	
Adjusted R ²	0.06	0.16	0.33	0.33	0.05	0.15	

Notes: 1) ***, **, * indicate coefficient estimates are statistically significant at 1%, 5%, 10% levels.

²⁾ F-statistic is for the restriction that the sum of coefficient estimates on L/TA(t-1) to L/TA(t-3) equals zero.

³⁾ Industry and year dummies were included in the regressions but coefficient estimates are not reported to save space.

5. POLICY IMPLICATIONS AND CONCLUDING REMARKS

This paper characterizes the post-crisis structural transition of Korea's financial system from three perspectives: from the perspective of financial industry consolidation and conglomeration and their impact on the profitability and risks of financial institutions, from the perspective of the macro flow of funds and comparative financial systems, and finally from the perspective of firm level data analysis on the credit allocation behavior of financial intermediaries. Major findings can be summarized as follows.

First, there has been remarkable improvement in the profitability and capital adequacy soundness of financial institutions after the crisis. The increase in market power and improved cost efficiency in operation are key factors underlying the strong recovery in the management performance of financial institutions. The government's restructuring reforms aimed to reconstruct balance sheets of financial institutions by providing business environments in which large financial institutions could benefit from economies of scale and improved market power. In this sense, the financial restructuring policy seems to have achieved its first-order objectives.

However, as opposed to the effect of consolidation, despite the progress in financial conglomeration, synergy and economies of scope have not yet been realized potentially due to the positive list and compartmentalized regulation systems. Asset size- and economies of scale-based profitability effect may not be sustainable as competition is being intensified with the development of capital markets and foreign financial products as alternative financial savings instruments.

As for the evolution of financial risks, while there is no evidence that large financial conglomerates are taking on risks more aggressively, various features of conglomeration seem to have increased the scope for instability after the crisis. The potential for systemic risk may have increased with financial conglomeration because although diversification may have increased at individual institutions, both direct and indirect interdependencies among large financial groups have substantially increased in the post-crisis period as their business portfolio and asset structure have become increasingly similar. Furthermore, financial conglomerates have become more vulnerable to contagion risks from non-bank and non-financial sectors as financial conglomerates increase activities which are closely tied to non-bank financial firms and capital markets. More open and globalized capital markets and increasingly diverse financial instruments also

undermine the ability of central bank and regulatory authorities to cope with financial disruptions.

Second, from the perspective of macro financial structure, the transition towards a more market-based system has been limited despite the expansion of capital markets and improvements in institutional infrastructure towards a more market-based financial system. This limited success and the resurgence of banking institutions can be attributed to various factors. The government's "bank-first, and NBFIs-later" approach to financial restructuring combined with the post-crisis, low risk appetite of households increased the concentration of financial savings on safer bank products. Withdrawal of the government's implicit guarantee on direct debt instruments, such as corporate bonds and commercial papers, and the delayed resolution of corporate bankruptcies also caused a flight to quality.

Bank-centered financial intermediation and the asymmetry between demand for bank credit and supply of funds to banks introduced new risks into the Korean financial system. Relatively large firms with better credit increased internal and direct financing as alternatives to bank financing. In contrast, SMEs and firms with low credit became more dependent upon bank borrowing. In response to the weakening corporate demand and increasingly higher credit risk of borrowing firms, banks with abundant liquidities aggressively extended consumer and property loans, which contributed to the creation of the real estate bubble and deterioration of household balance sheets. Thus bank-centered financial intermediation and the underdevelopment of markets for risk capital have led to an overall weakening of financial intermediation functions after the crisis, especially towards the high-tech and innovative SME sectors.

Third, while the resource allocation efficiency of the entire financial system may not have improved due to distorted and unbalanced fund flows, corporate lending practices of financial intermediaries seem to have improved in the post-crisis period. Corporate loans and lending interest rates became more sensitive to debt service capacity. Default risks of firms, and allocation of credit became more forward-looking as firms with bank loans exhibited tendencies towards higher subsequent profitability. However, resource allocation and risk sharing roles of financial intermediaries remain far from fully functional as financial intermediaries are still passive in corporate restructuring and extending risk capital to more innovative but risky firms.

The recent work of Ahn, Hahm and Kim (2007) illuminates upon this.

With firm-level data of manufacturing industries, it estimates the effect of external financing on factors of firm growth (such as capital accumulation, R&D investment, and total factor productivity growth). They found that while external financing is associated with faster capital accumulation of firms, this capital accumulation channel has become relatively weak after the crisis due to separation of external financial flows from corporate investment activities. Second, the total factor productivity enhancement effect of external finance remained considerably weak both before and after the crisis despite post-crisis financial reform efforts.

The above assessment of the financial system transition in post-crisis Korea leads to a set of outstanding reform agenda. First, it is important to institute a more balanced financial structure by encouraging greater fund flows to capital markets. Considering Korea's increasing dependence upon intensive growth factors and more advanced technology, the development of deeper and more sophisticated capital markets that can accurately price and diversify investment risks by processing more complex and heterogeneous information is critically important for sustained economic growth. In this regard, it is necessary to shift the foci of financial policies from the current ones of economies of scale and asset-based growth of financial institutions to fostering synergy and economies of scope through financial conglomeration, fair competition and investor protection in the capital market.

The recent enactment of the Capital Market Consolidation Act seems to be a positive step forward in this regard. This act aims to revamp the existing capital market regulatory system by introducing a negative list principle, and accelerate the delayed restructuring of the capital market-related industries (such as securities, futures, asset management, and investment advisory) by permitting the establishment of investment banks. It also aims to substantially strengthen investor protection to a level on par with that of the advanced countries.

In Korea's case where the role of banks has traditionally been emphasized, it would be desirable to institute a financial system in which the bank's functions of savings mobilization and information production can be flexibly combined with the capital market's functions of risk absorption and diversification. For instance, qualitative bases for corporate financing can be enlarged by linking a bank's credit businesses with securities underwriting or M&A businesses by sharing information. SME lending can be facilitated by encouraging risk sharing through asset backed securitization. Financial groups also need to maximize synergy and economies of scope through cross selling

activities, and sharing of customer base and information. Human capital, product development and improved risk management capabilities would be critical factors for success of financial conglomerates.

Second, faced with the shifting nature of financial risks in the presence of large and complex financial conglomerates, more intense and sophisticated supervision is necessary. For timely and effective monitoring of risks at large financial conglomerates, the supervisiory framework must be improved to the risk-based consolidated supervision. With a traditional static capital-based approach, it is almost impossible to evaluate accurately the development and propagation of risks of financial services and market activities of complex financial conglomerates. Although consolidated accounting and prudential regulatory measures are integral parts of consolidated supervision, Korea currently has only a rudimentary framework for financial holding companies and no consolidated framework for other types of financial groups. Capital adequacy standards for financial conglomerates must be more tightly linked with risk capital aggregated for the entire group. Further, such standards must reflect potential contagion and propagation of risks within a group.

Third, it is important to institute an effective mechanism that can cope with increasing potential for systemic risk. As discussed above, large financial institutions may engage in moral hazard and aggressive risk taking given the possibility of regulatory forbearance based upon "too-big-to-fail." A possible way of ensuring against regulatory forbearance by financial supervisors is through strict implementation of prompt corrective action provisions. However, in the case of large financial institutions, systemic risk could be a concern when strictly applying prompt corrective action. Hence, the systemic risk concern itself brings about expectations of future bailouts and causes distortions in fund flows by increasing market power of large institutions with taxpayers' money as collateral. In order to prevent regulatory forbearance for financial conglomerates, the conditionality for the systemic risk exception needs to be strengthened and explicitly spelled out.

It is also critical to have an institutional channel for communication, cooperation, and checks and balances among related regulatory authorities—especially among the financial supervisory authority, central bank, and the Ministry of Finance and Economy. For instance, monetary policy of the central bank and foreign exchange policy of the finance ministry are often directly linked with the credit boom-bust cycles in emerging market countries. As discussed above, with increasing indebtedness of

households, fluctuations in asset prices could destabilize business cycles through household balance sheets. It is debatable whether central banks need to respond proactively with asset price movements.⁸⁾ However, closer coordination between central bank macroeconomic policy and prudential supervisory policy should be required.

Likewise, the prudential regulation policy of the supervisory authority is often influenced by the stabilization policy of the finance ministry, the latter of which is more politically concerned. Also, the supervisory authority's institutional micro supervision information must be complemented with the central bank's macroeconomic financial market information. This cooperative institutional scheme must be able to systematically identify and monitor potential sources and propagation channels of systemic risk developments, and provide early warning signals for policymakers and financial institutions.

Finally, the existence of financial market discipline also greatly contributes to financial stability. Market discipline seems to have been improved after the crisis as fund flows became more responsive to asset quality and capital adequacy of financial intermediaries. To further strengthen market discipline, it is important to provide more transparent information on the management of financial institutions. Disclosure requirements are essential in providing relevant and timely information for market participants. Hence, public disclosure requirements need to be further strengthened, especially for large financial conglomerates. Along with efforts to promote information transparency, supervisory authorities also need to introduce more market-based regulatory measures, such as requiring financial conglomerates to issue subordinate debt. Likewise, strengthening of corporate governance and internal controlling schemes must be complemented with official financial supervision; sound governance of corporate firms and effective monitoring by financial institutions and capital markets would be a catalyst for financial stability in the era of financial deregulation and globalization.

⁸⁾ See for instance, Crockett (1997) and Bernanke and Gertler (2001) for debates on the financial stability as a goal of central bank monetary policy.

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Comments on "Ten Years after the Crisis: Financial System Transition in Korea"

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This paper presents a fine summary of how the financial system has changed in Korea since the crisis. The discussion in the paper covers three aspects of this change: a) the financial industry and the impact of recent changes on profitability and risk; b) financial structure, from the perspective of the flow of funds; and c) credit allocation to SMEs based on firm-level data.

Although the paper covers much ground and presents many results, in the view of this discussant, it highlights six major developments. First, the profitability of banks has improved, with stronger balance sheets. With the consolidation of banks, concentration has increased, but evidence on any impact of this is mixed. A major source of improved profitability is the reduction in loan loss provision (but little room is left for further reduction). A greater share of lending to SMEs and households (where competition is lower) may well be another source, although this point is not emphasized in the paper.

Second, a number of financial groups have been formed, and bank assets have concentrated in such groups. An important question is whether systemic risk has increased as a result of the concentration of risk. Unfortunately, no theory is available to guide our thinking. Evidence presented in the paper is also mixed at best.

Third, corporate finance has changed. Firms now rely more on internal funds. The author claims that firms perceive external borrowing as risky. If so, why don't they use equity financing? Is it because they do not want to dilute their ownership? The author also notes a fall in the share of short-term debt in corporate borrowing, which must be a positive development.

Fourth, in the areas of banks and households, there have been two notable developments. There is now a greater share of lending to SMEs and households in bank assets. As for households, there is an increased preference for safe bank assets. In this context, the recent pick-up in mutual funds may be an indication that risk appetite has recovered somewhat.

Fifth, Korea has seen a rapid expansion of the equity and government bond markets, and investors now enjoy access to a more diversified menu of instruments. On the other hand, the growth of the corporate bond market has been slow. This, however, is in line with the experience of other countries. A corporate bond market is usually the last market to develop. The author notes that the growth of capital markets may be limited by households' preference for safe assets and firms' reliance on internal funds.

Sixth, there has been an important change in the allocation of bank credit to SMEs. Before the crisis, banks typically lent more to less profitable firms, but after the crisis, banks began to lend more to more profitable firms. The loan interest rate also became more sensitive to credit rating and profitability after the crisis. As a result, bank borrowing became associated with greater subsequent profitability.

No coherent picture emerges from the paper, and there is no unifying perspective to put the three pillars of the study together. The recommendations of the paper—for improving supervision and further developing capital markets—are sensible but do not necessarily follow from any particular finding. Let me hasten to add that the lack of a definitive conclusion is not entirely the author's fault. Characterizing a financial system is no easy task, and the impact of financial reform is always difficult to assess. It may be premature to judge what has happened in Korea, because the trajectory of moving from one type of system to another is affected by many factors, both transitory and permanent.

This said, many of the paper's findings are encouraging. In particular, a) there is a greater menu of alternative vehicles of corporate financing; b) both bank lending and corporate borrowing are driven more by return and profitability considerations; and c) SMEs (and households) have greater access to bank financing. These and other findings lead us to believe that the Korean economy and financial system are now more resilient to crisis.

Additional considerations are necessary, however, to make the paper more complete. Among other things, the paper needs to address the impact of the greater flexibility of the won and the recent development of Korea's foreign exchange market in terms of depth and sophistication. It should also explicitly consider the impact of financial globalization. Whether one likes it or not, Korea is part of a large global financial market, and it may not make

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much difference where financial intermediation takes place. If the domestic financial system is inefficient, large firms will go elsewhere to meet their financial needs. What are the implications of global financial integration for developing domestic capital markets and for strengthening supervision? These are difficult but necessary issues to address for any study of domestic financial reforms in the 21st century.

Corporate Sector Restructuring in Korea: Status and Challenges

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Dongsoo KangKDI and OECD

1. Introduction

This paper investigates the progress in corporate sector restructuring in Korea since the 1997 financial crisis and analyzes the current challenges facing the Korean corporate sector. It focuses on the specific issues facing the corporate sector, and as such does not analyze otheraspects—macroeconomic policies and financial sector reforms—that have also been crucial to the recovery to date and will remain essential to sustain growth going forward. From available corporate sector data and a review of the literature, the paper concludes that much progress has been achieved in the corporate sector. Thanks to much restructuring and deep reforms, financial vulnerabilities have been greatly reduced and performance has improved. Leverage has declined, and maturity and currency mismatches have been reduced. Corporate sector profitability has generally been restored and investment has become more rational.

The paper attributes these improvements to a combination of multiple factors, most importantly: government-led initiatives, especially the use of measures specifically aimed at large and distressed corporations and the setting of a tight framework for corporate financial restructuring; a broad set of institutional reforms, covering, among others, corporate governance, accounting and auditing, bankruptcy and other forms of financial restructuring; financial sector reform, including banking system recapitalization and restructuring; and, changes in ownership structures in both corporate and financial sectors.

The paper points out, however, that some of the problems preceding the financial crisis still remain present today. In spite of many reforms, corporate governance practices of Korean corporations are still perceived to be below those of firms in many comparator countries. Ownership structures remain characterized by high wedges between cash-flow rights and control rights, with adverse consequences for minority shareholders and resource allocation. Barriers to entry for SMEs, such as the time and cost to opening up a business, are still large, hindering growth. The services sector is hindered in scale and efficiency of operations by many rules. And corporations have reduced their investment substantially and hold much larger amounts of cash, affecting future growth potential adversely.

More generally, the lower level of investment coupled with generally unimpressive profitability and low productivity growth raise some doubts about future corporate sector growth. Explanations of lower growth focus on how improved risk management, while having benefits, has led to excessively prudent investing behavior. Also factors such as an increased expectation in Korean society for corporations to play a larger role in social contribution and a greater policy focus on employment may have made corporations more reluctant to invest. And the advent of more knowledge-intensive production, with less need for investment in fixed assets, may have contributed to lower investment needs in the conventional sense. Further financial markets and corporate governance reforms will be necessary to assure the right level and type of investments, with a proper risk-return balance.

These concerns are part of more general debates in Korea about its growth potential with a number of long-term, internal and external factors mentioned to be behind the slowdown in growth. Korea will need to address the challenges its corporate sector faces from an appreciated real exchange rate and increased competition from other countries, notably China, amid a decline in its labor supply as the population ages. While to date China has played a mostly positive role in Korea's economic growth, especially through exports, it will become a challenge soon. Meeting this, and the more general challenge of global competition, will require Korea to move beyond an economic model of export-led growth based on extensive factor inputs to a more knowledge-based economic model, where it then can compete with the most advanced countries.

Such a model will require advanced human skills, an innovative and dynamic corporate sector with creative entrepreneurs, superior infrastructure, including advanced telecommunications, and a supportive overall business environment. This will, among others, call for more and better investment in education, more research and development, better adoption of technology, more financing for innovative but risky activities, and a reduction in the barriers to doing business. These steps will involve roles for the government, but with the right orientation, one in which it is confined to creating an overall conducive policy environment that maintains a market-oriented direction, yet plays a role as a key advocate. Korea is already moving in this direction, but will require more intense efforts. The experience of the last decade suggests, however, that Korea will meet this challenge as well.

The rest of the paper is structured as follows. In Section 2 we describe the corporate sector problems before the crisis and assess the corporate sector as it stands today, using available data and reviewing relevant literature. In Section 3 we assess the main drivers of improved corporate sector performance over the past decade and ask whether additional reform efforts are needed in these areas. Section 4 describes the current issues facing the corporate sector and the challenges going forward. The last Section concludes.

2. PROBLEMS BEFORE THE CRISIS AND ACHIEVEMENTS AFTER THE CRISIS

2.1. Problems before 1997

The problems and vulnerabilities in the corporate sector before the 1997 financial crisis have been well documented (Claessens *et al.*, 1998; Pomerleano, 1999; Mako, 2001; Joh, 2004; and many others). Large debts, high leverage, short maturity, and extended foreign exchange borrowings led to risky financial structures (Figures 2.1–2.4). The financial vulnerabilities were accompanied by over-investment, over-diversification by *chaebols* in non-core sectors, and low profitability.

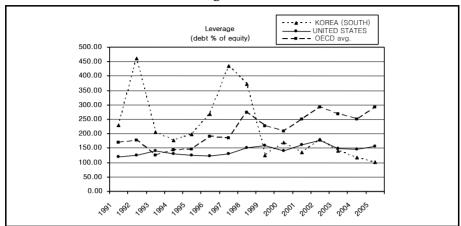


Figure 2-1.

- Note: 1) OECD avg. calculated based on: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland.
 - 2) For each indicator (debt % of equity, short term debt in % of total debt, return on assets in %, interest coverage ratio we use market capitalization weighted averages.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database

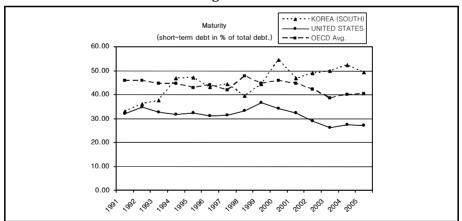


Figure 2-2.

Note: 1) OECD avg. calculated based on: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland.

2) For each indicator (debt % of equity, short term debt in % of total debt, return on assets in %, interest coverage ratio we use market capitalization weighted averages.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database

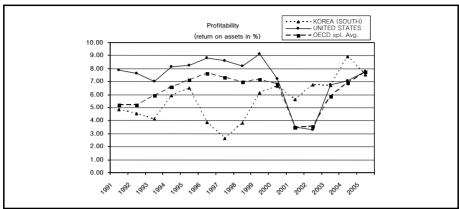


Figure 2-3.

Note: 1) OECD avg. calculated based on: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland.

2) For each indicator (debt % of equity, short term debt in % of total debt, return on assets in %, interest coverage ratio we use market capitalization weighted averages.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database

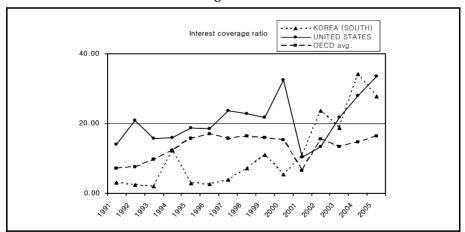


Figure 2-4.

Note: 1) OECD avg. calculated based on: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland.

2) For each indicator (debt % of equity, short term debt in % of total debt, return on assets in %, interest coverage ratio we use market capitalization weighted averages.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database

These problems of large financial vulnerabilities and weak performance arose in part from high ownership control concentration, particularly among the large chaebols, the predominance of business groups in Korea, and the various interlinks among corporations. These features meant poor transparency and weak corporate governance, which in turn often facilitated an inefficient allocation of resources and much risk taking. The weak governance structure was further aggravated by the following two factors. One was the general passive nature of the Korean banking system, with limited risk management and credit analysis skills and the still very large role of the government, both directly as an owner and indirectly as an overseer. And the second was the existence of many links between the corporate and financial sectors, most notably the control by chaebols over many merchant banks and other non-bank financial institutions (Hahm, 2004). The resulting lack of overall market discipline reflected itself in the limited exit of weak corporations. And in the capital markets, poor corporate governance translated itself into expropriation, low stock market valuation, and low rates of return for minority shareholders.

While ex-post these problems have been extensively identified and documented as important factors behind the 1997 crisis (World Bank, 1999; IMF, 1998; OECD, 1999), at that time too little emphasis was given to them. The exact contribution of the corporate sector vulnerabilities to causing the financial crisis remains, however, debated. While most have recognized a role for the weaknesses in the corporate sector, many have laid the main causes of the financial crisis more on other factors, such as external shocks, poor macro-economic management, the weak state of the financial system, or political uncertainties. While it is not clear that the crisis would have been avoided with a more robust corporate sector, Jones and Karasulu (2006) nevertheless show that in hindsight, but with the corporate database available at that time, stress tests could have provided useful information about the vulnerability of the corporate sector in 1997 to adverse developments, particularly interest rate shocks. While such analysis could not have predicted the likelihood of a shock occurrence, it could have helped predict and possibly mitigate the impact of the subsequent events.

2.2. Improvements since 1997

Thanks to vigorous policy actions following the crisis, much has been achieved in terms of restoring corporate sector health. Actions have included

a mixture of government issued guidelines, such as the required elimination of cross-guarantees, the forced reduction in financial leverage, special requests for the larger *chaebols* to reduce their investments and consolidate their operations, a specific process for large-scale corporate financial restructuring, recapitalization and financial restructuring of the banking system, financial sector reform, and increased market pressures facilitated by a number of institutional reforms. Across a wide spectrum, data confirm that these measures have led to reduced financial vulnerabilities and improved corporate performance.

Overall leverage has declined from 396% to 110% between 1997 and 2003 and interest coverage ratio has increased from 0.95 to 3.6 between 1998 and 2003 (Kim and Kim, 2004).¹⁾ The share of short-term debt declined from 22% to 9% between 1998 and 2001. There are also indications of more conservative liquidity management and more prudent investment behavior (Lim, 2005). The improvement in investment behavior seems to have been especially strong among *chaebols*. Hong, Lee, and Lee (2007) find that, after controlling for profitability and cash flows, there are no significant differences in terms of investment ratios between *chaebols* and non-*chaebols* in the post-crisis period. This indicates that the overinvestment that characterized the *chaebols*' behavior during the pre-crisis period has disappeared after the crisis.

Important to the reduction in vulnerabilities and more rational investment behavior has been the large exit of weaker firms, including some *chaebols*, through corporate workouts and in some cases outright liquidation (Table 2-1). Since the crisis, the number of reorganizations, compositions, and bankruptcies has remained quite high. In addition, the increase since 1998 in mergers and acquisitions (M&A), including many cross-border cases, has led to a more rational allocation of resources (Table 2-2; Appendix Table A-1 compares the cross-border M&As in Korea with those in other countries and shows the rapid growth in Korea). This restructuring has been accompanied by somewhat improved direct ownership structures, including larger foreign ownership and reduction in cross-ownership among related parties, which have facilitated higher transparency in management and allowed for more efficiency Country in resource allocation.

¹⁾ These numbers may differ from those in the Figures and Tables as the coverage and definitions are different. The Figures and Tables are based on Worldscope data, which are defined in a way that makes international comparisons possible. The data in the text come from Korean sources, including BOK.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Reorganization	79	52	132	148	37	32	31	28	38	35
Composition	13	9	322	728	140	78	51	29	48	81
Bankruptcy (Firm)	12	18	38	117	230	132	170	108	303	162

503

329

672

1.335 3.856

12.317

Table 2-1. Insolvency Cases in Korea

Note: The number of bankruptcy cases was not divided into firms and individuals until the year 2000.

350

Source: Kim (2007).

Bankruptcy (Individual)

Overall, the balance sheets of both large and small and medium-sized companies have greatly improved in terms of financial soundness. A comparison to other countries also shows that Korea's financial structures are no longer out of line (Table 2-3). And there is much evidence of improved performances based on more sustainable investment patterns.

Still, there remain signs of weaknesses and unfinished restructuring needs. Kim and Kim (2004) found that, despite the improved profitability, corporate debt service capacity was still weak for numerous firms. They found that in 2003, 27.5% of firms had an interest coverage ratio of less than one, with a large portion of distressed firms in high-tech industries where Korea is thought to have a comparative advantage. Even at that time, there remained a strong need to restructure financially distressed firms. Data suggest that today weaknesses exist not only in corporate balance sheets and performance. According to the Bank of Korea (2007), the percentage of large businesses and SMEs listed on the stock exchange unable to cover their net financial expenses with operating profits further rose to 23.7% and 41.5%, respectively, in 2006. To further enhance both profitability and efficiency in the corporate sector, and limit vulnerabilities, it will be necessary to continue financial and operational restructuring under market pressures.

Table 2-2. Recent Trends in M&A in Korea

		1998	1999	2000	2001	2002	2003	2004	2005
Total M&As	Case	486	557	703	644	602	589	749	658
	Amount (KRW tril)	125	80	30.7	13.5	15.3	13.7	16.2	19.2
M&As by foreign	Case	132	168	114	102	90	103	125	84
firms	Share in total (%)	27.2	30.2	16.2	15.8	15	17.5	16.7	12.8
	Amount (KRW tril)	9.3	10.9	2.5	1.6	1.3	3.5	6.3	5.5
	Share in total (%)	7.4	13.6	8.1	11.9	8.5	25.5	38.9	28.6

Source: OECD (2007).

Table 2-3. Corporate Financial Structures and Profitability

	Debt-equity ratio (%)		Current ratio			Profitability RoA (%)			
Country	1995	2000	2005	1995	2000	2005	1995	2000	2005
Brazil	55.79	76.72	96.95	1.44	1.20	1.47	2.73	9.74	12.46
China	64.84	135.93	88.47	1.62	1.86	1.43	8.89	7.88	4.95
Germany	378.98	336.59	323.94	2.31	1.37	1.51	2.76	4.24	5.43
India	87.28	55.98	74.90	1.49	2.16	1.76	13.25	16.13	13.38
Indonesia	92.95	239.35	78.67	2.68	2.01	1.77	12.85	8.18	10.49
Japan	242.04	137.18	177.88	1.53	1.93	1.84	2.15	3.69	4.52
Korea (South)	198.17	170.15	101.96	1.05	0.80	1.57	6.50	6.64	7.55
Malaysia	81.98	135.54	106.58	1.66	1.71	2.37	9.42	4.34	7.28
Philippines	67.46	90.78	100.21	1.86	1.95	1.61	8.45	4.21	8.55
Thailand	147.54	579.25	86.54	1.43	1.66	1.67	7.40	6.32	10.92
United States	125.56	140.29	156.57	1.61	2.02	1.89	8.22	7.19	7.80
OECD Average	154.19	211.17	240.85	1.67	1.45	1.55	7.10	6.78	7.71

Note: OECD average is calculated based on Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea (South), Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States. To maintain comparability, all data are calculated as market capitalization weighted averages.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database.

3. ASSESSMENTS OF THE MAIN DRIVERS OF IMPROVED CORPORATE SECTOR PERFORMANCE

The improvements in Korea's corporate sector performance, the reductions in financial vulnerabilities, and the fast recovery over the past decade are accounted for by a combination of factors. These include, most importantly, large government-led initiatives immediately following the financial crisis, drastic restructuring of the financial system, and many improvements in the institutional environment for the corporate and financial sectors, notably covering the frameworks for corporate governance, corporate financial distress, and disclosure and quality of information. Each of these factors has played a crucial role, but it has been the combination that has allowed for the rapid progress. The question today is whether any of these factors need to be enhanced or modified in light of past experiences, global lessons, or vis-à-vis changing circumstances.²⁾

3.1. Financial sector

Much of the improved performance and the lower vulnerability in the corporate sector can be attributed to the financial sector restructuring and reform measures put in place since the financial crisis. Key has been the reform of the banking system, which represented the major source of financing for the corporate sector before the crisis and was a major contributor to the weak corporate sector performance (Hahm 2004). Prior to the crisis, Korean banks were generally state-owned or controlled (Appendix Table A-2), with lending decisions often under the government control and aimed at national economic objectives. Banks were often poorly governed and had little knowledge and expertise on how to assess and monitor borrowers' risks and to undertake restructuring. Using pre-crisis data, Joh (2007) finds that financially troubled firms borrowed more than sound firms, but that these firms did not show better profitability after these loans were made.³⁾ Thanks to large-scale bank restructuring and recapitalization, better

²⁾ We leave out an analysis of the direct role of the government in financial restructuring which has been extensively covered elsewhere (e.g., see Joh 2004; Mako 2001).

³⁾ Kim (2007), in his comments on Joh (2007), raises three conjectures why Korean banks may have advanced more loans to already troubled firms in the mid-1990s: (1) the cost of liquidating or restructuring the distressed firms may have surpassed the

ownership structures, improved corporate governance, and improved lending and risk management practices, commercial banks now exercise much better discipline in their lending decisions and force corporations to perform more efficiently and finance themselves more prudently.

One of the most dramatic changes has occurred in bank ownership structures. In the last decade, ownership of the Korean banking system has changed substantially, more than that of many other comparator countries (Table 3-1). Most major commercial banks now have controlling foreign investors. This change in ownership structures has meant a better incentive framework, more compatible with market-based resource allocation and has allowed for the introduction of better risk management practices. The change in ownership structures also has meant that the room for government intervention in lending decisions has become much more limited and a moral hazard, e.g., the risk of bailout loans to large distressed companies, has become much less of a problem. This is reflected in, among other things, the reduced lending to larger corporations.

Table 3-1. Foreign Banks' Share

(Unit: % Out of Total Bank Assets) Country 1995 2000 2005 China 0.54% 0.47% 0.13% India 0.36% 6.36% 5.14% Indonesia 3.46% 5.03% 28.40% Korea 0.00% 10.61% 44.23% 16.04% 17.29% Malaysia 15.60% **Philippines** 0.00% 17.00% 1.00%

4.38%

5.38%

Source: Claessens, van Horen, Gurcanlar and Mercado (2007).

Thailand

11.90%

benefits; (2) in a period of financial and economic turmoil, current financial distress of a firm may not be a good signal of its future productivity, making a policy of rolling over non-performing loans preferable; and (3) banks may have had their own balance-sheet problems, particularly a large share of nonperforming loans, which prevented them from taking the profit-maximizing actions of restructuring and writing off loans.

Important in their own right, the improved practices and infusion of capital have made the banking system itself much more robust. Improved corporate governance has contributed to better risk management and more sustainable profits in the banking sector. Capital adequacy levels are much higher today and banks' ratings have dramatically improved. As S&P (2005) mentioned when it raised Korea's sovereign ratings two years ago, Korea's financial system has become much more robust to various shocks, largely thanks to upgraded corporate governance. Banking today is the most profitable sector of all industries in Korea. At the same time, due to improved use of global know-how and technology, combined with ample competition among banks and other financial institutions, financial intermediation costs remain low.

Besides the restructuring of non-performing loans and lower corporate

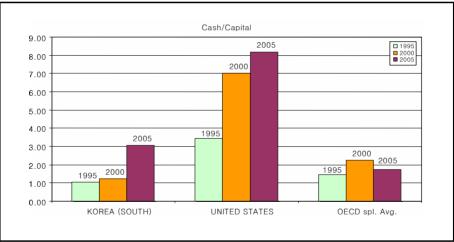


Figure 3-1. Cash to Capital Ratio

Note: 1) OECD avg. calculated based on Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea (South), Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland.

Cash/Capital was calculated as the market capitalization weighted averages of cash and short-term investments divided by lagged net property, plant and equipment.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database.

sector leverage, other changes in corporate balance sheets likely reflect in part Korea's strengthened banking system. Analyzing corporate liquidity holding behavior, Lim and Choi (2006) find that Korean firms' precautionary demand for liquidity has become much larger over the last decade (Figure 3-1). While this does not seem to have happened just in Korea—corporations in the US and other OECD countries also show a similar pattern—the recent change in Korea is relatively large. The larger cash holdings could be due to the increased uncertainties in sales and profits, in turn partly due to increased competition, making the corporate sector hold more cash. It could also be due to the reduced role of relationship lending and increased competition in the banking system, making banks no longer willing to provide liquidity to corporations with whom they have little certainty of a long-term relationship. Regardless, while higher liquidity holding has made corporations less risky, it may have come at the cost of too much reduced investment and possibly more pessimistic income statements in the future. This is a concern since, while it has been restored, profitability still remains low by emerging markets' and some advanced countries' standards (Table 2-3).

More generally, the lower level of investment coupled with generally modest profitability raises some skepticism on the future growth potential of Korea's corporate sector. Addressing this will require a combination of long-term structural policies covering a wide spectrum (Section 3 below). What is clear is that the current lower level of investment is not due to lack of external or internal funds, nor due to a high cost of capital. At the same time that large corporations have reduced their investment, SME bank loans have been growing very fast. This suggests that the constraints are not coming from the supply side as banks have been able accommodate this demand. If anything, the rapid growth in SME loans suggests that banks may be overextending themselves in this segment and consequently risks may be building up, also since the current spread between large companies and SMEs is only 60 to 70 basis points, despite the large gap in creditworthiness. Interest rates on long-term bank loans have generally also remained low. Capital market financing in various forms has generally been available. And, as noted, the large buildup of cash holdings suggests that internal cash flow would have allowed for higher investment.

3.2. Corporate governance

Another major driver behind the improvement in corporate sector performance and reduction in vulnerabilities has been corporate governance changes. Corporate governance changes have been due to government-led initiatives, to improvements in the overall institutional environment, and to changes in ownership structures. Immediately following the financial crisis, there have been a number of measures aimed directly at improving financial and general transparency, and corporate governance structures in the large *chaebols*, such as the elimination of cross-guarantees and the prohibition on ownership links. Through legal and regulatory changes, there have been many improvements in the institutional framework for corporate governance (Box 3-1 summarizes these measures). And, also as part of the financial restructuring and reforms, there have been considerable changes in the ownership structures of many corporations. We will discuss the major benefits in turn and identify areas of further necessary reforms.

The combination of direct interventions, improvements in the institutional environment, and changes in ownership structures have led to benefits in terms of reduced risks, improved firm performance, and higher stock valuation.

Box 3-1. Major measures taken to improve corporate governance after the crisis

- \cdot Minority shareholder rights strengthened by lowering the threshold for various shareholders initiatives
- · Outside board of directors introduced
- · Fiduciary duty of corporate directors introduced
- · Cumulative voting for directors allowed
- · Debt guarantees between chaebols' subsidiaries prohibited
- · External auditors and corporate accounting officers subject to stiffer penalties
- · Related party transactions must be approved by the board of directors
- · Introducing economic criteria in evaluating applications for corporate reorganization
- · Ceiling on foreign shareholdings in individual companies abolished in 1998
- · All forms of M&A, including hostile takeovers by foreigners, permitted
- · Class action suit introduced for all listed companies
- · Chaebols' exercising power on their financial affiliates restricted
- · Amendment to the Commercial Code to make managers and controlling shareholders more accountable to minority shareholders

Sources: OECD Economic Surveys (1999; 2001; 2003; 2005; and 2007); World Bank (2003).

The improvement in corporate governance and shareholder capitalism has made the management of *chaebols* more transparent and is believed to have contributed to alleviating the "Korean discount" in the South Korean stock market (Lee and Rhee 2007). This in turn has led to better functioning of equity markets and an improvement in the allocation of resources. While in the past equity rates of return have been very low, with dividends small and overall rates of return on equity often below those on government and corporate bonds, even though equity volatility was higher, since the crisis equity rates of return have been much higher. Most importantly, the cost of capital in the equity markets has become a better guide for corporations' investment opportunities and the allocation of resources has therefore been improved.

It is difficult to say definitively, however, how much of the change is because the regime has been upgraded, how much is due to factors such as increased competition, further globalization, and how much is due to changes in ownership structures away from insiders and towards much more demanding investors. One reasonably objective way to assess the contribution of the institutional framework to the improved performance is to score the corporate governance regime in Korea relative to that of other countries (Table 3-2). We see that Korea does quite well relative to other OECD and Asian countries. For example, the disclosure and shareholder suit indexes are better than the OECD average. But director liability remains far below, making the overall shareholder index below the OECD average.

Table 3-2. Corporate Governance Rules (2006)

Region or Economy	Disclosure Index	Director Liability Index	Shareholder Suits Index	Investor Protection Index
Korea	7	2	7	5.3
Asia & Pacific	5.2	4.4	6.1	5.2
OECD	6.3	5	6.6	6
Brazil	5	7	4	5.3
China	10	1	4	5
Germany	5	5	5	5
India	7	4	7	6
Indonesia	8	5	3	5.3
Japan	7	6	8	7
Malaysia	10	9	7	8.7
Philippines	1	2	7	3.3
Thailand	10	2	6	6
United States	7	9	9	8.3

Source: World Bank (2006a).

But it is also clear that, as elsewhere, there exists a divergence between the regulatory environment and (market perceptions on) corporate governance practices in Korea. Some of this is confirmed by a survey of Cheung and Jang (2006). Among the nine sampled countries/economies in East Asia, Korea is ranked far ahead of Hong Kong and Singapore in terms of principles and rules of corporate governance (Table 3-3). In corporate governance practices, however, Korea is perceived to be significantly behind these two countries by fund managers and analysts (although still ahead of most other East Asian countries). With a regulatory framework for corporate governance now set in place, it is therefore important to concentrate efforts on implementing and enforcing rules and regulations.

Table 3-3. Corporate Governance Rules and Practices

Countries	Rules and I	Regulations	Investors' Perceptions		
Countries	Index Ranking		Index	Ranking	
Philippines	3.61	1	2.08	7	
China	3.54	2	1.72	8	
Korea	3.38	3	2.68	3	
Thailand	3.20	4	2.60	4	
Taiwan	2.98	5	2.50	6	
Indonesia	2.92	6	1.57	9	
Malaysia	2.62	7	2.60	4	
Singapore	2.57	8	4.00	1	
Hong Kong	2.48	9	3.88	2	

Source: Cheung and Jang (2006).

Further confirmation of the differences between rules and corporate governance practices comes from the annual 2005 Credit Lyonnais Asia Pacific survey (Appendix Table A-3), where Korea is ranked in the middle of all East Asian countries in both rules and regulations, and corporate governance practices. The weak corporate governance practices of corporations are further confirmed in the ratings of corporate governance practices by commercial agencies, such as Governance Metrics International (GMI). Out of 49 countries, the average GMI corporate governance score for Korean corporations was only 2.31, which puts Korea as the fourth worse rated country.

Table 3-4. GMI Country Ranking Based on Individual Corporations' Ratings(as of September 18, 2006)

Country	Average overall rating	Rank in this group	Rank in all GMI
Brazil (23)	3.23	10	42
China (17)	2.94	11	43
Germany (66)	5.66	3	16
India (24)	4.67	7	31
Indonesia (6)	3.83	9	41
Japan (409)	4.01	8	38
Malaysia (16)	4.72	6	29
OECD avg.	5.45	5	n.a.
Philippines (2)	5.5	4	21
Korea (51)	2.31	12	46
Thailand (8)	5.75	2	15
USA (1739)	7.22	1	4
Total number of country observations		12	49

Note: OECD avg. calculated based on Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea (South), Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

Source: Governance Metrics International.

Corporations in all Asian countries rated better and no OECD countries rated worse than Korea (Table 3-4). Also, a study of the evolution of corporate governance practices in various markets suggests less improvement in Korea than in other countries.⁴⁾

Corporate governance is still weak in practice since some of the deeper underlying reasons for the problems remain similar to before the crisis. Most of the corporate governance problems in Korea center—as in most emerging markets and many developed countries—on the conflicts between minority and controlling shareholders, often still represented in management. For most corporations, there exists large outright control by insiders with a handful of share, or small cash-flow ownership, allowing insiders to fend off market pressures. Youn (2005) observes that chaebols with lower ratio of ownership exploit the treasury stock holding system as an effective tool to defend against takeover attempts. Conversely, those firms whose shares are largely held by major shareholders other than the controlling shareholders and their affiliates tend to maintain higher ratios of treasury stock. It may even be the case that over the past decade insiders have increased their control stakes and acquired more assets. Lim (2006) argues that the regulations on circular investments were and still are being circumvented today. Also in the immediate aftermath of the financial crisis, although rules were in place to prevent this from happening, the large corporations were among the few able to acquire assets, thereby increasing their assets base.

Anecdotal examples confirm the difficulties outside investors have in affecting management and controlling shareholders. For example, Hyundai Motors has had periodic demands from labor union for wage hikes, to which management has often acquiesced at the cost of minority shareholders' interests. One reason is that, without a market for corporate control and with the predominance of controlling shareholders, Hyundai Motors and other corporations like it do not face sufficient market pressures. While direct

⁴⁾ Using market data, De Nicolo, Laeven, and Ueda (2006) show that, according to their corporate governance quality (CGQ) index which consists of accounting standard, earnings opacity, and stock price synchronicity, Korea is ranked not only considerably behind developed countries but also below the average of Asian countries. Though the accounting standard indicator is the highest, earnings seem to be manipulated and stock prices do not reflect corporate governance problems very rapidly. This result is consistent with the survey findings of Cheung and Jang (2006). See further Appendix Table A-4.

ownership structures have changed after the crisis, including through larger foreign ownership, it remains the case that until control is changed from a small group of insiders to a larger group of dispersed shareholders, many of the corporate governance problems will likely remain.

Importantly, due to these corporate governance weaknesses and other reasons, the valuation of Korean firms, while improved, is still below that in many other advanced countries. As of the end of 2005, Korean firms were valued with a Tobin's Q of 1.02, significantly lower than firms of most other OECD and East Asian countries (Table 3-5).

Country	1995	2000	2005
Brazil	0.47	0.48	1.33
China	1.45	3.09	1.14
Germany	0.76	1.29	1.12
India	2.56	3.61	2.22
Indonesia	2.29	1.21	1.50
Japan	1.00	3.17	1.05
Korea (South)	0.82	0.93	1.04
Malaysia	1.83	1.15	1.17
Philippines	2.03	0.90	1.09
Thailand	1.58	0.93	1.33
United States	1.91	3.20	1.83
OECD Average	1.07	2.02	1.32

Note: 1) Tobin's Q ratio is approximated as the market capitalization weighted averages of the market value of equity plus book value of debt, divided by the book value of assets.

2) OECD avg. calculated based on: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Korea (South), Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland.

Source: IMF's Corporate Sector Vulnerability Utility, based on Thomson Financial's Worldscope database.

For the SMEs, as in many other countries, corporate governance is typically even weaker than for the larger listed corporations. At the same time, and perhaps surprisingly given the attention most often paid to the largest corporations, SMEs are a large part of Korea's economy, up to 50% of manufacturing output and around 32% of exports. To improve SME

governance, a difficult task, a large role will have to be played by the Korean commercial banks, which as lenders have a large stake in the governance of their borrowers. Another important role in improving corporate governance of the smaller firms will fall to the accounting and auditing (A&A) profession. And, since in part, weaknesses in corporate governance among the large firms tend to spill over to SMEs—many SMEs are domestic suppliers and subcontractors—improvements in large firms' corporate governance will aid SMEs' corporate governance.

3.3. Efficient resolution of corporate distress

Table 3-6. Ease of Closing a Business and Enforcing Contracts (2006)

	Closing a B	usiness	Enforcing Contracts			
Region or	Time	Cost	Recovery	Procedures	Time	Cost
Economy	(years)	(% of	Rate	(number)	(days)	(% of
		state)	(cents on			debt)
			the			
			dollar)			
Asia & Pacific	2.4	23.2	27.5	31.5	477.3	52.7
OECD	1.4	7.1	74.0	22.2	351.2	11.2
Brazil	4.0	12.0	12.1	42.0	616.0	15.5
China	2.4	22.0	31.5	31.0	292.0	26.8
Germany	1.2	8.0	53.1	30.0	394.0	10.5
India	10.0	9.0	13.0	56.0	1420.0	35.7
Indonesia	5.5	18.0	11.8	34.0	570.0	126.5
Japan	0.6	3.5	92.7	20.0	242.0	9.5
Korea	1.5	3.5	81.8	29.0	230.0	5.5
Malaysia	2.2	14.5	38.7	31.0	450.0	21.3
Philippines	5.7	38.0	4.0	25.0	600.0	16.0
Thailand	2.7	36.0	42.6	26.0	425.0	17.5
United States	1.5	7.0	77.0	17.0	300.0	7.7

Source: World Bank (2006a).

The regime for corporate restructuring and bankruptcy has clearly changed over the past decade and has been a major reason for the improved corporate sector behavior in terms of curbing excessive risk taking. This is especially true for the large *chaebols* that previously had been almost immune from the threat of exit. This was different from the small firms that already

faced the tangible likelihood of bankruptcy and liquidation. Following the financial crisis, indeed, many small firms were forced into bankruptcy. A series of bankruptcy law reforms has meant a large move towards a situation where the principles of economic logic have been adopted within the legal framework and in principle also apply to large firms (OECD 1999; Nam and Oh 2000; Oh 2007). Courts also have enhanced their expertise faced with dealing with situations of financial distress and the judicial system is no longer a major bottleneck.

A comparison of bankruptcy rules with other countries using a template for similar situations of financial distress confirms these improvements. It shows that while it takes equally long, it costs half as much to liquidate a firm in Korea compared to other OECD countries (Table 3-6). Data also show that liquidation involves fewer procedures. Furthermore, it takes less time and costs less money to enforce contracts in Korea compared to other OECD countries.

Nevertheless, much is still needed to make the overall environment for financial and operational restructuring more efficient and market-driven. Some of the current weaknesses derive from the fact that during the post-crisis period, restructuring was not based on normal procedures, but based on interim rules and very often guided by government. The corporate restructuring regime had tight deadlines, invoked penalties for non-compliance, and all creditors had signed on to the regime (Mako 2001). The Corporate Restructuring Coordination Committee, and ultimately the Financial Supervisory Commission, played a large role in individual restructuring, especially for large corporations. This regime for workouts was quite successful during this period dealing with the large sized corporate distress and was one of the key ingredients in Korea's quick economic recovery.

Being so tightly parameterized and government-oriented, however, had its costs. Most importantly, it suppressed the development of ordinary market-based restructuring and bankruptcy practices. And, while it was understood to be an emergency measure amid the crisis, the regime remained in place for many years afterwards. The Corporate Restructuring Promotion Act, for example, promulgated in 2001 as a substitute for the private corporate workouts, was supposed to be terminated with a sunset clause in 2005. This already long period during which most restructuring fell under a specialized act hindered the development of more market-based approaches to restructuring. In spite of objections from the legal community—

related to possible unconstitutional aspects of the Act—the sunset period was further extended on August 2, 2007 to the end of 2010. The argument was that the effectiveness of the current bankruptcy regime for large corporations' failure was still considered too weak and a continuation of the special regime was considered necessary.

This, however, continues to retard the development of market-based restructuring practices.⁵⁾

All these institutionalizing efforts of the workouts held up more normal forms of corporate restructuring. Furthermore, since the special regime inevitably led to the bailout of some corporations or imposed excessive costs on some creditors, it muted market discipline and undermined property right protection (Kang 2004a). This especially affected the SMEs where financial, corporate, and operational restructuring already lagged that of the larger corporations (Kang 2004b). Whereas most large corporations have gone through harsh restructuring to regain competitiveness and viability, SMEs have been less exposed to restructuring pressures.

Indeed, part of the current difference in performance between large corporations and SMEs can be attributed to past excessively generous financial assistance. Following the crisis, the government had no choice but to give priority to stabilizing the financial system and revitalizing large corporations, while observing the fiscal budget constraint. A simultaneous restructuring of both large corporations and SMEs would not have been possible. Instead, the strategy stressed bailouts for SMEs and large scale financial assistance through increased credit guarantees, allowing SMEs to avoid severe financial hardship. This assistance came on top of an already extensive system of government SME guarantees. Overall, this financial assistance, including the bailouts after the crisis, however, helped little and deterred the long-term viability of SMEs (Kang 2007).

It was not until 2004, when an SME collaborative workout scheme was introduced, that the need for more aggressive SME restructuring was acknowledged. Analogous to the corporate workout programs for large corporations, the SME workout scheme initially covered those commercial banks whose loans took up about 85% of corporate borrowing. With more

⁵⁾ The problem lies, in part, in the definition of "large," which is defined as a firm whose total borrowings from financial institution is about KRW 50 billion. This is a low threshold for calling a firm "large" and by setting the threshold so low, the normal court-led restructuring scheme becomes less applicable.

than 20% of bank loans to SMEs secured by public credit guarantee funds (KCGF and KIBO), the government also had to be active in rehabilitating distressed SMEs. The conservative policies of the guarantee funds and their inability to engage in restructuring schemes such as debt to equity swap and sales of non-performing assets, however, prevented expeditious restructuring (Kang 2004b).

With too little restructuring, the overall performance of SMEs has not improved much, despite macroeconomic recovery and financial market stability. Leverage today is higher for SMEs and profitability is lower than for the large corporations, whereas before the crisis the situation was the reverse (Figures 3-2 and 3-3). Investment is more depressed for SMEs than for large corporations (Figure 3-4; also Lim 2005), in spite of rapidly growing bank lending to the SMEs. This suggests that financial distress continues to build up in the SME sector, which a recent Financial Stability Report (BOK 2007) confirms.⁶⁾

450 (%) Large Enterprises SMFs

Figure 3-2. Debt to Equity Ratio: Large Enterprises and SMEs

Source: Bank of Korea.

⁶⁾ While large businesses having sufficient liquidity reduced their borrowings, the dependence of SMEs on borrowings rose in recent years, due to increased demand for working capital and to the influence of aggressive competition among banks to increase their market shares. Especially, the dependence on borrowings of SMEs with net interest coverage ratios of less than 100 (indicating low profitability) rose to 29.7% in 2006, up from 27.3% the year before.

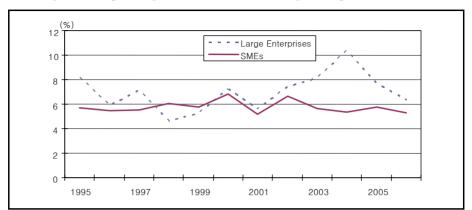


Figure 3-3. Operating Profit to Total Asset: Large Enterprises and SMEs

Source: Bank of Korea.

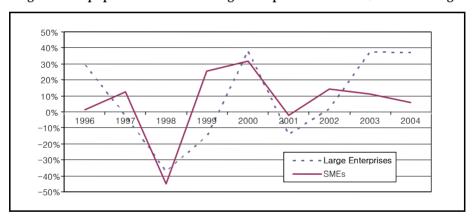


Figure 3-4. Equipment Investment: Large Enterprises and SMEs (Manufacturing)

3.4. Disclosure and quality of information

Following the crisis, authorities quickly embraced the view that high quality information disclosed to market participants in a timely and reliable manner is one of the key elements to having market discipline work and allowing for efficient resource allocation and limited risks. Further stimulated by global pressures, the need for better accounting and auditing (A&A) rules has since been well established in Korea (for more detail, see

World Bank 2004). Data indeed suggests that there have been generally better designed rules in Korea compared to the ones before 1997 and that Korea now compares favorably with other Asian countries (Appendix Table A-4). In particular, the rules for disclosure of banks' financial statements have been much improved.

But, as in many other jurisdictions, practices can lag the rules and the market perception of this gap is wide in Korea, relative to advanced East Asian economies like Singapore and Hong Kong (Cheung and Jang 2006). De Nicolo, *et al.* (2006) find that, despite better accounting standards, the overall corporate governance quality has deteriorated due to corporate managements maneuvering corporate performance and to unsatisfactory effective transparency linked to less timely reflection of corporate news in stock prices.

Anecdotal examples confirm this discrepancy. For instance, recent revelations about financial transactions among the members of the SK network showed how practices of accounting embellishment have long been deeply rooted in Korea's corporate culture and how costly they are to correct. Authorities recognize the weaknesses in A&A and are taking further steps, including imposing greater liabilities and a larger role for the standards setting and auditing professional bodies (Box 3-1). While there have been new regulations and supervisory approaches to deal with these problems, they have not, however, been fully effective. The Financial Supervisory Service (FSS), for example, issued recently an "amnesty" regulation that allowed listed corporations to confess to any accounting digressions without any penalties, but not many corporations have stepped forward and acknowledged their mistakes.

4. CHALLENGES: REMAINING AND NEW

There are a number of areas where many observers agree that reform efforts still need to be intensified to assure an efficiently and prudently operating corporate sector. At the same time, a number of new challenges facing the corporate sector have come up in the last few years.

4.1. Remaining challenges

Many efforts continue to be spent on improving and deepening the rules governing corporations, covering corporate governance, accounting and auditing, disclosure, restructuring, and other aspects. The overall direction of these policies is in further enhancing the role of the market and the use of market-based methods in how corporations are monitored and governed, and how financial difficulties are resolved. Many of the changes have consequently involved delegating more of the tasks of ensuring compliance with the new rules to the market, rather than to regulating authorities, as was the case in the past.

This delegation has been a learning experience for many market participants and authorities. As in many other jurisdictions, the full benefits are yet to been seen, while risks have arisen in the meantime. For instance, in corporate governance, analysis shows that outside directors do not yet play a large enough role in improving corporate governance (Cho 2006) and outside directors on management boards have yet to act independently of the executive directors. Although the responsibilities and incentives for outside directors are quite well established, they have been lacking in their responsibilities and corresponding activities to improve corporate transparency. As Cheung and Jang (2006) show, outside directors have tended not to attend the regular board meetings and have often entrusted their voting rights to the executive directors who effectively appointed them. Other evidence points to continued corporate governance weaknesses and severe agency costs.

More thus needs to be done. Also given global trends in financial services industries, the direction of entrusting a greater role to the markets will have to be maintained and intensified. The government will have to resist interfering directly, even when there are isolated instances where the market is not functioning well. An example is the well-recognized problems of financial distress among SMEs. Measures needed to encourage a better functioning approach for SME restructuring largely involve a reduced direct role for the government and an improvement in the institutional framework for bankruptcy and restructuring (Box 4-1 summarizes the policy directions suggested by IMF 2006). To cultivate restructuring practices, the credit guarantee system and its supporting acts should recognize the long-term competitiveness of the SME sector as the final goal. Political and stakeholders' concerns should not delay credit guarantee reforms towards market principles as only those will assure economic efficiency and fairness, and Korea's global competitiveness (Kang 2005b; OECD 2007).

Box 4-1. Policy Suggestions for Restructuring the SME Sector

- · Strengthen the incentives for restructuring
- Reform credit guarantee scheme: reducing credit guarantees (CG) to existing firms; enhancing commercial orientation of CG funds; writing off past losses
- CG funds work with private sector in managing their NPLs: amending the laws governing the CG funds; developing distressed debt market for SMEs; introducing automatic stay in court-led restructuring; streamlining court procedures and costs for small companies
- · Upgrade the financial infrastructure for SMEs
- Expand risk-based lending: reforming the collateral laws to allow for various securitization like introducing a "universal security interest" in the Civil Code; creating a market for pricing and insuring SME credit risk such as credit insurance; developing a secondary market for SME credit
- Strengthen venture capital (VC) industry: exploiting public pension funds to develop VC industries like extending investing horizons; attracting more foreign VC investment by allowing for tax incentives for off-shore funds; relaxing the restrictions on M&A for SMEs
- · Improve the environment for growth of innovative SMEs
- Decriminalize personal bankruptcy to encourage more entrepreneurship
- Encouraging more inward FDI by multinational companies

Source: IMF (2006).

The establishment of a sounder corporate behavior requires not just improving the overall corporate governance and restructuring frameworks, but also diligently maintaining the current or introducing new direct prohibitions and interventions. For example, tighter regulations on the circular shareholding of conglomerates are needed as there still exist concerns that *chaebols* circumvent these rules. Lim and Cho (2005) document that a few controlling shareholders' dominant control over affiliated companies through cross shareholding had greatly increased between 1998 and 2001 when the government removed the regulation on the total amount of shareholding of other companies in order to facilitate corporate restructuring. As a result, the controlling shareholders' voting rights have increased via their affiliated companies quite rapidly. Also, Lim and Jun

(2006) argue that the circulatory shareholding creates voting rights among affiliates without requiring any cash outlays or other costs or expenses. This is an infringement on minority shareholders' rights by artificially reducing their relative voting shares.⁷⁾

Another important policy issue the government has had to address concerns the role of corporations in the ownership of financial institutions. Many observers, e.g., S&P (2005) when upgrading Korea's sovereign rating, have noted that preventing control of the financial system by large corporations and business groups is crucial to prevent the recurrence of a financial crisis. Recently, however, some in government and banking have called for reconsideration of the inability by non-financial firms to acquire commercial banks stock, now limited up to a 4% maximum ownership stake. However, a relaxation of bank ownership rules and allowing more ownership by corporations may lead to misallocations and would introduce systemic risks, especially since Korea has much larger business groups than most other (advanced) countries. Besides concerns about systemic risks, worries about economic power concentration and concerns about fair competition have in many countries led to limits on the ownership of banks by non-financial corporations.⁸⁾ Since ownership has now already been somewhat liberalized, it is crucial that at the same time existing measures are enforced, especially those rules governing conflict of interests and transparency, and that additional measures be taken, such as increased disclosure on related party transactions.

4.2. New challenges

Besides these well-known, existing reform issues, the large challenges ahead for Korea's corporate sector have to do with the overall macroeconomic environment facing the corporate sector, the human skill-set available to corporations, and the overall business environment, especially in terms of fostering innovation. Korea has to face these issues at a time of lower corporate sector investment, a decline in productivity growth, and a

⁷⁾ They suggest as a more effective regulatory tool, an ex post system where minority shareholders, whose rights are infringed, are allowed at low cost to file a lawsuit asking the court to nullify the resolution of the general meeting of shareholders.

⁸⁾ While other advanced countries generally do not ban non-financial firms from controlling banks, in most countries such investment is rare (see further IMF 2006).

more demanding global environment.

Thanks to structural reforms and restructuring, the corporate and financial sectors now fully recognize the importance of risk management. The increased emphasis on risk management has contributed, however, to a slowdown in corporate investment. Furthermore, heightened uncertainties over business environments have led to increased demand for liquid assets (Lim and Choi 2006). These factors seem to particularly affect the sluggish investment growth of SMEs. Lim (2005) shows that the low overall investment rate stems largely from the service industries which consist mostly of SMEs, while equipment investments of the manufacturing sector led by large companies remain solid. With lower investment, growth perspectives are reduced. Especially in light of the importance of the SME sector as a main driver of innovation in a knowledge-based economy, their low investment is bad news for economic growth. Furthermore, productivity growth has actually declined since the 1990s (IMF 2006), especially in the SME sector.

With lower investment and productivity growth, how to assure long-term growth is an even more important question. It is clear that going forward the economic model will have to be different from the past. Rapid accumulation of input factors combined with solid productivity growth has allowed for Korea's impressive growth for the past 35 years, but the limits are being reached. Already the growth of the factor inputs, labor and capital, has been slowing in the 1990s. As labor supply will decline in the near future as the population ages, reaching higher income levels will become more challenging. While the lower investment reflects in part the improved risk management of corporations, it also reflects the sense that investment prospects have worsened. The appreciation of the exchange rate has made exports, the main source of growth, less competitive, especially affecting more traditional items such as textiles and basic manufacturing. While exports still remain strong today, the profitability of exporting firms has deteriorated. More generally, with the increased competition from other countries, it is less clear how Korea can repeat the fast growth of the last decades.

Many other analyses confirm this need for new sources of growth (OECD 2006; World Bank 2007; IMF 2006). On one hand, this question is common to many advanced countries. As income levels rise, a pattern of appreciating real exchange rates and the need to move up the ladder in product quality are to be expected. With little natural advantages from

which to build competitive advantages, however, the question is more complex for Korea. The answer will, among others, have to involve, besides continuous restructuring and reform, an upgrading of skills, more flexible labor markets, a better business environment, and more focus on fostering innovation.

4.2.A. Competing in the global economy

The concerns about lower levels of investment and exports relate to worries about the overall competitiveness of the Korean corporate sector, especially in light of China's influence. On the one hand, and in the shorter-term, China presents an opportunity as its high growth creates import demand and channels for processed export. Korea has also been well positioned to share in its success through FDI and off-shore manufacturing and services, which has helped its own economy. On the other hand, there are risks for Korea to be overtaken by China, as is happening rapidly in a number of sectors (Kim, Kim, and Lee 2006). At the same time, Korea is facing competition from lower-cost countries and it needs to compete with the most advanced countries. In the words of some observers, it runs the risk of being located in a nutcracker situation between Japan and China.

These concerns brought about by global competition affect both large firms and SMEs, but in different ways. SMEs in low-skills segments, such as textiles and basic manufacturing, have for some time faced the risk of hollowing out from China and other low cost countries. Since many SMEs miss both scale and cost advantages and lack specific expertise, they are most likely to be competed out of business. Large and higher skilled firms can overcome these deficiencies, but will have to move up the technology ladder to compete globally. The unavoidable polarization between low and high-technology firms is already occurring steadily in Korea (Kim and Lee 2003).

4.2.B. Moving to a knowledge-based economy

Many observers in and out of Korea realize the above mentioned concerns. The answer has been generally formulated as the need to move to a "knowledge-based economy." There is also general agreement on the implications of such a move, although many of the specific reform measures remain debated. The joint World Bank/KDI report (2006), for example, lists the following four pillars of a framework for a knowledge economy:

An economic incentive and institutional regime that provides good

economic policies and institutions, which promote efficient allocation of resources and stimulate creativity and incentives for the efficient creation, dissemination, and use of existing knowledge.

An educated and skilled labor force that continuously upgrades and adapts skills to efficiently create and use knowledge.

An effective innovation system of firms, research centers, universities, consultants, and other organizations that keeps up with the knowledge revolution, taps into the growing stock of global knowledge, and assimilates and adapts new knowledge to local needs.

A modern and adequate information infrastructure that facilitates the effective communication, dissemination, and processing of information and knowledge.

The reforms necessary to build these pillars and achieve the aim of a knowledge economy are many, of course, and not the main subject of this paper. Notwithstanding, a few implications can be highlighted, since they are of direct relevance to the corporate sector: more flexible labor markets, reduced entry barriers, better financial markets, improved corporate governance, and more focus on fostering innovation.

4.2.C. Labor markets.

For one, Korea will need to continue to address weaknesses of its labor markets. When one scores countries in their labor laws, it shows that there are some differences between Korea and other countries. In terms of the continental ease by which to employ and fire workers, Korea ranks 110, which is not that different from European OECD countries. Two exceptions, however, are the rigidity of hours worked which is somewhat higher than on average in OECD countries, and the cost of firing which is much higher in Korea (91 weeks of wages) than that on average in OECD countries (31 weeks of wages). On all these measures Korea stands out relative to other Asian countries. Korea's labor laws reflect the typical pattern of more restrictive rules in the more advanced OECD countries, but if it wants to compete with other countries at similar income levels, Korea needs to have much less restricted labor markets.

Table 4-1. Comparison of Labor Markets (2006)

Region or Economy	Difficulty of Hiring Index	Rigidity of Hours Index	Difficulty of Firing Index	Rigidity of Employment Index	Non-wage labor cost (%of salary)	Firing costs (weeks of wages)
Korea	11.0	60.0	30.0	34.0	17.5	91.0
Asia & Pacific	23.7	25.2	19.6	23.0	9.4	41.7
OECD	27.0	45.2	27.4	33.3	21.4	31.3
Brazil	67.0	60.0	0.0	42.0	37.3	36.8
China	11.0	20.0	40.0	24.0	44.0	91.0
Germany	33.0	60.0	40.0	44.0	19.2	69.3
India	33.0	20.0	70.0	41.0	16.8	55.9
Indonesia	61.0	20.0	50.0	44.0	10.0	108.3
Japan	28.0	60.0	0.0	29.0	12.7	8.6
Malaysia	0.0	20.0	10.0	10.0	12.8	88.0
Philippines	56.0	40.0	20.0	39.0	8.5	91.0
Thailand	33.0	20.0	0.0	18.0	5.2	54.3
United States	0.0	0.0	0.0	0.0	8.4	0.0

Source: World Bank (2006a).

4.2.D. Entry barriers.

Related to the need for a more dynamic and innovative economy is the need for further flexibility, especially in the SME and services sector. This involves, among others, the reduction of many entry barriers, where Korea scores poorly both relative to other OECD and to Asian countries. In terms of the time and costs it takes to start a new business, Korea ranks 116. Relative to other OECD countries, the number of procedures is twice as many in Korea; the time it takes to establish a business 50% longer; the costs three times as high; and the minimal capital needed to start a firm almost 8 times as much. This implies high entry barriers for those new firms that are often not only the main sources of employment growth, but that are also the innovative new entrepreneurs needed.

Table 4-2. Starting a Business (2006)

Region or Economy	Procedures (number)	Duration (days)	Cost (%GNI per capita)	Min. Capital (%GNI per capita)
Korea	12.0	22.0	15.2	299.7
Asia & Pacific	8.2	46.3	42.8	60.3
OECD	6.2	16.6	5.3	36.1
Brazil	17.0	152.0	9.9	0.0
China	13.0	35.0	9.3	213.1
Germany	9.0	24.0	5.1	46.2
India	11.0	35.0	73.7	0.0
Indonesia	12.0	97.0	86.7	83.4
Japan	8.0	23.0	7.5	0.0
Malaysia	9.0	30.0	19.7	0.0
Philippines	11.0	48.0	18.7	1.8
Thailand	8.0	33.0	5.8	0.0
United States	5.0	5.0	0.7	0.0

Source: World Bank (2006a).

While there is a general appreciation in Korea for the need to ease the labor, entry, and other barriers to entrepreneurship, it appears that there is not momentum large enough to pass through the objections by special interest groups, especially labor, financial institutions and/or politicians. The unionized labor force ends often positioned as another insider group as it colludes with management and hinders business restructuring. Recurring strikes at the time of wage negotiations at the large corporations are prime examples. These aggressive tactics, of which the costs are often passed on to subcontracting firms and their employees, are acquiesced to by management that itself is deficient in transparency and market pressures. An uncomfortable collusion of insiders—owners of firms and labor at the large corporations—prevents reform. This is not dissimilar to other OECD countries, particularly continental European ones, and unfortunately experiences show that a reform process could be long and complex. Korea may, however, not have the luxury to wait.

4.2.E. Financial services.

Other areas where reforms will be useful are the further easing of access to financial services for SMEs. Aggregate data would suggest that the ability of SMEs to raise funds in Korea is not a serious concern since the share of

SME in total loans is relatively large. Furthermore, (too) many government programs exist for SME financing (OECD 2005 and 2007). The problems are that the allocation of these funds is largely to existing firms and that considerable amounts are still being distributed to firms that have been losing competitiveness and viability (Kang, 2005a; IMF, 2006). At the same time, government programs are not well adapted to provide financing for new activities as they are based on traditional criteria and backward looking data. For instance, an entrepreneurship policy that aims to channel more funds towards innovation- oriented businesses, e.g., a credit guarantee system for innovative SMEs, is unlikely to work well in the face of financial agencies' traditional approaches with limited expertise on business and risk evaluation, and being burdened with much bureaucracy (Kang, 2007). At the same time, existing firms, of which many in the brick and mortar type are under distress, tend to resist against the inevitable restructuring given employees' concerns over jobs, and try to hold onto the government programs. Again, while there is room for reforms in the area of public programs for SME finance, with a large number of laborers employed in these traditional firms facing restructuring, the pressures are often large and the political economy of reform complex (Kang 2005b).

Another area where access to financial services can be improved is in the capital markets. While Korea has very active secondary equity markets (KSE and KOSDAO) and guite a number of SMEs have been able to after the crisis, stock exchanges are not necessarily the best way to mobilize funds for new risky ventures, as they can be confined to a relatively small number of firms and available for short periods of time. During the venture IT boom and bust in the early 2000s, stock markets did not protect small investors with high standards. Furthermore, especially following a period when technology-based firms were not fairly priced and an abundance of overpriced IPOs led to loss of investors' confidence, early stage investors can no longer take stock exchanges for granted as an effective exit mechanism. Rather than heavy dependence on publicly trading capital markets, it will be essential to assure possible ways to mobilize funds. Often private placements will, for example, be more suitable for untested firms than IPOs will be. Also, it is often venture capitalists that can best develop the new businesses, and only after a substantial period can these firms subsequently go to a listed market. As such, active private equity and M&A markets can be very effective in facilitating innovation-oriented businesses.

The Korean financial markets, however, have not yet met these diverse

demands of venture businesses and capitalists. According to Korea Venture Capital Association (KVCA), M&A accounts for less than 10% as an SME investment exit tool, while the venture capitalists in the United States have recouped investment of up to 78% from M&A transactions. In Korea, a number of regulations imposed on the venture capital industry hinder M&A transaction, while the founders of venture business have strong attachments to their own firms. For example, the management right of founding shareholders is guaranteed safe due to the restriction that venture capitalists are not allowed to have majority shares. This restriction was introduced to prevent large companies' predominance over venture firms, but it has served as a tool with which the management can evade necessary intervention of equity investors. Hence, corporate governance is very weak in prospective Korean venture businesses. In view of fragile long-term competitiveness and weak innovation capacities of SMEs, venture businesses could better develop when their management is passed onto large corporations. For large corporations, acquisition of venture businesses can be seen as outside research and development (R&D) activities that is more experimental and adventurous. In this context, M&A market development with a more active role of large companies will not only help promote venture capital investments by widening investment exit mechanisms but will also maximize economic growth potential through establishing corporate value chains.

Capital that is willing to take on risk for correspondingly high returns is quite limited in Korea. Recently, various instruments including private equity funds and mezzanine financing have been introduced, but they do not effectively contribute to risky investments in innovation-oriented businesses. Rather, the government, including the National Pension Fund, has played an instrumental role in these alternative investments, especially since the bust of the venture boom in early 2000s. Given moral hazard, weak incentives, poor skill, and inefficiency generally associated with bureaucracy, however, the government's direct engagement in the capital markets should phase out.

Part of the further development of Korea's capital markets will also require the removal of barriers among the many types of non-bank financial activities and allowing financial institutions, especially predominant commercial banks, to provide these types of services in a more integrated manner. So far, Korea's banking services provision remains separate from securities and insurance activities. This differs from global trends where these services are

increasingly being provided in a single consolidated company. In turn, this separation hurts the real sector by hindering the efficient delivery of a broad class of financial services. It is also harder for firms to avail themselves of a more upgraded set of financial services as they grow, e.g., as they move from banking to capital markets services. In this respect, further legal enactments to integrate financial markets and services are necessary.

4.2.F. Corporate governance.

Another area for improvements remains corporate governance. As noted, the rules protecting investors are largely comparable to those in other OECD countries (with the exception of the liability of the directors). In spite of these reform measures, however, corporate governance still faces large dissatisfaction, as noted in the ratings of investors and other agencies. Much of this is due to chaebols' having control rights far exceeding their cash-flow rights. This occurs in part because chaebols exercise indirect control over their firms through institutional investors' ownership. As Lim (2007) shows, the controlling shareholders of the 13 investment trust companies with market shares of more than 2% are either chaebols (6) or banks (7). Also chaebols control many non-bank financial institutions: they control, for example, more than half of the insurance and securities companies. Given these indirect powers over institutional shareholders, insiders often dominate control in Korean chaebols at the expenses of other, minority shareholders. Another reason is poor implementation of rules. One example concerns the outside board of director system. Cho (2006) documents that the ratio of outside directors appointed by the largest or major shareholders is very high, 76% in 2003. Thus, outside directors are unlikely to play the active role of whistle-blower and oversee the activities of the management.

More generally, capital markets are still relatively passive in corporate governance. While there have been cases of more active investor engagement on some corporate governance issues, aided by shareholders activist groups such as People's Solidarity for Participatory Democracy (PSPD), participation in general by domestic investors is limited, in part due to conflict of interests. And except for a few well-publicized instances, foreign investors are too widely dispersed to play a role as effective active agents. This is more a constraint as, relatively speaking, the level of foreign direct investment is still low in Korea, limiting another form of corporate governance pressure.

At the same time that the basic corporate governance principles and practices are still being put in place or tested, the role of corporations in the

economy is more fundamentally being questioned. Corporations are, for example, increasingly more asked to play a social role. Under the current administration, more emphasis has been put on balanced growth, with a particular focal point on alleviating bi-polarization in various segments: urban vs. rural areas; large enterprises vs. SMEs; management vs. labor; permanent laborers vs. temporary laborers, etc. Corporations, especially large ones, that have benefited in the course of expeditious growth periods are asked to shoulder the costs of a social safety net. One of the challenges to large corporations, however, is that these additional burdens coupled with global competition pressure them to divert to other sectors and into more difficulty. For example, they are shifting more of their operations overseas and relving less upon Korean SMEs to meet their production needs. As a result, SMEs are under further pressure and go into more distress. Policies that impose large social costs on corporations are not likely viable in the era of globalization. Rather, in order to survive, straightjackets in corporate activities should be removed and more incentives to innovation should be provided, while transparent corporate governance is firmly put in place to assure economic fairness.

4.2.G. Innovation.

Finally, an important part of a transition to a more knowledge-based economy will be a well-performing innovation system to keep Korea moving up the value chain. The government is considering the implications of aiming at a more innovative economy and is taking actions accordingly. These actions operate across a whole range of policies, including financial sector, labor, tax and education policies (for more detailed policy recommendations (Kim, 2005). The agenda here is large and some actions will affect not only the traditional corporate sector but also the service sector, as the latter supports the real sector and is an important source of growth in its own right.

In relation to strengthening the role of SMEs in an innovation-driven economy, a flexible business environment is called for with not only low entry but also low exit barriers. Many innovation-oriented businesses will fail due to their nature of risk-taking. Given the substantial likelihood of default, corresponding rehabilitation and restarting mechanisms should promote entrepreneurship. According to surveys (e.g., Kang, 2004), one of the main reasons that SME owners are reluctant to restructure their businesses under distress is that they are concerned about losing not only wealth but

also the opportunity to get back into business. The absence of proper rehabilitation opportunities and the existence of social stigma on default prevent entrepreneurs from taking socially necessary risks. Thus, the system that provides defaulters of good will with opportunities to restart their businesses should be instituted.

5. CONCLUDING REMARKS

Thanks to strong policy actions, reform measures and market pressures, Korea's corporate sector has made great progress in recovering from the 1997 financial crisis. Financial vulnerabilities have largely disappeared and profitability has been restored. Nevertheless, concerns remain, including those regarding a depressed level of investment and relatively low profitability.

And new issues have come up, including the general competitiveness of Korea's corporate sector. Increased global competition, notably from China, a more appreciated real exchange rate, and a declining labor supply make continued corporate sector reform necessary and require more vibrant services and SME sectors. In turn, this means that there is a continuing need to reform the overall business environment, labor and financial markets, and adopt policies fostering innovation.

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APPENDIX

Table A-1. International Comparison of Cross-border M&A

	Cross-border M&A sales						Cross-border M&A purchases						
	(Mi	llions of	US dolla	ırs)	`	(Number of deals)		(Millions of US dollars)				(Number of deals)	
Region/economy	1995	2000	2005	1995	2000	2005	1995	2000	2005	1995	2000	2005	
OECD avg.	6165.5	39376.0	22572.0	123.7	224.4	163.5	6105.6	38849.1	22901.4	136.2	252.5	180.3	
Asia avg.	449.6	2015.6	3984.0	28.1	57.7	87.6	464.5	768.3	2591.3	20.0	21.1	49.9	
Germany	7495.7	246990.0	63122.1	406	436	429	18508.8	58671.0	41600.1	377	692	305	
United States	53237.4	324350.0	105560.2	668	1388	1035	57342.9	159269.0	147551.4	1172	1830	1421	
Japan	541.3	15541.0	2512.2	24	107	86	3942.8	20858.0	8130.7	75	130	158	
Brazil	1760.5	23013.0	5799.7	50	204	65	379.3	429.0	3848.2	20	34	26	
China	402.8	2247.0	8252.7	58	94	255	249.1	470.0	5279.0	13	35	58	
Korea, Republic of	192.3	6448.0	6542.0	9	53	36	1391.6	1712.0	451.2	17	12	26	
India	276.2	1219.0	4209.7	45	111	126	28.5	910.0	2648.6	14	55	91	
Indonesia	808.5	819.0	6763.4	21	33	61	163.3	1445.0	5878.2	11	5	25	
Malaysia	98.3	441.0	1453.9	24	35	72	1122.2	761.0	1677.9	66	28	127	
Philippines	1207.8	366.0	327.8	30	25	21	153.4	75.0	1970.9	12	5	9	
Thailand	161.3	2569.0	338.3	10	53	42	143.7	5.0	233.1	7	8	13	

Note: 1) OECD avg. calculated based on Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Republic of Korea, Spain, Sweden, Turkey, United Kingdom and United States.

2) Asia avg. calculated based on China, Republic of Korea, India, Indonesia, Malaysia, Philippines, and Thailand.

Source: UNCTAD, cross-border M&A database (www.unctad.org/fdistatistics), World Investment Report 2006, UN.

Table A-2. Changes in Ownership of Commercial Banks

Economy	Number of banks			Bank sector assets		Concentration ratio of assets of top three banks (%)		Average state ownership in top ten banks (%)		Average foreign ownership in top ten banks (%)	
Economy	Number of banks		(% of GDP)		Concentration ratio of assets of top three banks (%)		Average state ownership in top ten banks (%)		Average foreign ownership in top ten banks (%)		
Economy	1997	2002	2004	1997	2004	1997	2004	1997-99	2004	1997-99	2004
China	86	129	135	107	162	73.2	61	96.4	89.7	0.02	3.2
Indonesia	222	142	134	85	62	n.a.	42.2	73.8	51.3	0	16.7
Malaysia	36	26	25	170	169	22.8	33.1	10.9	3.5	15.9	26.2
Rep. of Korea	16	11	8	98	106	50.7	50.6	37.2	5.8	12.2	21.3
Philippines	51	24	24	104	70	29.6	29.4	7.8	5.8	11.3	9
Thailand	16	13	12	156	113	47.4	47.8	1.3	29.3	8.1	11.7
Hong Kong (China)	361	224	208	587	485	29.7	53.4	0	0.3	63.1	66.5
Singapore	152	120	113	204	221	75.6	91.8	0	4	8.3	15.6
Japan	148	137	129	151	148	26.9	35.3	0	1.3	0.2	3.6
Germany	236	273	252	152	188	15.3	44.2	1.7	2.7	3.5	5.8
United Kingdom	452	385	380	302	403	23.4	31.1	0	0	2.9	12.8
United States	9.06	7798	7532	58	69	17.3	30.3	0	0	0	3.2

Source: World Bank (2006b).

Table A-3. Corporate Governance Score: A Market Perspective

Economy	China	Indonesia	Malaysia	Korea	Philippines	Thailand	Hong Kong	Singapore
Rules and regulations	5.3	5.3	7.1	6.1	5.8	6.1	6.6	7.9
Enforcement	4.2	2.7	5	5	3.1	3.8	5.8	6.5
Political and regulatory	5	3.8	5	5	5	5	7.5	8.1
IGAAP	7.5	6	9	8	8.5	8.5	9	9.5
Corporate governance culture	2.3	2.7	4.6	5	3.1	3.5	4.6	5.8
Economy score	4.8	4	6	5.8	5	5.3	6.7	7.4

Sources: Credit Lyonnais Asia Pacific (2005); World Bank (2006b).

Table A-4. Corporate Governance Quality Index

	Corporate governance quality index				Accountability standards indicator				Earnings smoothing indicator				Stock price synchronicity indicator			
Country	1995	2000	2003	Avg. growth rate	1995	2000	2003	Avg. growth rate	1995	2000	2003	Avg. growth rate	1995	2000	2003	Avg. growth rate
China	0.56	0.59	0.51	-0.01	0.81	0.84	0.85	0.01	0.07	0.17	0.10	0.04	0.80	0.77	0.58	-0.01
India	0.58	0.62	0.60	0.01	0.81	0.86	0.86	0.01	0.09	0.14	0.13	0.05	0.83	0.87	0.82	0.00
Indonesia	0.60	0.60	0.63	0.01	0.87	0.84	0.84	0.00	0.12	0.14	0.14	0.01	0.81	0.83	0.92	0.02
Korea	0.58	0.59	0.59	0.00	0.92	0.88	0.92	0.01	0.04	0.13	0.12	0.13	0.79	0.76	0.74	-0.02
Malaysia	0.52	0.55	0.61	0.02	0.81	0.87	0.87	0.01	0.13	0.12	0.18	0.04	0.63	0.66	0.79	0.04
Philippines	0.54	0.60	0.66	0.03	0.80	0.82	0.83	0.01	0.13	0.12	0.28	0.10	0.68	0.86	0.88	0.01
Thailand	0.55	0.62	0.64	0.02	0.81	0.84	0.84	0.00	0.10	0.20	0.21	0.10	0.75	0.81	0.87	0.01
Brazil	0.56	0.61	0.62	0.01	0.80	0.84	0.80	0.00	0.10	0.15	0.17	0.07	0.78	0.86	0.90	0.03
Germany	0.63	0.66	0.67	0.01	0.84	0.87	0.88	0.01	0.15	0.25	0.21	0.05	0.92	0.87	0.91	0.00
Japan	0.57	0.64	0.64	0.01	0.89	0.91	0.91	0.00	0.09	0.10	0.13	0.05	0.74	0.90	0.88	0.02
United States	0.72	0.78	0.75	0.00	0.89	0.89	0.89	0.00	0.32	0.53	0.43	0.04	0.96	0.91	0.92	0.00
OECD avg.	0.62	0.63	0.65	0.01	0.84	0.85	0.86	0.00	0.12	0.19	0.19	0.07	0.85	0.84	0.87	0.01

Note: OECD avg. calculated based on Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea (South), Luxembourg, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and United States.

Sources: De Nicolo, Laeven and Ueda (2006).

Comments on "Corporate Sector Restructuring in Korea: Status and Challenges"

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This paper reviews the structural problems before the crisis, the achievements after the crisis, and the remaining challenges in the Korean economy. The achievements in the corporate sector are examined through an assessment of the following areas. First, there is a discussion on the financial sector and banking sector reforms, in particular. The next area is corporate governance for which many reform measures were introduced. Then the efficient resolution of corporate distress is covered, and this paper says that both the legal system and the practices were improved greatly. On the final area of the achievements, the disclosure of information, there is not much discussion.

The paper moves on to discuss the challenges, both the remaining ones for the above four or five issues and the new ones. Concerning the new challenges, this paper discusses a very broad range of issues related to the knowledge-based economy and the Korean economy's overall competitiveness, including labor market issues, innovation capacity, and the financial services which are in turn related to innovation capacity, with a focus on SMEs.

With regard to the assessment of the bankruptcy system, it should be noted that many reforms were taken after the crisis, not before the crisis, to correct the inefficiencies of the system in dealing with the bankruptcies of the *chaebols* as well as of the SMEs. However, there is a criticism that the post-crisis reforms went too far, resulting in overregulation, and the reform of the bankruptcy system still remains an important challenge for the Korean economy.

Concerning the challenges, there are several questions which must be addressed. What is the right level of investment with a proper risk-return balance for Korea? In other words, is the lower level of investment in the post-crisis period a problem for which policy measures are needed? Here,

the dilemma is that the lower level of investment might be the result of previous reforms, the financial and corporate governance reforms. To what degree should the government intervene in the business sector? For instance, in 2003, the government and business sector (*chaebols*) got together and tried to agree on the necessary degree of intervention in the *chaebol* policies (based on the conception that some market pressure index should give a guideline for the necessary degree of intervention). The next question is related to how to improve the implementation of rules and regulations in corporate governance. One must take seriously the gap between the actual practices and the mere introduction of rules in corporate governance, in particular, in the areas of the disclosure system and civil enforcement.

Session II

Changes Looking Forward: Towards Long-Term Stable Economic Growth

Achieving Long-Term Fiscal Sustainability in Korea

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1. INTRODUCTION

1.1. Korea will confront a number of fiscal challenges in the coming decades, notably accommodating spending pressures brought on by rapid population aging.

As Korea undergoes a dramatic transformation from a relatively young population to one of the oldest, spending on the elderly—in the form of pensions, health care and long-term care—is, absent any adjustment, projected to increase by almost 11% of GDP over the next 50 years. In addition, the government's desire to increase social safety net spending to average OECD levels by 2030 and potential cost from reunification with North Korea may also put strains on the budget.

1.2. This paper simulates the impact of age-related fiscal pressures on Korea's economy and discusses options for addressing them in a sustainable manner.

As the authorities are well aware, the current fiscal stance is not sustainable. The fiscal pressures will not show in the near term as the pension system continues to accumulate assets. However, in the absence of offsetting measures, as age-related spending pressures mount in the long

term, both the fiscal deficit and public debt would balloon and the external current account deficit would grow rapidly. Our analysis suggests that the preferred approach to addressing these pressures would likely involve efforts on a number of fronts, including tax base broadening, improved tax administration, pension reform, and expenditure reallocation. Moreover, the earlier these measures are taken, the lower the adjustment costs.

2. DEMOGRAPHIC CHANGE AND RELATED FISCAL PRESSURES

2.1. In the coming decades, the demographic structure of Korea is expected to undergo significant changes.

The fertility rate—having fallen sharply from around six in 1960 to just over one—is among the lowest in the world and life expectancy will increase by about eight years over the next 45 years (UN, 2004). As a result, the working-age population is projected to decline by about 30%, while the elderly population is expected to expand by more than 240%. These changes imply an extraordinary large increase in the old-age dependency ratio from about 15% to 65%. Although population developments in the G7 countries show similar patterns, the magnitude of the change is much less pronounced, with this ratio increasing on average from 25% to 45%.

2.2. Given the demographic outlook, it is estimated that—absent any policy response—public age-related expenditures will increase by as much as 11% of GDP over the next half century.

Aging is expected to lead to a sharp rise in pensions (including occupational pensions)1) of some four to five percentage points of GDP,2) and a rise in health and long-term care expenditure of six to seven percentage points of GDP (OECD 2006; Yun 2005). Because of the severity of population aging in Korea, the total projected increase is almost three times that in the average G7 economy.

¹⁾ In addition to the National Pension System, separate occupational pension schemes operate for government employees, private teachers and military personnel, and currently insure around 8% of the labor force.

²⁾ Based on Feyzioğlu (2006), Gruenwald (2003) and Moon (2003), adjusted to include the effects of the recent pension reform bill, which is discussed later.

2.3. Korea has a number of options to ensure fiscal sustainability in the face of these spending pressures.

The government recently passed limited pension reform and is also considering steps to broaden the tax base and improve tax administration. Further changes to the pension system will also be needed. In addition, reforms could be implemented in the health care sector and non-age-related expenditure growth could be restrained.

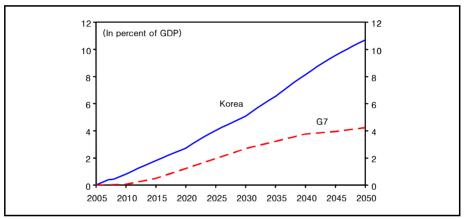


Figure 1. Age-Related Expenditure Pressures

Sources: European Commission (2005); OECD (2001); and staff calculations.

3. APPLYING THE GLOBAL FISCAL MODEL TO KOREA

3.1. The GFM is a dynamic general equilibrium model designed to examine fiscal policy issues.³⁾

The GFM analyzes the impact of fiscal policy on real activity through both aggregate demand and supply channels. Aggregate demand responses result from the absence of debt- neutrality and consumers' impatience, and aggregate supply responses arise from the distortionary effects of taxation.

³⁾ See the Appendix for a more detailed description of the model.

The model is calibrated to reflect the macroeconomic features of Korea. Several alternative scenarios are simulated and, while the precise permutations are largely illustrative, a number of interesting results emerge.

3.2. The model confirms that, without any fiscal adjustment, debt will rise sharply.

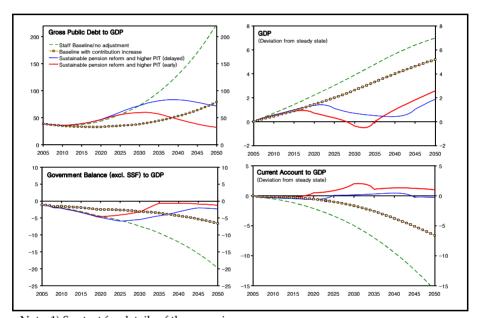


Figure 2. GFM Simulations: Basic Results 1)

Note: 1) See text for details of the scenarios. Sources: Fund staff estimates and projections.

Under a "no adjustment" baseline, the fiscal deficit increases steadily, reflecting debt-financed expenditure increases and growing interest payments, and the debt path enters a sharp upward trend (Figure 2). This fiscal stance leads to other imbalances, as strong private consumption and investment growth, supported by large public spending, leads to a ballooning external current account deficit. The next 15 years look deceivingly stable, as the accumulation of assets in the pension fund allows public debt to remain

below 50% of GDP while the fiscal deficit (excluding social security funds) remains modest. Moreover, rising fiscal expenditures raise GDP growth, employment, and wages. However, these developments mask the underlying pressures stemming from demographic changes. Since sufficient assets are not accumulated to pay for future expenditure, and structural reforms are not implemented to reduce expenditure pressures, increasing pension and health care expenditures push the fiscal balance into substantial deficit over the long-term, with adverse consequences for long-run growth (which would enter a downward trajectory starting around 2060, with similar declines in consumption and investment).

3.3. Another possible representation of the baseline, based on hikes in health care contributions, would lower the projected long-term debt level but still place it on a upward trajectory.

Since the subsidy element of health care spending is limited to 20% by law, hikes in contributions could help to finance a large part of the anticipated rise in health care costs. Based on the assumption that the required increases in contributions take place, gross public debt remains lower, at around 80% of GDP in 2050, than the more than 200% under the previous scenario. However, these increases would still require discretionary action and would need to be large, rising from 3% of GDP now to 8% of GDP by 2050. Moreover, the consequences for the fiscal and current account deficits and growth in the long run, while less pronounced, would remain serious.

3.4. The recently passed pension reform bill delays, but does not resolve, the problem.

Korea's National Pension Fund (NPF) is very young, having been introduced in 1988, and its assets will continue to be built up over the medium term, peaking in the mid-2030s.4)

⁴⁾ Payment of regular old-age pensions will begin only in 2008, once the initial participants meet the minimum 20 years of contributions.

150 (In percent of GDP) 100 100 50 50 0 0 -50 -50 -100 -100 Before current pension reform Current policies (after current pension reform) Sustainable pension reform -150 -150 -200 -200 2005 2015 2025 2035 2045 2055 2065 2075

Figure 3. Pension Fund Assets

Sources: Korean authorities and Fund staff estimates.

Table 1. Pension Parameters in Selected OECD Countries

	Contribution rate	Retirement age	Replacement rate ¹⁾
Australia	9.0	65	52.4
Belgium	16.4	65	63.1
Finland	22.9-33.0	65	78.8
France	16.4	60	68.8
Germany	19.5	65	71.8
Greece	20.0	65	99.9
Italy	32.7	65	88.8
Japan	13.6	65	59.1
Korea	9.0	60	44.3
Mexico	11.3	65	45.1
Netherlands	25.8	65	84.1
Norway	21.9	67	65.1
Spain	28.3	65	88.3
Sweden	18.5	65	68.2
United Kingdom	23.8	65	47.6
United States	12.4	67	51.0
Average	19.8	64.5	68.7

Note: 1) Net replacement rates on average earnings in mandatory pension programmes.

Source: OECD (2005).

However, as the number of pension recipients increases, its assets are projected to diminish rapidly. The recently passed pension reform bill will gradually reduce the pension benefit replacement rate from the current 60% of wages to 40% by 2028, but does not raise the contribution rate from its current 9% (Ministry of Finance 2007). As a result, the assets of the pension fund will still be depleted, but about 15 years later than the pre-reform date of 2047. While the new replacement rate will be relatively low, Korea has, together with Australia, the lowest contribution rate among OECD countries, and the retirement age in Korea is also well below the OECD average.

3.5. Extending pension reform, for example by raising contribution rates, could put the pension fund on a sustainable footing.

For instance, a rise in contribution rates from 9% to 18% over the period 2011–2030 would ensure stabilization of pension fund assets at a positive level and a continuation of surpluses on the pension fund balance. Smaller increases would be required to the extent that the payroll tax base could be broadened or the return to equity enhanced. With this type of prefunding strategy, a large part of the pension expenditure increases will be financed by the returns on the pension fund assets.⁷⁾

3.6. In addition to a sustainable pension reform, more measures would likely be needed to address increased pressures on health and long-term care expenditure.

Assuming that the pension reform is implemented in a sustainable way, rising health care costs are still projected to increase the fiscal deficit, especially after 2025. Without measures to raise revenues, reform the health sector or contain other expenditure, the fiscal deficit would likely remain on an undesirable path. As discussed earlier, one route would be to increase health contribution rates. Below, we consider some alternative options which may be easier to sustain and yield superior long run macroeconomic outcomes.

⁷⁾ To limit potential concerns about political interference in the allocation of the pension system's assets, the governance and investment policies underpinning their management would need to be carefully designed.

3.7. One option is to raise revenue to prevent fiscal deficits from widening (Figure 2).

As discussed below, there appears to be considerable scope to raise tax revenues in Korea, in particular via base broadening. One strategy could be to start raising tax revenues—either through base broadening or by raising tax rates—only when the fiscal surplus (excluding the social security fund) is eliminated, which will shift costs to the next generation. To model this, the effective personal income tax (PIT) rate is assumed to increase gradually starting in 2025 to maintain fiscal balance.⁸⁾ This requires the effective PIT rate to rise by nine percentage points in 20 years. Under these assumptions, public debt stabilizes at around 70% of GDP, and a positive pension fund asset position is maintained. However, higher taxes lead private consumption and investment to decline over the medium term relative to the "no adjustment" baseline.⁹⁾

3.8. Long-term costs to the economy could be lowered by raising taxes earlier and/or faster.

Early action is preferable, given the unprecedented speed at which Korea is aging and the additional long-term pressures on its public finances, notably from increased social safety net spending and potential reunification.¹⁰⁾ As an illustration, if tax increases are brought forward and accelerated even slightly, so that the effective tax rate is allowed to increase continuously from 2021 until 2035, the effective PIT rate hike could be limited to 7.5 percentage points. Relative to the previous scenario, the government

⁸⁾ Base broadening cannot be distinguished from rate increases in the GFM, except in the case of payroll taxes. Hence, our simulations reflect increases in the effective tax rate, which could reflect either of the two.

⁹⁾ This deterioration is not reflected in the GDP figures because increasing government expenditure raises GDP.

¹⁰⁾ There may be other arguments in favor of timely action, including political economy considerations, as the elderly will soon represent the majority of the voting public, making it potentially more difficult to implement some reforms; and the possibility that capital markets may anticipate the consequences of long-term pressures and impose penalties—in the form of lower debt ratings, limited access to capital or higher borrowing costs—if they perceive that the government has not done enough to address these concerns.

maintains a comfortable overall surplus, and the current account remains in surplus due to interest returns on foreign assets. With the long-run effective tax rate lower when early action is taken, long-run GDP growth is also higher as both consumption and investment are raised.

3.9. The type of tax increase also matters (Figure 5, Panel A).

For instance, an effective VAT increase instead of a PIT increase would reduce distortions, and therefore lower the adverse impact of higher taxes on private consumption. For instance, with a gradual rise in the effective VAT rate of nine percentage points from 2010 until 2025, the decline in private consumption is less than one-fifth, and GDP growth almost doubles, relative to the case of an increase in the effective PIT rate. However, the choice between the PIT and VAT hike is likely to depend on equity as well as efficiency considerations.

3.10. An alternative is to restrain expenditure growth (Figure 5, Panel B).

This could take the form of cost efficiency gains from health care reform or measures to restrain non-age related expenditure growth. We consider a scenario where, in addition to the sustainable pension reform, total expenditure growth is reduced by four percentage points of GDP over the period 2011–2025, offsetting about half of the baseline increase in health and long-term care expenditure under the "no adjustment" baseline. The results again show that early action makes a significant difference. Cost saving measures implemented in the next 15 years could put the fiscal stance on a sustainable path without an increase in taxes, because the return on assets accumulated early on would help pay later for the increased health care costs. The macroeconomic implications are also positive: domestic consumption and investment recover and the current account remains in surplus. However, relying solely on expenditure cuts is probably not feasible, as public spending in Korea is relatively low and additional long-term spending pressures, for higher social safety net spending and potential reunification

¹¹⁾ This order of efficiency is consistent with evidence from various international studies—see Baylor (2005) for a survey—as well as results of a general equilibrium model for the Canadian economy (Department of Finance 2004). See Baylor and Beauséjour (2004) for a detailed description of the model and a demonstration that the conclusion is robust under alternative values for important model parameters.

with North Korea, are looming.

3.11. Finally, the government may prefer to implement a combination of more modest policies in each of the areas mentioned above (Figure 5, Panel C).

This could be particularly attractive if making large reforms in any one area would be difficult politically. A combination of higher taxes and expenditure restraint is considered, consisting of a pension contribution rate hike together with some payroll base broadening; limited hikes in the effective VAT and PIT rates; and a slowing of non-age-related expenditure growth. Combining these policies does not change the main conclusions: as long as the fiscal stance is put on a sustainable path at an early stage, the boom-bust of the baselines is avoided as the pickup in GDP and the recovery in consumption and investment are sustained over the long term, and the current account registers a moderate surplus.

4. POLICY OPTIONS FOR ACHIEVING THE REQUIRED FISCAL ADJUSTMENT

4.1. While the GFM provides insights into the scope of the fiscal challenges that Korea faces and suggests broad solutions, this section discusses more concrete policy responses.

Unlike most other aging economies, Korea benefits from relatively high rates of economic growth, considerable scope for increasing tax revenue, and a low level of public debt. This provides more degrees of freedom in dealing with age-related fiscal pressures, and some specific recommendations are discussed below, in addition to pension reform.

¹²⁾ More specifically, the scenario assumes a payroll base broadening of 30% during 2008–2010 followed by a pension contribution rate hike from 9% to 13% during 2010–2025; an effective VAT rate increase of four percentage points during 2011–2020 and an effective PIT rate increase of two percentage points during 2016–2025; and a cut in total expenditure growth of one and a half percentage points of GDP during 2011–2020.

Denmark
Hungary
Sweden
Iceland
Norway
Finland
Poland
Poland
Relgium
Ireland
Austria
Italy
France
Czech Rep. Greece Turkey United Germany Spain Portugal Slovak Rep. Luxem bourg New Australia Korea Switzerland Canada Japan

Figure 4. General Government Tax Revenue, 2000–2003

Source: OECD, Revenue Statistics Database.

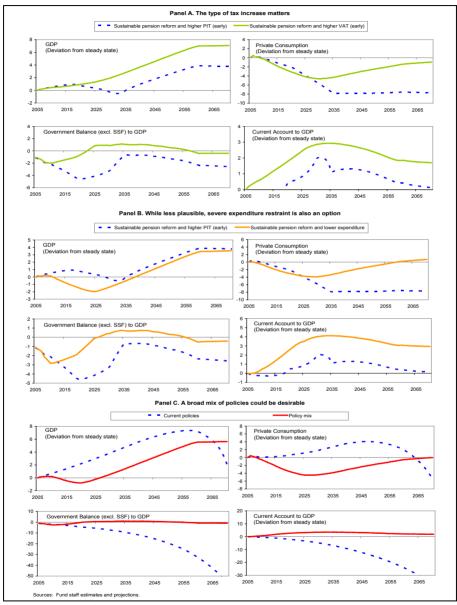


Figure 5. GFM Simulations: Further Results

Sources: Fund staff estimates and projections.

4.2. First, there is considerable scope to boost tax revenue collections to accommodate Korea's future spending needs.

At around 25%, the revenue- to-GDP ratio is low relative to most OECD countries. For all major taxes in Korea, there is considerable scope for increasing the resource envelope through base broadening, even without increases in tax rates. Key options include:

· Personal income tax (PIT). While personal income tax rates are broadly in line with those in most countries, PIT yields are very low. In Korea, PIT revenue accounts for roughly 3% of GDP and 14% of total tax revenue, compared to an OECD average of 10% and 26%, respectively. A key reason for this divergence is that relatively few people in Korea pay PIT: in 2003, the bottom 80% of wage and salary employees in the tax system accounted for only 10% of taxable income, while the bottom half had virtually no taxable income. This partly reflects the large number of allowable deductions—including insurance premiums, medical expenses, and education expenses—which are not subject to an overall ceiling and are estimated to have reduced the potential tax base by nearly 43% of wage and salary income.

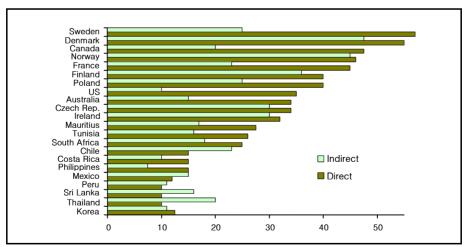


Figure 6. Effective Tax Rates

Source: IMF, World Economic Outlook.

Capping these wage deductions would broaden the PIT tax base. Moreover, it is suspected that many employees, particularly self- employed and non-regular workers, do not file returns or understate incomes.¹³⁾ In this context, improving tax administration by intensifying the auditing of the self-employed and strengthening penalties for misreporting income could also help.

- · Corporate income tax (CIT). Corporate income tax is a core source of revenue in Korea, accounting for 3% of GDP or 14% of total taxes, the latter the fourth largest among OECD countries. However, over the coming years, global pressures to lower statutory rates of corporate tax are likely to also be felt in Korea. This makes it important to safeguard this source of revenue by limiting tax incentives. In this context, honoring sunset provisions that exist for the elimination of various CIT incentives and introducing similar clauses for other special schemes would help. In addition, publishing on a regular basis *ex post* estimates and projections of tax expenditures would enhance fiscal transparency and contribute to the public debate on the use of tax exemptions.
- · *VAT and excises*. Korea makes relatively heavy use of consumption taxes, which raise over one-third of all tax revenue. However, the VAT rate of 10% compares to an OECD average of around 18%, and the VAT yield is around 4.5% of GDP, compared with the OECD average of 7%. While the Korean VAT is well designed, base broadening in line with international best practice could be a potentially significant source of additional revenue. In the longer run, when gains from base broadening are exhausted, consideration could also be given to raising the VAT rate.

¹³⁾ Unlike employees, self-employed workers must pay the full 9% contribution rate themselves, so that evasion is more attractive. With nearly two-thirds of Korea's labor force either self-employed or working as day laborers, unpaid family workers or short-term irregular employees, enforcing compliance is extremely difficult.

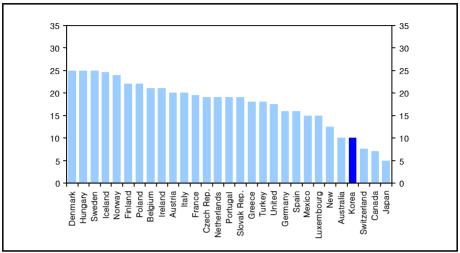


Figure 7. Standard VAT Rate

Sources: OECD; IMF, World Economic Outlook.

The authorities' own preliminary plans, as described in their draft *Directions* for *Tax Reform*, are broadly in line with these recommendations.

4.3. Second, although the scope for expenditure-based responses appears more limited, greater efficiency and discipline with respect to non-age related spending would also help.

About 40% of total central government expenditure is non age-related in the median OECD country, compared to nearly 75% in Korea. In particular, Korea allocates a relatively large share of GDP to public investment and economic affairs. ¹⁴⁾ However, the scope for expenditure re-allocation remains limited—in particular as public spending is already relatively low in Korea and spending increases for the social safety net, and possibly for reunification with the North may eventually be required.

¹⁴⁾ According to the OECD, public investment accounts for around 8% of GDP for the general government compared to 3% of GDP in the average OECD economy. Spending for economic affairs accounts for around 6% of GDP compared to the OECD average of about 4% of GDP.

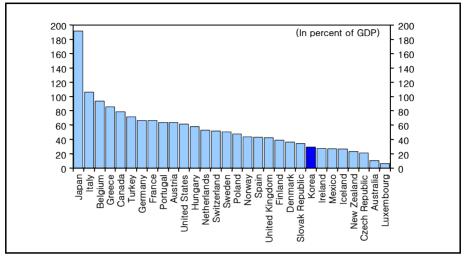


Figure 8. Government Debt, 2005

Sources: CEIC Data Company, Ltd; IMF, World Economic Outlook.

4.4. There may also be some room for a limited rise in the debt- to-GDP ratio over the longer run.

At around 33% of GDP, Korea's public debt ratio is relatively low by OECD standards.¹⁵⁾ The government is justifiably keen to keep debt at around its current level ahead of the onset of the full effects of aging and given other long-term expenditure pressures, such as those related to potential reunification. However, as spending pressures build, some rise in the debt-to-GDP ratio may become inevitable. While debt sustainability depends on a number of factors and needs to be carefully evaluated, international experience suggests that, on average, countries with a low ratio of debt relative to GDP and revenues, a low proportion of external debt, and better-developed financial systems tend to be less susceptible to debt crises. On all these metrics, Korea currently performs well so a modest rise in the debt level over the long term could likely be accommodated without a significant increase in vulnerabilities. At the same time, ongoing efforts to

¹⁵⁾ In emerging market economies, the average public debt ratio is currently around 70% of GDP.

improve debt management, notably the implementation a five-year debt management plan, should continue.

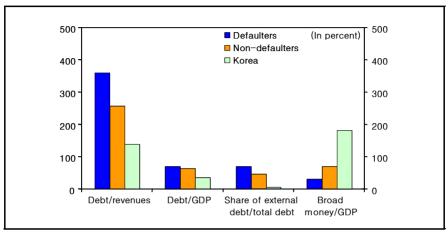


Figure 9. Key Indicators of Public Debt, Last 10 Years

Sources: IMF, World Economic Outlook.

4.5. Finally, publishing a regular long-term fiscal report, as in several other OECD countries, could help address long-term challenges in a comprehensive manner.

A number of economies confronting population aging pressures, including Australia, New Zealand and the United Kingdom, routinely publish reports assessing risks to long-term fiscal sustainability, covering horizons of 30 to 50 years. Similarly, the European Commission publishes a comprehensive aging report for all EU member states, assessing fiscal sustainability, on an annual basis. Such reports can help to stimulate public debate and create an awareness of looming pressures that weigh on the conduct of fiscal policy, making it easier to build consensus on needed reforms.

5. CONCLUSION

5.1. A number of important policy implications emerge.

First, without fiscal adjustment, public debt rises very rapidly. Second,

while Korea benefits from favorable initial conditions compared to other economies facing age-related fiscal pressures, the unprecedented speed of its demographic transition and the confluence of long-term fiscal pressures that it faces leave a relatively narrow window of opportunity. Third, addressing Korea's long-term fiscal challenges will necessitate reform in a number of areas: in addition to pension reform, there is considerable scope for fiscal consolidation by increasing tax revenue, and some room for raising spending efficiency and reducing non-age related spending as well as perhaps for some limited debt build-up, in tandem with further improvements in debt management. Building consensus for these reforms will not be easy, but the publication of a regular long-term fiscal report would help to communicate the underlying fiscal pressures to the public.

APPENDIX: THE GLOBAL FISCAL MODEL

A-1. The GFM is a four-country dynamic general equilibrium model based on the New Open Economy Macroeconomics (NOEM) tradition. (16)

The GFM extends the NOEM framework by introducing non-Ricardian features via three distinct channels to allow for thorough fiscal policy analysis:

Households have finite horizons. As a result, even temporary changes in fiscal policy affect consumption patterns since any offsetting action required by the government's intertemporal budget constraint is (perceived to be) borne by future generations and there is no bequest motive.

A fraction of households are liquidity-constrained and consume all their disposable income every period and thereby immediately respond to fiscal policy initiatives that change their disposable income.

Labor and capital taxes affect incentives to consume and invest and thus are distortionary.

A-2. The model has a number of other features consistent with general equilibrium models.

Consumption and production are characterized by constant elasticity of

¹⁶⁾ See Botman and others (2006) for a detailed description of the GFM.

substitution functions, and firms and workers have some market power so that prices and wages are above their perfectly competitive levels. Both traded and non-traded goods are modeled to allow for a bias toward domestic goods in private or government consumption. Capital and labor are the two factors of production and are used to produce traded and non-traded goods. Capital and labor can move freely between sectors, but are not mobile internationally. Investment is driven by Tobin's Q with adjustment costs. Firms respond sluggishly to differences between the discounted value of future profits and the market value of the capital stock. There are two kinds of financial assets, government debt (traded internationally) and equity (held domestically). International trade in government debt implies the equalization of nominal interest rates across countries over time. However, real interest rates across countries could differ because of the presence of non-traded goods and home bias in consumption.

A-3. The GFM provides a good platform for discussing the relative merits of alternative fiscal consolidation measures and has been applied to several countries.

The non-Ricardian structure of the model implies empirically plausible responses of key macroeconomic variables to changes in fiscal policy. The wide-ranging menu of taxes allows a detailed analysis of the composition of adjustment while the strong micro foundations allow consideration of the fundamental determinants of the effects of fiscal policy, such as the response of consumers and producers to changes in fiscal policy as well as the sensitivity to the structure of the economy.

A-4. The model is calibrated to reflect the macroeconomic features of Korea (Table A-1).

In particular, the ratios of consumption, investment, government spending, wage income, and income from capital relative to GDP are set to their current values. Similarly, key fiscal variables—revenue to GDP ratios from taxation of corporate, labor, and personal income and consumption tax, as well as government debt and current government spending—have been calibrated to Korea's fiscal structure. Also, the calibration reflects the trading patterns between Korea, the Euro Area, United States, and the rest of the world.

A-5. The preliminary calibration of behavioral parameters is based on microeconomic evidence found in the literature (Table A-2).¹⁷⁾

These include parameters characterizing real rigidities in investment, markups for firms and workers, the elasticity of labor supply to after tax wages, the elasticity of substitution between labor and capital, the elasticity of intertemporal substitution, and the rate of time preference. In particular, the following calibration method was used:

- The baseline value of the sensitivity of labor supply to the real after-tax wage is equal to -0.05, which is at the low-end of those found by microeconomic studies.
- The elasticity of substitution between labor and capital in the production function equals -0.75.
- The baseline value for the elasticity of intertemporal substitution is 0.33. This parameter describes the sensitivity of consumption to changes in the real interest rate.
- The wedge between the rate of time preference and the yield on government bonds determines consumers' degree of impatience and has not been subject to extensive microeconomic analysis. We have set the baseline value of the wedge to 4% (corresponding to a planning horizon of 25 years).
- The baseline assumes that 40% of consumers are liquidity constraint (i.e., excluded from participating in financial markets). As these consumers have no wealth, these households consume a quarter of aggregate consumption.
- The baseline assumes that the markup over marginal cost in the tradables sector equals 11% and in the nontradables sector equals 14%.
- The baseline expenditure projections are based on the assumption that all non-agerelated expenditure remains constant in percent of GDP. In addition, pension expenditure increases according to Moon (2003), and health care and long-term care expenditure gradually increases (linearly, and broadly in line with the change in old-age dependency ratio) from the current level to the level predicted by OECD (2005) by 2060.

¹⁷⁾ Other structural parameters have been calibrated using evidence from Laxton and Pesenti (2003) and Batini and others (2005).

Table A-1. Korea: Key Macroeconomic Variables in the Initial Steady State

Nationa	l expenditure acc	ounts at market pric	es		
Expenditure ratios		Facto	Incomes		
Consumption	55.6	Cap	ital	44.1	
Government consumption	14.8	Lab	or .	55.9	
Investment	26.7	Gover	nment		
Exports	41	Net	debt	18.4	
		Gro	ss debt	36.4	
	Tax rates an	d revenue			
Payroll taxes (worker and employer)		On pe	rsonal income		
Effective	5.5	Effe	3.7		
As percent of GDP	4.6	Ası	ercent of GDP	3.3	
On corporate income		On α			
Effective	15.5	Effe	8.3		
As percent of GDP	3.4	Ası	percent of GDP	4.7	
	Trade flow	/ m atrix			
	Korea	Euro area	United States	Rest of the world	
GDP (percent share of world nominal output)	3.0	27.0	30.0	40.0	
Total exports	41.0	25.0	15.0	20.0	
To Korea		1.0	0.6	1.0	
To Euro area	11.4	==	9.0	2.7	
To United States	122	10.3	***	0.3	
To rest of the world	17.4	13.7	10.0		

Source: IMF staff estimates.

Table A-2. Korea: Behavioral Assumptions and Key Parameters in the Initial Steady State

Planning horizon of consumers Labor disutility parameters Fraction of rule-of-thumb consumers Intertemporal elasticity of substitution Elasticity of substitution between capital and labor	25 years 0.95 0.40 0.33 0.75	
Depreciation rate on capital	0.50	
Capital adjustment cost parameters	0.50	
Elasticity of substitution between varieties		
Tradables sector	10.00	
Price markup over marginal cost	1.11	
Nontra dables sector	8.00	
Price markup over marginal cost	1.14	
Capital share in production tradables sector	0.58	
Capital share in production nontradables sector	0.58	
Utility from real money balances	0.02	
Price stickiness parameters	0.00	
Home bias in government consumption	Yes	
Home bias in private consumption	No	
Elasticity of substitution between traded and nontraded goods	0.50	
Bias towards domestically produced tradable over nontradables	0.40	

Source: GFM simulations.

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Comments on "Achieving Long-Term Fiscal Sustainability in Korea": Should We Be Concerned by Korea's Exposure to the International Interbank Market?

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We have recently witnessed lines of anxious depositors outside Northern Rock in England. This is the first time that there has been a retail run in England since the crisis of Overend Gurney in 1866. The Asian financial crisis featured retail runs only in Indonesia.

The modern run on banks is usually electronic, from deposits into Treasury bills (not cash). Its expression is a widening of the so-called Ted spread, or Treasury-Eurodollar spread. This has widened recently as money market mutual funds and others have taken flight from asset-backed commercial paper and shifted into Treasury bills.

In retrospect, an international electronic run on Korean banks by the rest of the world's banks was the center of Korea's crisis ten years ago. Against this background, yellow lights have flashed as Bank for International Settlements (BIS)-area banks have reported a sharp increase in claims on *banks in Korea*.

A key observation is that this build-up of interbank debt is concentrated among foreign banks. The lesson of 1997 was well learned and *Korean banks* are subject to maturity matching requirements on their foreign currency books. If the build-up of short-term interbank debt of banks in Korea represents the liabilities of foreign banks in Korea, then it follows that the stage is *not* being set for a re-run of the Korean crisis of 1997. Today's covered interest arbitrage by foreign banks does not entail the same risk of a disorderly reversal as 1996's build-up of interbank claims on then-shaky Korean banks. Does it follow that there is nothing to be concerned about?

It appears that Korean officials are concerned. In particular, the authorities have exercised moral suasion to prevent foreign banks from bringing in short-term deposits in response to very substantial incentives for covered interest arbitrage. Moreover, the purposes test for foreign currency borrowing, which was put aside earlier in this decade, has been revived. And, as of next year, leverage limits for the deductibility of interest payments to foreign affiliates will be lowered from six times capital to three times capital.

Two concerns seem to have motivated these measures. The first concern is that Korea's international balance sheet is suffering a negative externality from the accretion of short-term debt by foreign banks. The second concern is that the inflows are leading to excess liquidity in Korea's money and bond markets. On the first point, the concern can be captured by the declining ratio of official foreign exchange reserves to short-term debt, albeit from a very comfortable level. On the second point, the concern is that heavy purchases of Korean Treasury paper by foreign banks have attenuated the effect of increases in the Bank of Korea's policy rates on longer-term yields.

BIS data show that won assets of reporting banks exceed won liabilities by about \$50 billion. In effect, eurodollars have been converted into synthetic won funding by foreign banks in Korea. One inference to draw is that one should look at credit growth in Korea, in addition to money growth. This is because such synthetic won funding would not be captured by the monetary aggregates. When foreign banks invest these funds in government paper bought from local banks, these in turn can make loans to the household and business sectors.

Recent events in the international interbank market have raised another source of concern regarding the dependence of Korea on the international interbank market. One can imagine now (as one with difficulty could have imagined earlier this year) that major international banks might for their own reasons—unrelated to Korea—call in their advances to their branches in Korea. In this scenario, at this stage quite remote, foreign banks would have to reduce their assets, selling Korean Treasury bonds, possibly leading to a steepening of the yield curve. Given the history of bond market crises in Korea since 1998, a period of illiquidity in the bond market could not be excluded. Alternatively, the foreign banks could seek to replace their synthetic won funding with ordinary won funding, possibly pressuring the spread between bank rates and government yields in the Korean market. In short, strains in Korea's money and bond markets could arise from retrenchment by foreign banks. This is a new vulnerability that recent events in the international interbank market have brought to the surface.

Household Debt in Korea and Macroeconomic Implications

Meral Karasulu IMF

Jerald A. Schiff IMF

1. INTRODUCTION

1.1. In the decade since the Asia crisis, Korea's financial sector has strengthened considerably.

Non-performing loans have been reduced dramatically, to low levels, capital adequacy has improved, and financial sector supervision and corporate governance have been enhanced. Reflecting these improvements— and despite the recent global capital markets turmoil—the financial sector's vulnerability to risks appears low. Moreover, the corporate sector has rebuilt its balance sheets and, in fact, corporate debt is low.

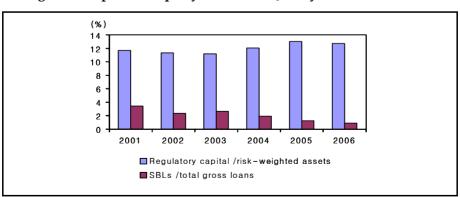


Figure 1. Capital Adequacy and Asset Quality of Korean Banks

Source: FSS

1.2. In contrast, households continue to face significant risks, which may have increased over time.

In this paper, we address perhaps the key risk to households, that of high and rising household debt levels. The debt of the Korean households reached more than 68% of GDP and 150% of disposable income at end-2006, the latter figure above that of those in the US and Japan.

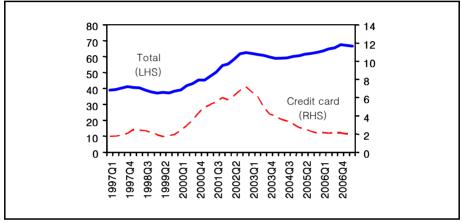


Figure 2. Household Debt (In Percent of GDP)

Source: BOK

The rest of Asia is also experiencing a rise in household debt, with China and India experiencing particularly rapid growth.

1.3. The indebtedness of households may have important macroeconomic implications.

First, high levels of debt raise the sensitivity of household balance sheets to interest rate and income shocks. Second, such shocks can have important implications for the financial health of the lenders. And third, as illustrated by the history of the credit card crisis in 2002–2003, a subsequent retrenchment of credit from the household sector could further depress consumption and economic growth.

1.4. In Korea, financial institutions appear to be relatively well-protected from risks arising from heavily indebted households.

A large share of household debt in Korea is in the form of home mortgages which, until recently, were overwhelmingly variable rate, short-term (three-year) bullet loans.¹⁾ These loans placed most risk—notably interest rate and rollover risk—on households. (Of course, if a significant number of consumers is unable to repay loans, financial institutions would suffer as the value of collateral would also likely decline.) In recent years, this has generated concern that, following on a sharp run-up in home prices, a turnaround in prices—or another shock, such as a rise in interest rates—could limit the ability of households to roll over their loans and so lead to a sharp compression in consumption and growth. In the last several years, the mortgage market has changed significantly—with a rising share of longer maturity and amortizing loans²⁾—shifting at least some risk to the financial sector. Such a shift should, given the generally good health of the financial sector, contribute to lower overall vulnerabilities for the Korean economy.

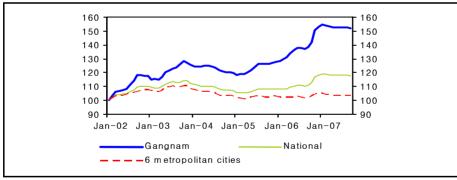


Figure 3. Real Housing Prices (January 2002=100)

Source: CEIC Data Company, Ltd.

¹⁾ In the USA (2005), EU (2004) and UK (2004) variable rate mortgages constituted 31%, 46%, and 72% of all mortgages, respectively. The comparable figure for Korea in April 2007 was 93.8%.

²⁾ According to BOK, average maturity of housing finance loans increased from 4.7 years at and-2003 to 9.4 years in 2006. In the same period the share of amortizing loans increased from 14% in 2003 to 56% in 2006.

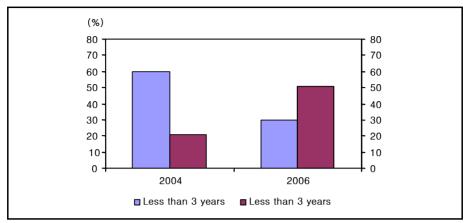


Figure 4. Shares of Housing Loans, By Maturity

Source: FSS

1.5. This paper examines the sources of, and risks from, household debt in Korea.

Most studies that have explored these issues have used aggregate measures of household debt, in part because household level surveys have not been widely available. However, analyses based on such aggregate data provide insights for only a notional average household and do not address the differences across households, for example with respect to net worth or propensities to consume, or more generally the vulnerability of their balance sheets to various shocks. These sorts of differences are important not only to understand the recent rise in household debt but also to assess the household sector's sensitivity to shocks, and the potential macroeconomic vulnerabilities facing Korea.

1.6. In this paper, we supplement the evidence from aggregate data with analysis based on a panel data set that can differentiate between different household characteristics.

Section B summarizes the recent trends and Section C discusses various factors that may have contributed to increased household indebtedness. Section D presents an econometric model examining factors explaining household consumption, differentiating among various household characteristics, such as

wealth, homeownership and age, and links this analysis to household indebtedness. This section also provides a set of stress tests based on household balance sheets and income statements to analyze the impact of interest rate and real estate price shocks. Section E concludes.

2. IS KOREA'S DEBT BURDEN TOO HIGH?

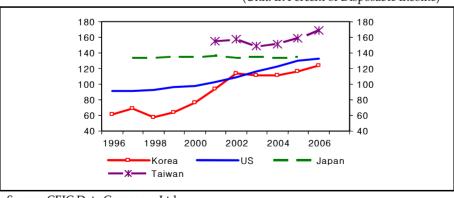
Household debt burdens in Korea have risen over time, and appear high by most measures, even in comparison with the US and Japan.

(Unit: In Percent of GDP) 120 120 100 100 80 80 60 60 40 40 20 20 1996 1998 2000 2002 2004 2006 Korea -US Japan - Taiwan -Australia

Figure 5. Household Debt

Source: CEIC Data Company, Ltd.

Figure 6. Household Debt



(Unit: In Percent of Disposable Income)

Source: CEIC Data Company, Ltd.

- Household debt has risen steadily as a share of GDP and now stands at about 70%. This is still below levels of Japan and, especially, the US but is high for emerging markets. This figure is widely cited, and relatively easily compared across countries, but is of limited use in evaluating macroeconomic vulnerabilities.
- Relative to disposable income—a better proxy for balance sheet vulnerability— Korea's debt is comparable to US and Japanese levels, at nearly 130%. This measure still has several limitations as an indicator of vulnerability. First it excludes other assets holdings, besides income flow, which could affect debt service capacity. Second, it fails to provide an indication of the ability to service debt of various maturities and interest rates. If the composition of debt changes or interest rates rise, near-term payments associated with a given level of debt-to-income can vary significantly. Ideally the amount of interest and principal due relative to income over a period of time would be a better measure to assess the debt burden of households.

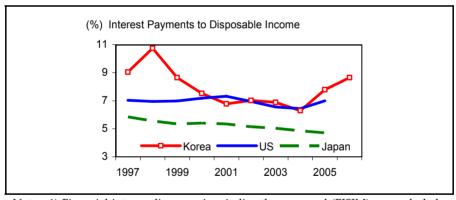


Figure 7. Household Income Gearing Ratio

Notes: 1) Financial intermediary services indirectly measured (FISIM) are excluded from interest payments.

2) Series for Japan and the United States are updated using the same standard as in Korea.

Source: National accounts of the repective countries.

 In Korea the household gearing ratio—the share of interest payments to disposable income—has risen sharply, from about 7% to nearly 9% since 2004. Korean households now pay a larger share of their income as interest than either their US counterparts or consumers in Japan. This rise has occurred even as interest rates in Korea have been on a generally declining trend, and likely reflects both the rising debt and generally modest gains in personal incomes (below GDP growth) over the last several years.

- One can try to gauge the size of the debt burden as part of a broader evaluation of household balance sheets. On this basis, Korea's household debt is significantly larger relative to household financial assets than in either the US or Japan. This may reflect the less deep financial sector in Korea, and the corresponding relative lack of financial assets in Korean household balance sheets.
- Finally, there is reason to believe that Korean household vulnerabilities to changes in economic conditions may be higher than for households in Japan or the United States. As mentioned above, risks in mortgage lending, which represent a significant share of household lending, rest to a significant degree on Korean households rather than on lending institutions. Moreover, the lack of a strong social safety net suggests that a sharp economic slowdown could have a significant impact on consumers' ability to repay loans.

(Unit: In Percent of Household Asset) 60 50 40 30 20 10 -1996 1998 2002 2004 2006 Korea -US Japan Taiwan Australia

Figure 8. Household Debt

Source: CEIC Data Company, Ltd.

C. WHAT EXPLAINS KOREAN HOUSEHOLDS' DEBT LEVELS?

This section explores various alternative explanations of household indebtedness in Korea based both on the life-cycle model of consumption and on supply side factors in the financial sector that may affect available credit to households. The analysis relies both on KLIPS data set and aggregate data. A description of the KLIPS database is provided in the Appendix.

3.1. Life-Cycle Model of Consumption

The life-cycle model of consumption links aggregate demand for borrowing in an open small economy to demographics, the expected income path and real interest rates. Specifically:

• A younger demographic profile would suggest a higher aggregate debt level, as people in their youth tend to finance current consumption with borrowing against expected future income. As incomes grow in later years, households accumulate assets and reduce debt. Once they retire, they begin dissaving, drawing down assets accumulated during their working lives. Hence a country with a demographic profile with a large number of young households would tend to have higher debt levels (assuming no shift in debt preferences of household cohorts over time). Although Korea has a slightly younger population, overall Korean households' age profile is very similar to those in the US, with 55% of household heads above 45 years of age in both countries. The age profile of debtors is similar as well, but in all age cohorts fewer Korean households are indebted than in the US, pointing to a more limited access to credit for households in general. However, contrary to the predictions of the life-cycle hypothesis, a lower percentage of younger households are indebted in Korea than in the US as compared to older cohorts, reflecting even lower access to finance at younger age in Korea and to the traditional role of parents in fulfilling the role of the financier for the younger generations. The NSO projects that in 2020 more than 65% of households will be headed by people over 45 partly due low fertility rates. If current trends continue, without improved access to finance at younger age, this would suggest that aggregate household debt growth may moderate to the extent the number of children to be supported declines. However, considering the relatively lower incidence of household indebtedness, growth in per capita incomes and further development of the financial sector

(% of HHs with debt, 2004) (%, Age profile of HHs) 100 US (LHS) 90 Korea (LHS) 25 80 US-Age - - Korea-Age 70 20 60 50 15 40 10 30 20 5 10 Less than 35-44 45-54 55-64 65-74 75 or more

Figure 9. Debtors by Age: USA and Korea

Source: US Survery of Consumer Finances, KLIPS for debt data US Census (2006), NSO (2005) for age data

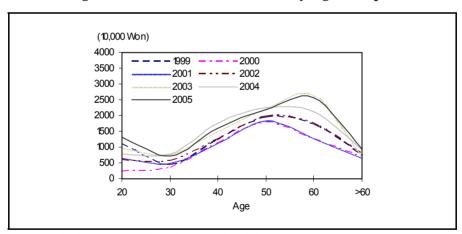


Figure 10. Households' Total Debt by Age Groups

Note: Debt does not include real estate related deposits Debt is inflation adjusted (base=1999)

Source: KLI Labor Panel

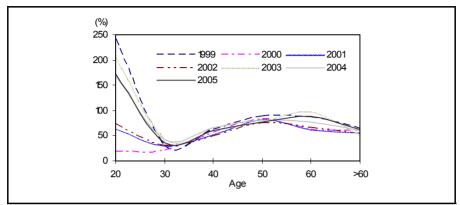


Figure 11. Households' Total Debt / Total Income Ratio by Age Groups

Note: Debt does not include real estate related deposits

Source: KLIPS

should improve access to all households and hence raise aggregate debt levels, as they accumulate assets and are better able to access various asset-liability management tools. As predicted by life-cycle hypothesis, younger cohorts have higher debt to income ratios, but older cohorts account for the majority of the debt in Korea and the increase in debt in 1990–2005 is mostly accounted by cohorts above 50 years of age. Hence the demographics do not provide a good explanation for the rising debt levels in Korea.

• The effect of real interest rate changes on aggregate net household debt is ambiguous. According to the life-cycle hypothesis a decline in real interest rates would have opposing effects on different age cohorts (Muellbauer 1994). For young cohorts, a decline in interest rates would reduce debt servicing costs while increasing present value of future inco, providing incentives for higher debt levels. However, for older cohorts this would mean lower returns on accumulated assets and hence a desire to dissave less, leading to lower net aggregate debt levels. In 1999–2005 real interest rates on household credit in Korea declined from about 10.3% to 2.9% on average. However, during the same period, only 8.3 percentage points out of a cumulative debt growth of 57% is accounted by cohorts below 40 years of age, the remainder being explained by older households. This suggests that in the overall sample the decline in interest rates was a key factor in driving the aggregate debt levels, but contrary to the predictions

of the life-cycle hypothesis, the trend is driven by the behavior of older cohorts. This is also reflected in the negative net financial asset position of older cohorts in the sample and is closely linked with relatively late homeownership in life.

(%of HHs) >60 Age

Figure 12. Incidence of Debt from Financial Institutions

Source: KLIPS

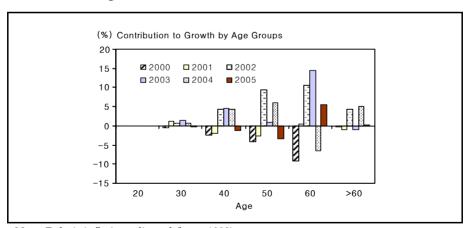
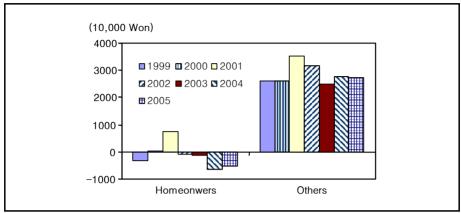


Figure 13. Debt from Financial Institutions

Note: Debt is inflation adjusted (base=1999)

Source: KLIPS

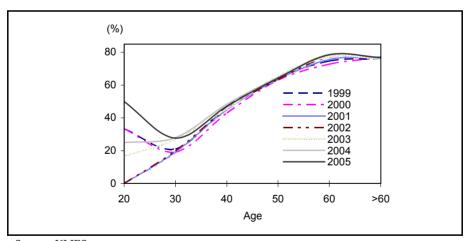
Figure 14. Households' Net Financial Assets by Homeownership



Note: Assets and debt include real estate related deposits

Source: KLIPS

Figure 15. Homeownership by Age Groups



Source: KLIPS

3.2. The Role of Housing

Another key factor affecting aggregate debt levels is the homeownership decision of households. If more consumers choose to own rather than rent, borrowing tends to be higher to enable smoothing of non-housing related consumption. There is also a direct link between the cost of housing and debt levels. The higher the house prices relative to household incomes, the higher are the debt levels needed to buy a home. In addition, the lower the supply elasticity of housing, the higher is the effect of household borrowing on house prices, which in turn would require even higher debt levels.

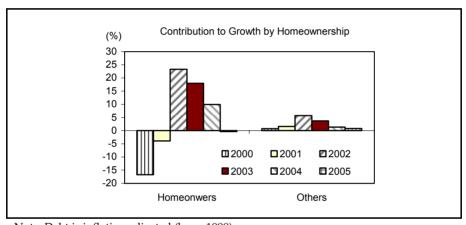


Figure 16. Debt from Financial Institutions

Note: Debt is inflation adjusted (base=1999)

Source: KLIPS

• In Korea, these factors tend to work to increase household debt. Home ownership rates are relatively high—comparable to those in the US and Japan—and the Chonsei system for renters implies that even those households that do not own their homes may still need to borrow for a down payment or to smooth non-housing related consumption. KLIPS dataset points to a close link between homeownership and indebtedness. About 58% of indebted households owned a house at end-2005 (Appendix Table 1). This is reflected in negative net financial asset position of homeowners, who tend to be older cohorts and have high positive net assets when real estate holdings are included. The relatively late homeownership in life mirrors the structure of household

lending in general and housing finance in particular. For homeowners, real assets act as collateral enabling them to access financing easier. At the same time, with low loan to value ratios and short maturities, financing a house in Korea required higher down payments or equivalently longer periods of savings from income prior to homeownership. The increasing homeownership by younger cohorts since 2004 points to the changing structure of housing finance in Korea, which enables a larger number of younger households with lower incomes to carry debt with longer maturities.

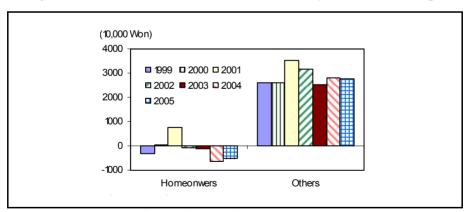
Table 1. Home Ownership Rate

(Unit: in percent)

	2003	2004	2005	2006
Korea (KLIPS) US Japan	61.5 68.3 60.9	61.9 69.0 	61.4 68.9 	 68.8

Source: CEIC Data Company, Ltd; KLIPS; Japan Statistics Bureau.

Figure 17. Households' Net Financial Assets by Homeownership



Note: Assets and debt include real estate related deposit

Source: KLIPS

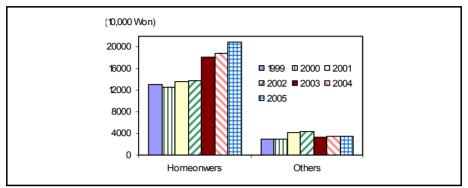


Figure 18. Households' Net Assets by Homeownership

Note: Assets and debt include real estate related deposit

Source: KLIPS

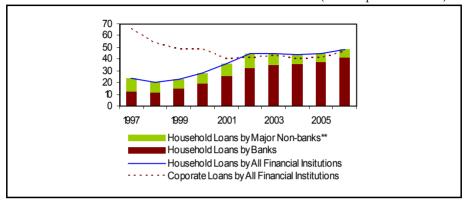
3.3. Supply Side Factors: Shifting Financial Sector Trends

Besides the demand for credit, the supply of funds to the household sector can have equally important effects on observed debt levels. In particular, if consumers face liquidity constraints and are not able to borrow to smooth consumption optimally over their life-cycles, then aggregate debt levels would be lower. The changes in the institutional features of the lending market that relax such liquidity constraints could lead to higher debt levels.

Financial deregulation and deepening has been closely associated with increased borrowing by households in many industrial economies since the 1980s. The literature provides evidence that the relaxation of borrowing constraints through the process of financial development has been a leading cause of increased household borrowing. This reflects a move away from sub-optimal consumption closely tied to current period disposable incomes to a situation in which consumers are better able to smooth their consumption based on their life-time earnings (Bayoumi 1993). In effect, financial development allows behavior closer to that predicted by the life-cycle model to be observed. More recently, a similar trend can be observed for emerging market economies. Habibullah *et al.* (2006) present evidence of liquidity constraints in household consumption for 10 Asian economies from 1950 to 1994, but only in the case of Korea, Sri Lanka and Taiwan do they report a significant relaxation of these constraints since the 1980s, reflecting financial deepening in these economies.

Figure 19. Household* and Corporate Loans

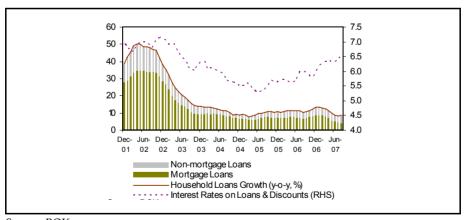
(Unit: In percent of GDP)



Note: * Include general loans and loans for housing. ** Includes loans of KDB(until 01), Merchant Banks, Trust account of banks and life and card loans and cash advance of Credit Card company insurance companies

Source: BOK

Figure 20. Sources of Household Loan Growth (Banking Sector Loans Only)



Source: BOK

In the last decade the evolution of Korean household indebtedness has been closely linked to shifting trends in the financial sector. Since 1998, credit to households has increased at an average annual rate of 13%, reaching about 67% of GDP at end-2006 from about 38% of GDP prior to the crisis. More than 77% of this increase can be attributed to lending by depository money banks. This coincides with retrenchment of credit from the corporate sector following the financial crisis, when the banking sector increasingly shifted toward retail lending and since 2000 through a rapid expansion of credit card use. The competition to lend to the household sector also appears to have contributed to the rapid rise in household debt. Since 2000, lending rates to the household sector declined faster than those charged to the corporate sector, despite the expectations of higher risk for such lending.

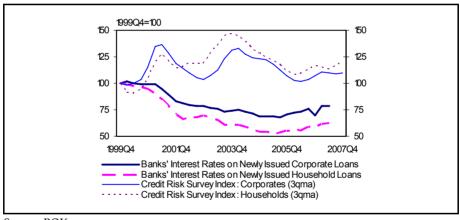


Figure 21. Banks' Credit Risk Survey Index and Interest Rate

Source: BOK

If increased access to credit is a key factor behind increasing aggregate debt levels, a corollary of this trend could be found in the relationship between consumption and disposable income. Under the life-cycle hypothesis, consumption growth should not be predictable with current period income. Deviations in the data from this prediction have been attributed to the presence of "rule of thumb" consumers, who either do not have access to finance or are able to borrow only below their optimum level; "thumb" consumers

(y/y % change) 40 40 30 30 20 20 10 10 0 0 -10 -10 Correlation (1996-2006): 0.86 -20 -20 1996 1998 2000 2002 2004 2006 Real Household Consumption Household Credit

Figure 22. Real Household Consumption Growth and Household Credit Growth

Source: CEIC Data Company, Ltd.

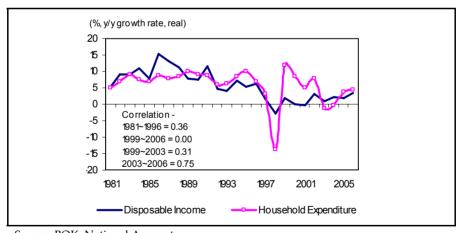


Figure 23. Income & Consumption

Source: BOK, National Accounts

due to financial deepening would imply a lower correlation between household consumption and income, and household credit. In Korea, the correlation

between aggregate disposable income and household expenditure growth until 1997 was 0.36. Since 1999, however, the trend is less clear. When the full period of 1999–2006 is considered, the correlation disappears. However, this finding appears to be tainted by the effects of the credit card crisis on households. In 1999–2003 when credit to households was recovering from the aftermath of the crisis, the correlation between consumption and disposable income did go down slightly, but since the credit card crisis, it appears to have become even more pronounced.

But has access to credit increased in Korea? Evidence from panel data points to a moderate relaxation of borrowing constraints for lower income groups. Since 2000, 5% more households in lower income groups acquired debt. However, the increase in aggregate debt since 2003 is largely due to borrowing by households who had prior access to debt and have income levels above the median income in the sample. Their borrowing accounts for half of the annual average real increase of about 16% in household debt since 2003. In fact, lower income groups now account for a lower share of aggregate debt. Thus, the moderate decline in the number of "rule of thumb" households does not appear to be the leading cause for increased household debt in the sample.

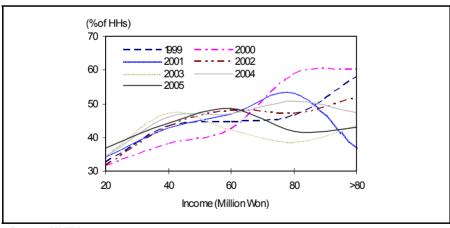
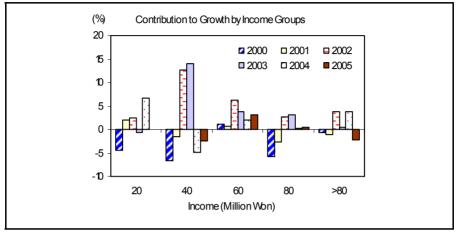


Figure 24. Incidence of Debt from Financial Institutions

Source: KLIPS

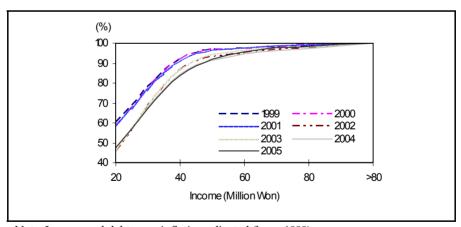
Figure 25. Debt from Financial Institutions
(Contribution to Growth by Income Groups)



Note: Debt is inflation adjusted (base=1999).

Source: KLIPS

Figure 26. Cumulative Distribution of Debt from Financial Institutions



Note: Income and debt were inflation adjusted (base=1999).

Source: KLIPS

4. MODELING HOUSEHOLD CONSUMPTION BEHAVIOR AND STRESS TESTS

This section provides regression estimates of household consumption and presents a set of stress tests to gauge the impact of interest rate and real estate price shocks on household balance sheets.

4.1. Description of the Data

The data used in the analysis comes from KLIPS, an annual panel data survey of households conducted by Korea Labor Institute in 1998–2005. The appendix describes the key variables used in this study and Table 1 lists the summary statistics of the data. The panel study includes about 5,000 households and records many household characteristics such as age, education, and homeownership, besides debt, asset, after tax-income, and expenditure items.

4.2. Empirical methodology

We estimate the sensitivity of household consumption to income, interest rates and availability of credit controlling for different household characteristics. Estimations are carried out using the fixed-effects estimation method for panel data. This method allows us to control for unobserved heterogeneity by capturing all household-specific, non-time-varying determinants of consumption that are not explicitly addressed in the regression specification by the household fixed-effects term. We also split the sample by median income and debt holders. This enables us to estimate the differences in consumption behavior for low and high income groups and examine the implications of these differences for aggregate consumption in the economy. A rise in interest rates, for example, would affect the consumption behavior of households depending on their net asset position. Indebted lower income groups and those without debt, which tend to have higher marginal propensity to consume out of disposable income, may dominate aggregate consumption trends over interest-bearing net asset holders with high income who tend to have lower marginal propensity to consume.

In order to model consumption under weak liquidity constraints we follow de Bondt (1999) and Coricelli et al. (2006) and Hayashi (1985). We distinguish between three groups of consumers. The first group consists of consumers

with no access to credit, for which consumption expenditure is a constant fraction, λ_1 , of income. The second group of consumers has access to credit, but is not able to borrow optimal levels of debt and hence their consumption is also a fraction of income, λ_2 , but also depends on credit they can obtain. The final group of households is not liquidity constrained and can thus choose its optimal consumption path on the basis of permanent income, unconstrained by their current income. Under these assumptions, an extended Euler equation à la Campbell and Mankiw (1990, 1991) can be written for each household as:

$$c_{ti} = \mu_0 + (1 - \lambda_1 - \lambda_2) s E_{t-1} r_{t-1} + (\lambda_1 + \lambda_2) y_{ti} + \lambda_2 H C_{ti}$$
 (1)

where c_t is consumption at t; y_t is disposable income, r_t is the real interest rate, and HC is household credit and s is the intertemporal elasticity of substitution assumed to be positive.

The household credit is modeled similar to specifications found in Cox and Japelli (1993), and Crook (2003):

$$HC_{ti} = a_0 + a_1 i_{t-1} + X_{ti}$$
 (2)

where X_{ti} includes household specific variables. In the estimations we include current income, financial assets, real estate assets, family size, age of household head and education. We deflate all variables with wage income to account for heteroscedasticity across groups.

Substituting (2) into (1) and assuming constant real rates:

$$c_{it} = \mu + (\lambda_1 + \lambda_2)y_t + i t_{t-1} + 2X_{ti} + \varepsilon_{ti}$$
(3)

where $\mu = \mu 0 + \lambda 2$ a₀ +(1– $\lambda 1$ – $\lambda 2$))s, 1 = $\lambda 2$ a 1, 2 = $\lambda 2$ a 2 and the error term, t, is orthogonal to all variables known at time t–1 or earlier.

The estimation of equation (3) reveals interesting facts and is consistent with earlier findings for other countries (Table 2). In the full sample, the current income has a positive and significant impact on consumption. For lower income groups, propensity to consume out of current period income is about five times higher than that of the sample

average, while for high-income households current income is not significant. This result is robust regardless of whether lower income households have any debt or not. These findings suggest significant liquidity constraints for lower income groups. Real estate assets, which include home as well as secondary real estate holdings, increase consumption significantly indicating a positive wealth effect, as do financial assets, which include not only equities, bonds and insurance policies, but also liquid assets such as bank deposits, which can be used to smooth consumption. For lower income groups, the asset variables have higher parameters suggesting their importance in smoothing consumption. As expected, an increase in interest rate reduces consumption, and significantly more so for high-income households who tend to have more debt as well as financial income. Family size and the age of household tend to increase consumption. The estimations also included squared terms of assets, real estate variables, income and age to capture the non-linear dynamics to differentiate between high-income, high-asset, and older households. All these terms have the expected negative sign, consistent with the argument that increasing income, assets or age does not contribute linearly to consumption.

Table 2. Consumption Regression (Equation3)

Fixed Effects Regression with AR(1) correction¹⁾ Dependent variable: Household expenditure²⁾

	(1)	(2)	(3)	(4)	(5)	(6)
Regressors 2)	Full Sample	Full Sample	Income <=	Income >20mn.		Income >20mn.
105103013	Tun Sumple	T un sample	20mn, Won	Won	Won, No Debt	Won, No Debt
Total Income	0.06	0.07	0.30	0.03	0.27	4.03E-03
	(0.01)**	(0.01)**	(0.05)**	0.01	(0.00)**	(0.01)
Total Income**2)	-7.90E-07	-1.04E-06	-2.44E-04	-4.00E-07	-2.33E-04	-8.16E-09
	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)
Real Assets	0.01	1.31E-02	1.47E-02	4.85E-03	3.82E-02	6.19E-03
	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**
Real Assets**2)	-1.53E-08	-1.51E-08	-8.53E-08	-3.40E-08	-2.53E-07	-1.29E-08
	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)
Financial Assets	4.71E-03	4.52E-03	0.04	0.02	3.50E-02	9.25E-04
	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)
Financial Assets**2)	-7.09E-09	-6.91E-09	-1.89E-07	-1.81E-08	-1.49E-07	3.85E-08
	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)**	(0.00)
Age	18.43	18.17	13.39	54.40	17.11	35.51
	(0.71)**	(0.07)**	(1.07)**	(4.14)**	(1.25)**	(7.39)**
Age**2)	-0.22	-0.21	-0.16	-0.53	-0.21	-0.44
	(0.01)**	(0.01)**	(0.01)**	(0.06)**	(0.00)**	(0.00)**
Family Size	54.28	52.76	53.99	111.76	-17.35	234.07
	(4.15)**	(4.01)**	(6.67)**	(18.17)**	(7.67)*	(32.28)**
Interest rate (t-1)	-0.03	-0.04	-0.03	-0.05	1.32E-02	-4.26E-02
	(0.00)**	(0.00)**	(0.02)	(0.00)**	(0.03)	(0.00)**
Education	0.04	0.06	0.10	0.07	0.04	0.09
	(0.03)	(0.02)**	(0.03)**	(0.01)**	(0.02)	(0.01)**
Constant	0.44	0.60	0.46	0.05	0.50	0.02
	(0.12)**	(0.11)**	(0.11)**	(0.04)**	(0.12)**	(0.03)
Income dummy 3)		-0.27				
		(0.01)**				
Debt dummy 4)		0.03	0.04	0.01		
-		(0.01)	(0.04)	(0.01)		
Nobs	14464	14464	4859	7501	2481	3400
Number of households	4330	4330	2185	2772	1266	1616
R-sq:						
within	0.67	0.67	0.77	0.57	0.87	0.43
between	0.83	0.83	0.41	0.94	0.42	0.96
overall	0.76	0.77	0.50	0.92	0.52	0.95

Notes: 1) Standard errors in paranthesis, * Signifacant at 5 percent; ** Signifacant at 1 percent

- 2) All variables deflated by household wage income
- 3) 1 if income is above 20mn. Won, 0 otherwise
- 4) 1 if finandial debt is nonzero, 0 otherwise

4.3. Stress tests

In this section we devise a set of stress tests to assess implications of some macroeconomic shocks on households' debt payment ability. For these tests we rely on the household balance sheet information at end-2005 only and simulate the static impact of a shock, while keeping all other variables unchanged, including income. In the absence of household level data on debt payment problems, defining financial stress of households is problematic. We rely on two alternative definitions of debt-at-risk.

The first ad-hoc measure of stress defines a household to be financially stressed if its total debt service to income ratio (DSTI) increases above a certain threshold. In the simulations, we chose two alternative thresholds: i) two standard deviations of the average baseline DSTI at end-2005, and ii) 40% of income. Considering the large variation in DSTIs in the sample the first rule-of-thumb threshold is high enough to capture only the most vulnerable households, which tend to have high DSTI ratios to begin with and are most likely to be affected from a shock. The alternative threshold of 40% is motivated by the commonly used debt service to income ratio by lending institutions in Korea. However, this ad-hoc measure of stress does not take into account the households' ability to reduce consumption or liquidate assets to service debt when faced with payment difficulties. Furthermore, since stress is defined only by reference to DSTI, only shocks that can be directly linked to debt payments can be considered. This limits shocks that we apply—without making heroic assumptions—to interest rate shocks.

The results using the first definition of financial stress indicate that an increase in interest rates of 100–300 bps could increase distressed household debt by 7 to 21 percentage points. A 300 bps increase in interest rates would increase the average debt servicing cost to households to 51% of their income, almost doubling their debt service payments from the baseline. The debt under stress would reach 47% of total debt. For low income households, who tend to have higher baseline DSTI ratios, the impact would be more severe with 51% of debt coming under stress as debt service payments go up to 65% of income. If the alternative threshold of 40% is used uniformly across households, the increase in total debt under stress drops to 7–18 percentage point range, and also from a lower baseline of distressed debt reflecting the variation in baseline DSTI ratios across income groups and the higher

threshold value. Under this scenario, a 300 bps increase in interest rates would increase debt service payments up to 68% income and bring 34% of total debt under stress.

Threshold: Mean +2*Stdev of Baseline DSTI Increase in Stressed Debt (LHS, ppt) DSTI under Stress (RHS, as a %of Income) 30 70 60 25 50 20 40 15 30 10 20 5 10 20 40 60 80 >80 Income (Million Won) ■ 100 bps ■ 200bps -- DSTI-100bps □ 300bps - DSTI-200bps DSTI-300bps DSTI Stress Threshold

Figure 27. Interest Rate Shocks

Source: KLIPS and Staff Forecasts

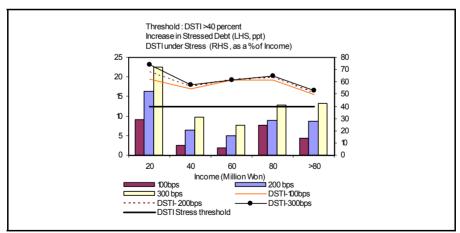


Figure 28. Interest Rate Shocks

Source: KLIPS and Staff Forecasts

The second definition of financial stress follows Del-Rio and Young (2005) and Herrala and Kauko (2007) and is based on a household budget constraint. A financially distressed household has a surplus—defined as income net of debt payments plus a portion of pledgeable wealth—that falls below a "comfortable" level of consumption. By linking financial stress to consumption and wealth this measure attempts to capture the ability of households to reduce consumption to a certain extent or liquidate assets in order to service debt before default and can be used to perform stress tests on asset prices as well as interest rates:

$$SR_{ti} = Y_{ti} - (r_{ti} D_{t-1,i})$$
 (4)

where SR is household surplus, Y is disposable income, D is household debt and r is the interest rate. Denoting MC_{ti}^* as the minimum level of consumption that household i is 'comfortable' with at time t and household wealth as W_{ti} a household is defined as financially distressed if the surplus income supplemented by the possibility of pledging a fraction, γ , of wealth to take more debt to temporarily sustain consumption or to draw down on their assets is below the desirable minimum level of consumption:

$$SR_{ti} + \gamma W_{ti} < MC_{ti}^*$$
 (5)

Evidently, MCti*, the desirable minimum consumption, is unobservable; it depends on a number of factors including tastes, family size and other family characteristics, and needs to be estimated. We use two approaches to estimate MCti. First we assume that the MCti*/Yti is given by the actual share of household expenditure in income at end-2005 as reflecting revealed consumption preferences of households. In the second approach we assume MCti* is given by the minimum share of household expenditure in income in 1999–2005 for each household. The former concept defines the stress level before any adjustment to consumption, while the second one assumes that the household is willing to reduce its consumption to its lowest level observed in the sample. Since the sample includes the credit card crisis, this is a reasonable approximation to define the minimum consumption that households would be comfortable with based on their past behavior. By normalizing eq. 5 by income, we define households under financial stress if:

We first consider W³⁾ to include only liquid assets, but exclude real estate deposits paid by renters in the form of *chonsei* or key money as these deposits tend to be locked over the life of rental agreements averaging around two years. For real estate holders that rent out, however, we include these real estate deposits as another liquid buffer for consumption smoothing or debt payments. As a second approximation to W, we add all net real assets of the household including real estate holdings. Although real estate assets are not liquid they could be pledged for additional debt to smooth consumption. Pledging of real estate for additional debt would require net positive equity. In other words, the total debt related to the real estate would need to be less than the market price of the real estate. The probability of positive equity will depend on the loan-to-value ratio applied by the lenders, the age of the mortgage and the amount of equity in the real estate and the real estate prices. However, the KLIPS database does not specify pledged real estate assets for secured debt nor does it specify the amount of the secured debt separately, hence we assume that the pledgeable value of total real estate holdings is given by the difference of their market value and household's total debt from financial institutions. Obviously, this simplification may underestimate the pledgeable net equity value of real estate if the majority of debt was unsecured to begin with and the real estate holdings at end-2005 are not encumbered. However, in the sample, real estate ownership and indebtedness are closely linked (Figure 16), limiting the risk of underestimation. The latter definition of W is defined for real estate owners only and can be used to test the impact of real estate price changes on their balance sheets.

When household surplus is used to define financial stress, an increase in interest rates of 100–300 bps could increase distressed household debt by 8 to 14 percentage points from the respective baseline. Although the inclusion of liquid assets into household surplus provides a buffer for debt payments, in the baseline, the share of debt that can not be covered by surplus without altering current consumption is 45%, pointing to underlying balance sheet weaknesses of indebted households. If, alternatively, the threshold surplus is lowered to the minimum consumption share in income observed in the sample, the baseline

³⁾ Ideally in an intertemporal budget constraint the relevant wealth variable would include not only current assets, but also the net present value of tangible and human capital as well future discounted value of life time earnings. Insufficient data precludes estimating life-time wealth in the sample.

stressed debt drops to 13%. As a result, the debt-at-risk under a 300 bps interest rate shock would reach 26%–59% of the total depending on the households' willingness to reduce their consumption expenditures as a share of income or maintain it at the same level as end-2005.

Threshold: Surplus (= Income +Liquid Assets- Debt Payments) < Curr. Cons. Increase in Stressed Debt (LHS, ppt) Surplus under Stress (RHS, as a % of Income) 15 150 12 90 9 6 60 3 30 20 40 60 80 >80 Income (Million Won) ■ 100 bps 200 bps **⊐** 300 bps Surplus- 100 bps ---- Surplus-200 bps Surplus-300 bps Surplus Stress Threshold

Figure 29. Interest Rate Shocks

Source: KLIPS and Staff Forecasts

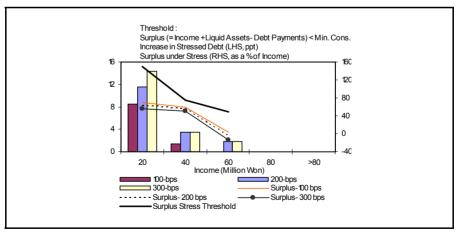


Figure 30. Interest Rate Shocks

Source: KLIPS and Staff Forecasts

The effects of a decline in real estate prices are difficult to examine in isolation without regard to the macroeconomic environment in which they are falling. The household financial distress need not increase if real estate prices fall in an unchanged macroeconomic environment. This is because financial distress is primarily a function of the household's ability to service the mortgage, which is more closely linked to the household's net total asset position rather than its gross real estate debt or the value of the real estate itself. Hence in the simulations we consider a combined shock of interest rate increases and decline in real estate prices, consistent with recent macroeconomic trends.

A combined shock of an interest rate increase (100–300bps) and a drop in real estate prices (10%-30%) is likely to increase debt-at-risk by only one to four percentage points from the baseline. The primary reason behind the small impact is the large positive net asset position of real estate owners and hence the low levels of baseline debt-at-risk, which ranges on average from 6 to 6% depending on the definition of surplus threshold used. Under a combined shock of a 300 bps interest rate increase and a 30% drop in real estate prices, debt that comes under stress reaches 11%-13% of total and the debt payments account for 48%–51% of income, up by about 14 percentage points from the baseline. Lower income real estate owners are more exposed; even a 10% drop in real estate prices would lead to an increase in debt albeit by very small magnitudes. However, interestingly, it is the high income real estate owners who would see their debt-at-risk rise most if they maintain the same consumption share out of income. Obviously, these are also the households who can more easily reduce their consumption share without significant hardship.

Threshold: Surplus(=Income +Liquid Assets +Net Real Assets -Debt Payment) < Current Consumption Increase in Stressed Debt(LHS, ppt) Surplus Under Stress (RHS, as a%of Income) 9 200 100 6 0 -100 3 -200 -300 20 40 60 >80 Income (Million Won) ■ 10 %drop **2**0 %drop 30 %drop Surplus Under stress- 10 % - - - - Surplus Under Stress-20 % Surplus Under Stress-30 % -Surplus Stress Threshold

Figure 31. Interest Rate and Real Estate Price Shocks

Note: * Interest rates increase by 100bps, real estate owners only

Source: KLIPS and Staff Forecasts

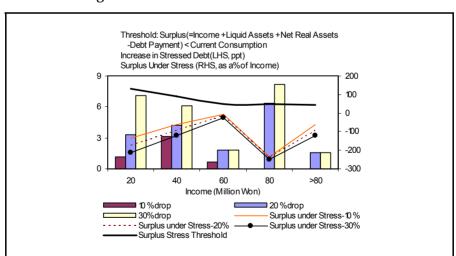


Figure 32. Interest Rate and Real Estate Price

Note: * Interest rates increase by 300bps, real estate owners only

Source: KLIPS and Staff Forecasts

Threshold: Surplus (=Income +Liquid Assets +Net Real Assets -Debt Payment) < Mininum Consumption Increase in Stressed Debt(LHS, ppt) Surplus Under Stress (RHS, as a%of Income) 0 4 -100 2 -200 -300 20 60 80 >80 40 Income (Million Won) ■ 10 %drop ■ 20 %drop → 30 %drop Surplus Under stress- 10 % ----- Surplus Under Stress-20 % Surplus Under Stress-30 % Surplus Stress Threshold

Figure 33. Interest Rate and Real Estate Price Shocks

Note: * Interest rates increase by 100bps, real estate owners only

Source: KLIPS and Staff Forecasts

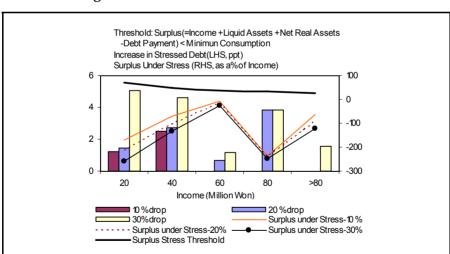


Figure 34. Interest Rate and Real Estate Price

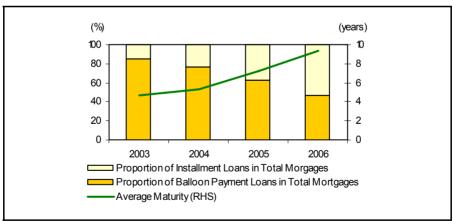
Note: * Interest rates increase by 300bps, real estate owners only

Source: KLIPS and Staff Forecasts

A more pressing risk related to real estate ownership in Korea is linked to the changing structure of housing finance. As mentioned above, mortgages increasingly are of longer maturities and also are of amortizing- type rather than bullet loans, reducing the rollover and refinance risk to households. However, around 94% of all mortgages remain linked to 91-day CD rates exposing the households to substantial interest rate risk. In addition, the BOK estimates that during the shift from bullet type loans to amortizing loans, 88% of all outstanding amortizing loans in June 2007 offered grace periods during which no principal payments are required. For more than 57% of such loans, grace periods are between two and three years. Based on the age and grace period profile of outstanding mortgages, the BOK estimates that each year about 20 trillion won of mortgage loans will reach the end of their grace period. For 2009 the estimated figure is twice as high.

This transition is expected to increase the aggregate principal and interest repayment burden from 13.2 trillion won in 2006 to 14.7 trillion in 2007 and 14.4 trillion won in 2008. For Korean households, the ratio of interest payments to disposable income increased to 9% in 2006. After this transition, the additional principal payments would increase this ratio by an additional 2–2.5 percentage points by 2010.

Figure 35. Distribution of Domestic Banks' Mortgage Loans by Repayment method



Note: Based on six major domestic banks (end of period basis)

Source: BOK

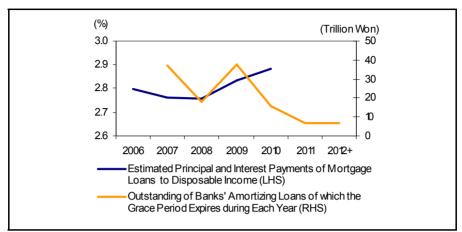


Figure 36. Scheduled Mortgage Loan Burden on Households

Source: BOK, FSS

These aggregate numbers point to a potentially substantial aggregate impact. The affected mortgages in 2008 represent 7% of total outstanding housing loans as of H2-2007 and about 6% of projected end-2008 housing loans.⁴⁾ The corresponding numbers for 2009 reach 15% and 13%, respectively. If the majority of these mortgages are held by lower income groups, their ability to service their installment payments could be stretched, leading to a substantial increase in non-performing housing loans and in the process precipitate a decline in real estate prices.

5. CONCLUSIONS

This paper analyzed the main factors behind high debt levels in Korea using both aggregate and household level panel data. High debt-to-income and debt service-to-income ratios in the aggregate data point to increasing vulnerabilities for the household sector. The decline in real interest rates and supply side factors appear to have played an important role in increasing debt levels. Household level analysis, on the other hand, suggests that most of the increase in debt can be attributed to increased indebtedness of above-

⁴⁾ We project housing related lending to grow at an annual nominal growth rate of 7%.

median-income and older households and is closely linked to homeownership. Access to credit by lower income and younger age groups improved only marginally in the sample and does not appear to be a leading cause of higher debt levels. An estimated consumption function indicates that lower-income groups' propensity to consume out of current income is much higher, confirming the presence of liquidity constraints for these groups. This, however, also makes their consumption less sensitive to interest rates shocks, although they are more likely to face financial stress if indebted.

A set of stress tests conducted to analyze the impact of interest rates and real estate price shocks on households' ability to service their debt point to substantial risks. The results of individual tests depend on the definition of financial stress applied, but on average they indicate that an increase in interest rates of 100–300 bps could lead to about a 5–11 percentage point increase in distressed household debt. The increase in debt service payments to income ratios range from 6 to 17 percentage points, reaching 42%–53% of disposable income. A combination of interest rate and real estate shocks, on the other hand, would increase distressed debt by about 4–6 percentage points only. This is a reflection of large net total asset position of real estate owners—on which the stress tests can be performed—and the relatively low loan-to-value ratios. Indebted lower income groups, as expected, appear more vulnerable to any shock.

A more pressing risk remains the jump in mortgage installment payments as converted loans' grace periods end. Although the recent conversion of bullet type short term mortgages to longer term amortizing mortgages will reduce overall vulnerability of households in the longer term, the adjustment could be bumpy in the next two years. The BOK estimates that about 88% of amortizing mortgages may be affected at the time their grace periods end. Households will be required to make regular installment payments which is estimated to add another 2–2.5 percentage points of GDP to their already high debt service payments. In 2008 and 2009 the share of mortgages that will be affected by the lapse of their grace periods amount to 7% and 15%, respectively, of total outstanding housing related loans at H2-2007.

These results point to a need to further improve risk management capacity of financial institutions to ensure that the debt payment ability of households at the end of grace periods is taken into account when loans are extended. Financial institutions

would also need to be more pro-active in monitoring potential credit problems before the end of the grace periods. Going forward, there may also be a need to reconsider tax incentives for loans with such grace periods to discourage these non-traditional mortgages.

APPENDIX: DESCRIPTION OF THE DATA

The panel data used for the analyses are from Korea Labor Institute (KLI). KLI's Korean Labor and Income Panel Study (KLIPS) is conducted annually on a sample of 5,000 urban households, which are the original baseline samples, and their branch families are also traced. The survey started in 1998 and the latest available data is on Wave 8 (2005). Wave 9 (2006) data will be published in June 2008. The dataset also includes demographics, type of residence and financial information such as income, expenditure, assets and debts. We exclude the first wave (1998) from our sample because it lacks debt variables which are critical for our analysis of households' balance sheets. The summary statistics are in Table 1. Table 2 provides information on the coverage and representative qualities of the KLIPS database with the census data. The comparison of age representation is based on the census data published by the NSO and confirms that the KLIPS data base adequately captures the demographics in the country. A population wide comparison of financial information at household level is evidently not available. The Household Income and Expenditure survey (HIES) of the NSO is the only other available database that captures household financial information for 9,000 households. However, KLIPS and the HIES are not directly comparable since the latter includes information on pre-tax income, while in the KLIPS database income variables are after taxes and deductions. Furthermore, the HIES database does not cover single households. Despite these differences, the comparison suggests that the KLIPS database is broadly representative.

The following is the list of definitions based on the KLIPS dataset.

Income

Financial Income: Annual income from interest on financial asset + interest from private loans and non-financial institutions + dividends + other financial income

Income from Real Estate: Annual income from rents on real estate + net gains from real estate transactions + other income from rental real estate

Other Income: Annual income from social insurance such as pension and unemployment benefits + transfer income from both public and private sectors + other income such as income from insurance, retirement benefits, income from lottery, etc.

Total Income: Annual Wage + Financial Income + Income from Real Estate + Other Income

Debt

Total Debt: Debt from financial institutions + Debt from non-financial institutions (firms where household member is employed) + Debt from private sources + Debt related to *chonsei* + debt from loan clubs (Kye) + Other debt

Total Debt Service and Amortization: Debt service and Amortization of total debt. In the dataset the two cannot be separately identified.

Assets

Total Financial Assets: Bank deposits + stocks, bonds, trusts accounts + insurance policies + money put into private loan club (Kye) but not yet received + loans to friends or relatives + other financial assets

Total Financial Assets including Real Estate related Deposits: Total Financial Assets + *Chonsei*+ Rental deposits

Non-Financial assets: Current market value of real estate holdings

Liquid Assets: Bank deposits + stocks, bonds, trusts accounts + insurance policies+ other financial assets

Others

Debt/Income ratio: 100* Total Debt /Total Income

Debt/Total Financial Assets: 100*Total Debt / Total Financial Assets

Total Debt Service/Total Income: 100*Annual Total Debt Payments / Total Income

Statistics
. Summary
Table 1

	1999	2000	2001	2002	2003	2004	2005
Number of households	4,187	3,994	3,843	3,920	4,130	4,213	4,255
Percentage of homeownership	60.4	59.0	60.7	60.5	61.5	61.9	61.4
Homeowners	176,7	2,333	7,332	7,5 /0	2,338	7,009	2,013
Percentage of household with debt	48.8	45.2	45.6	48.5	48.3	49.8	51.7
Percentage of those owning homes	56.2	52.1	9.09	53.6	53.0	54.7	57.7
Percentage of those paying chonsei	41.5	38.9	39.9	41.3	41.8	42.3	42.3
Total household debt (in 10,000 Won)	7,531,805	6,654,625	6,237,610	7,931,960	10,068,331	10,947,863	12,213,729
from Financial Institution (%)	9.09	58.6	63.4	64.9	66.1	9.79	63.2
from Non-financial Sectors (%)	39.4	41.4	36.6	35.1	33.9	32.4	36.8
Debt service / Total earnings (%) 1/	9.39	8.08	7.39	6.47	68.9	6.52	6.19
Debt service / Total wage (%)	10.96	9.14	8.27	7.51	7.78	7.35	7.02
Debt/Income (%)	99.05	86.74	79.32	79.33	91.16	89.99	96.03
Interest rate on Household loans	11.10	10.25	8.75	7.23	6.85	6.27	5.66
Source: KLI Labor Panel data							
1/ Earnings include wage. financial income income from real estate, transfer income, etc.	ome from real estate.	transfer income	etc.				

Table 2. How representative is KLIPS database?

	Sumn	Summary Statistics: KLIPS	s: KLIPS				Summa	Summary Statistics: NSO	OSN:	
2000		2001	2002	2003	2004	2005		2000	2005	
							Age Group**			
		0.14	0.08	0.15	0.18	0.10		0.56	0.44	
		7.80	8.03	9.01	9.57	8.73		9.47	8.29	
		24.51	23.64	23.70	23.54	24.60	30~39	26.47	22.57	
		27.42	28.24	27.50	27.59	27.27		26.6	27.50	
		19.46	19.15	19.51	19.49	20.05		17.55	18.75	
19.24 20.64		20.67	20.85	20.12	19.64	19.25		19.35	22.44	
							Income Group***	2003	2004	2005
		60.94	49.79	45.54	42.70	40.36	18	24.76	23.2	22.53
		30.43	36.12	36.49	36.71	36.04	42	51.68	49.77	48.08
		6.18	9.21	12.60	12.40	14.83	09	15.04	16.71	17.96
0.94 0.83		1.17	2.51	2.77	5.09	5.46	72	3.98	4.75	5.2
		1.28	2.36	2.60	3.10	3.31	>72	4.55	5.57	6.24

** Source: NSO Population and Housing Census.

***Source: NSO Household Income and Expenditure Survey, Unit: Million Won.

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Comments on "Household Debt in Korea and Macroeconomic Implications"

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Does the household debt surge imply a macroeconomic risk for Korea? The paper provides theoretical implications of a household debt surge, stating that, in such an event, households become more sensitive to interest rate and income shocks and the financial health of lenders erodes. However, based on empirical evidence in Korea, it is found that the wealthier- or elder-based debt composition implies a relatively lower macroeconomic risk.

In addressing the question of whether Korean wealth composition alleviates household debt risk, it was found that the lower 92% of households are net debtors, possessing the vast majority of household liabilities, and these debtors are more prone to depend on sources other than commercial banks for their credit. Since the second half of 2006, credit has become less available for lower end households. Therefore, these households have been forced to resort to borrowing from non-commercial banks, such as mutual savings banks. In accord with this, the delinquency ratio of mutual savings banks has risen to 13.03%, while that of commercial banks has remained at 0.19%, as of the end of June.

Although Korean commercial banks appear robust at the aggregate level, aggregates are of limited use in monitoring macroeconomic risk. While the asset size of merchant savings banks is relatively insignificant (3.7%) when compared to that of commercial banks, it is not prudent to be satisfied with "on average" circumstances. It may be compared to having one's head in a hot oven while having one's feet in the freezer. Moreover, history has witnessed "psychological contagion" time and time again.

Households may be relatively safer from interest rate hikes, but yet another concern is the stress from housing price precipitation. Unfortunately, it is difficult to conduct a stress test due to the lack of information of individual vulnerability. Household income and property statistics are held by National Tax Services and household loan statistics are held by financial institutions, and the law protects the financial privacy of individuals.

The household debt surge also implies risk diversification on the macro-level. Banks' overexposure to corporations and underexposure to households have been adjusted after the Asian Financial Crisis.

One comment of note is that the data provided by the Korean Labor and Income Panel Study (KLIPS) (Korean Labor Institute) seems to underestimate household wealth at the high end and overestimate it at the low end, meaning it excludes *chaebols* and the homeless. Another comment is that household debt has surged during the aftermath of the crisis. It appears that the Korean economy is still adjusting to the 10-year-old shock.

Productivity Growth and Structural Changes in the Korean Economy before and after the Financial Crisis

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1. Introduction

There has been a wide-spread skepticism on sustainable growth prospects of East Asia since Japan's lost decade in the 1990s and Korea's financial crisis in 1997–1998. The average annual growth rate of per capita GDP in the Korean economy was 5.0% during the pre-crisis period of 1984–1997 but slowed down to the 3.18% level during the post-crisis period of 1998–2004. The real question that remains unresolved is whether the potential GDP level of the Korean economy has actually declined as much as the actual GDP level accordingly and whether the potential sources of growth have been halved since their high-growth era. As previously documented in Pyo (1999) (2000) (2003), the Korean financial crisis was the consequence of the real sector crisis in the sense that the slowdown in corporate productivity before 1997 ultimately invited excess demand for domestic credit and the resulting twin crises (see IMF (2003) and Pyo (2003)). Therefore, it seems worthwhile to examine the pattern of productivity growth before and after the financial crisis.

The purpose of the present paper is to present new estimates of growth accounting and productivity trends before and after Korea's financial crisis in 1997–1998 based on EU-KLEMS Korea's 72-industry data set. Even though Pyo and Ha (2007) have demonstrated that value added may not be separated from gross output, we have applied value-added growth accounting following Hayashi and Prescott (2002), assuming the separability of the value-added function from the gross output function. But we have extended their single-sector model to a multi-sector model and modified the

employment ratio term. The estimates of productivity growth in a multi-sector value-added growth accounting model in the present paper suggest that there was a significant structural change in the Korean economy. While the per capita GDP growth (5.0%) during the pre-crisis period of 1984–1997 is dominated by capital intensity growth (3.75%) with a smaller contribution of TFP (0.41%), the per capita GDP growth (3.18%), which significantly slowed down during the post-crisis period of 1998–2004, is decomposed by significantly lowered capital intensity growth (1.44%) but relatively increased contribution of TFP (0.49%). In particular, the ICT equipment producing manufacturing sector and ICT-using service sectors seem to have gone through significant structural changes after the financial crisis. For example, during the post-crisis period of 1998-2004, GDP per capita in ICT manufacturing increased at an average annual rate of 21.01% with TFP growth (9.95%) and capital intensity growth (-1.41%) while other manufacturing per capita GDP increased at the rate of 5.80% with TFP growth (3.62%) and capital intensity growth (-1.95%).

We have also applied the multi-sector growth accounting model to estimate potential GDP by explicitly considering the capacity utilization rate and natural rate of unemployment. The results indicate that the post-crisis Korean economy during 2001–2004 could have achieved an average growth rate of 6.2% in potential per capita GDP but actual average per capita GDP growth rate during the period was only 3.2% due mainly to very sluggish demand as documented in Pyo (2006) and Pyo and Ha (2007). Even though the aging population and sluggish investment demand hold back another round of high-growth era, the strong ICT sector in the Korean economy, a corporate restructuring process in a regime that is much more open, and continuing FTAs with other economies will make such growth possible. For this purpose, the enhancement of human capital through educational reforms and upgraded OJT programs seems vital to allow the Korean economy to reach and pass a threshold externality point.

The paper is organized as follows. In Section 2, we introduce a Hayashi-Prescott type growth accounting model but modify it in two aspects: (1) we use 72-sector growth accounting instead of economy-wide, one aggregate growth accounting to identify sectoral differences in productivity growth, TFP and capital intensity, and (2) we further decompose the employment ratio into a capital labor ratio and capital- employment ratio. In Section 3, we present estimates of multi-sector growth accounting and decomposition of per capita GDP growth. We also present estimates of potential per capita

GDP after explicitly considering capacity utilization rate and potential employment rate. The final section concludes the paper with some policy implications.

2. A MULTI-SECTOR GROWTH ACCOUNTING MODEL

We adopt the growth accounting model of Hayashi and Prescott (2002) but we extend it into a multi-sector value added growth accounting model and reformulate it by decomposing the employment rate by two meaningful definitions, capital-labor ratio and capital-employment ratio, as follows:

$$Y = AK^{\theta}(hE)^{1-\theta} \tag{1}$$

where Y, K, , and represent value-added, physical capital, human capital, technological progress and share of capital income, respectively. For notational simplicity, we delete subscript i for a particular industry and t for a particular time from the above equation.

Reformulating some variables, we define:

$$y \equiv \frac{Y}{N} \quad e \equiv \frac{E}{N} \quad x \equiv \frac{K}{Y}$$
 (2)

where N is economically active population and e and x are employment intensity and capital intensity respectively.

Equation (1) can be expressed:

$$v = A^{1/(1-\theta)} hex^{\theta/(1-\theta)}$$
(3)

Dividing equation (1) by economically active population (*N*), we derive:

$$\frac{Y}{N} \equiv A(\frac{K}{N})^{\theta} h^{1-\theta} (\frac{E}{N})^{1-\theta} \tag{4}$$

and reformulating each variable to per capita terms,

$$y = Ak^{\theta}h^{1-\theta}e^{1-\theta} \quad \text{where} \quad k \equiv \frac{K}{N}$$
 (5)

Capital-output ratio which is defined as capital intensity can be expressed as:

$$x = \frac{K}{Y} = \frac{K}{AK^{\theta} (hE)^{1-\theta}} = A^{-1}K^{1-\theta} (hE)^{-(1-\theta)}$$

$$x = \frac{K}{Y} = \frac{K/N}{Y/N} = \frac{k}{y}$$

$$k = xy$$
(6)

Rearranging numerical expression of per capita value added by using equation (7), we get:

$$y = Ak^{\theta}h^{1-\theta}e^{1-\theta}$$

$$= A(xy)^{\theta}h^{1-\theta}e^{1-\theta}$$

$$= Ax^{\theta}h^{1-\theta}e^{1-\theta}y^{\theta}$$
(8)

$$\frac{y}{y^{\theta}} = y^{1-\theta} = Ax^{\theta}h^{1-\theta}e^{1-\theta}$$

$$\therefore y = A^{1/(1-\theta)}x^{\theta/(1-\theta)}he$$
(9)

Using definitions of equation (2), we derive:

$$e = \frac{K/N}{K/E} = \frac{k}{k^*}, \text{ where } k^* \equiv \frac{K}{E}$$
 (10)

Equation (9) combined with equation (10) is like below:

$$y = A^{1/(1-\theta)} h x^{\theta/(1-\theta)} \frac{k}{k^*}$$
 (11)

Taking the natural logarithm on both sides, we can get a growth accounting formula:

$$\log y = \frac{1}{1 - \theta} \log A + \log h + \frac{\theta}{1 - \theta} \log x + \log k - \log k^*$$
(12)

Also, differentiating equation (12) with respect to time, we can get the basic growth accounting equation:

$$\frac{\dot{y}}{y} = \frac{1}{1 - \theta} \frac{\dot{A}}{A} + \frac{\dot{h}}{h} + \frac{\theta}{1 - \theta} \frac{\dot{x}}{x} + \frac{\dot{k}}{k} - \frac{\dot{k}^*}{k^*}$$
(13)

We have also adopted a production function approach with unemployment rate (u) and capacity utilization ratio (v). So, equation (1) can be re-specified as:

$$Y = A(\nu K)^{\theta} ((1-u)hE)^{1-\theta}$$
(14)

We assume potential GDP would be generated if the unemployment rate is at the historically observed lowest level (u^*) and capacity utilization rate is at the historically-observed highest level (v^*). Using these two values, we can get the growth rate and the level of potential GDP per capita.

3. MULTI-SECTOR GROWTH ACCOUNTING AND DECOMPOSITION OF PRODUCTIVITY GROWTH

Before we conduct growth accounting for the Korean economy, which went through a turbulent period of financial crisis in 1997–1998, we examine trends of key macro variables. According to Hayashi and Prescott (2002), the capital intensity of Japan has steadily increased while working hours have declined. The de-trended real GDP per working age population of Japan

peaked around 1991–1992 and has steadily declined since then.

As shown in Figure 1, the trend of key macro variables in the Korean economy reveals a similar trend. The capital intensity of Korea has also steadily increased while working hours have declined. The real GDP per working age population de-trended by a straight line peaked around 1996, declined in 1998, but began to recover after 1998.

We have applied the growth accounting model of the Hayashi and Prescott type to 72 industry data of the EU-KLEMS Korea Dataset (see Appendix for classification). As summarized in Table 1, the economy- wide growth decomposition indicates that the growth rate of per capita value-added during the entire period of 1970–2004 was 4.20% which is decomposed by the growth rates of capital intensity (3.92%), average hours worked (-0.08%), employment rate (1.60%), and TFP (-0.41%). For the sub-period of 1984–1997 before the financial crisis of 1997–1998, the growth rate of per capita GDP (5.0%) is decomposed by the growth rates of capital intensity (4.76%), average hours worked (-0.75 %), employment rate (1.90%), and TFP (-0.04%). But the picture has been turned around during the post-crisis period of 1998–2004 with a lower growth rate of per capita GDP (3.18%) being decomposed by lower capital intensity growth (1.88%) and higher growth rate of TFP (0.27%).

We have decomposed the Mining/Manufacturing/Electricity, Gas and Water supply sector into ICT-Manufacturing and Other Manufacturing and the Service sector into Producer Service, Distribution Service, Consumer Service and Social Service as shown in the Appendix.

The decomposition of 72 sectors into several groups reveals striking patterns of growth in different sub-sectors. For example, in ICT Manufacturing after 1998, the dominant growth of per capita GDP (21.01%) of the sector is mostly accounted for by the growth rate of TFP (10.17%) while its capital intensity has grown at the rate of (-1.85%) implying that capital productivity (Y/K) has increased tremendously during the period reflecting the ICT boom. In the Service sector, Distribution Service ranks first in both the growth rate of value added (3.44%) and TFP (0.81%) for the entire period.

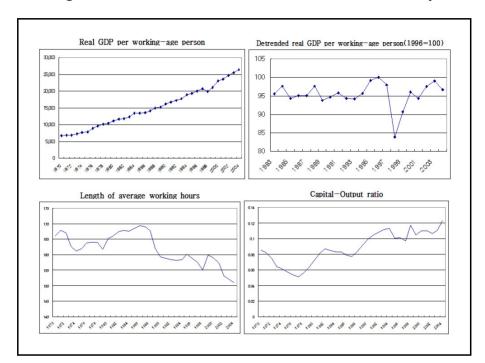


Figure 1. Trends of Macro Variables in the Korean Economy

Table 1. 72-sector Growth Accounting: Korea (1970–2004)

Donio d				A *** O ** O ** C ***	Datas of	Eastons	•
Period Period	y	A	x=K/Y	h Average Gro	e=E/N	ractors	
Period	y v	A	x=K/Y	h	e=E/N e=E/N	K/N	K/E
Teriou	у	Λ	X-IX/ I	Economy-		N/IN	K/E
1970-1983	3.89	-1.09	4.10	0.42	1.83	8.07	6.20
1984-1997	5.00	-0.04	4.76	-0.75	1.90	9.98	7.97
1998-2004	3.18	0.27	1.88	0.37	0.55	4.97	4.53
1970-2004	4.20	-0.41	3.92	-0.08	1.60	8.22	6.58
1	4.20	0.11		riculture, Forest			0.50
1970-1983	4.48	-0.78	7.49	-0.38	-0.74	11.90	13.62
1984-1997	6.43	2.84	7.11	0.20	-4.06	13.72	18.89
1998-2004	3.74	0.65	-3.63	0.24	4.99	1.05	-4.50
1970-2004	5.13	1.04	5.05	-0.01	-0.92	10.42	12.06
2				acturing/Electric			
1970-1983	4.62	1.12	1.24	0.52	0.90	6.14	4.96
1984-1997	5.87	2.44	3.16	-1.01	0.13	9.14	9.09
1998-2004	6.54	4.05	-2.11	0.39	0.23	5.85	4.08
1970-2004	5.53	2.20	1.34	-0.14	0.45	7.31	6.48
2a			CT (Computer,	Manufacture of			
1970-1983	17.31	9.00	-2.78	-0.15	1.22	12.52	17.57
1984-1997	24.96	15.45	-2.41	-0.89	0.14	20.27	10.31
1998-2004	21.01	10.17	-1.85	0.70	0.19	17.74	9.78
1970-2004	21.22	11.56	-2.44	-0.28	0.56	16.78	12.98
2b						nd Water Supply	
1970-1983	4.73	1.29	1.04	0.54	0.88	6.03	4.69
1984-1997	5.51	2.18	3.28	-1.02 0.15		8.88	9.07
1998-2004	5.80	3.90	-2.54	0.39	0.23	4.54	3.05
1970-2004	5.27	2.13	1.22	-0.13	0.44	6.90	6.16
3				Servio			
1970-1983	1.11	-0.98	3.74	0.25	-0.52	4.90	5.41
1984-1997	2.55	-1.48	5.64	-0.59	1.28	8.05	6.95
1998-2004	0.94	-2.21	5.49	0.40	0.24	4.60	6.16
1970-2004	1.67	-1.45	4.88	-0.07	0.38	6.14	6.20
3a				Producer S	Service		
1970-1983	1.95	-4.51	10.14	-0.19	-0.52	5.39	13.08
1984-1997	0.48	0.37	-1.29	0.11	1.28	1.65	-2.07
1998-2004	-0.44	-11.75	17.67	0.21	0.24	1.18	17.08
1970-2004	0.85	-3.92	6.98	0.01	0.38	2.98	7.67
3b				Distribution	Service		
1970-1983	2.62	1.79	-1.21	0.47	-0.52	1.39	2.72
1984-1997	4.32	0.04	2.97	-0.80	1.28	7.24	5.62
1998-2004	3.19	0.75	1.05	0.36	0.24	5.55	3.64
1970-2004	3.44	0.81	0.97	-0.08	0.38	4.65	4.10
3c				Consumer			
1970-1983	3.61	-2.51	10.87	0.42	-0.52	15.13	13.75
1984-1997	2.50	-2.60	9.87	-0.65	1.28	12.43	13.55
1998-2004	2.19	-0.05	3.83	0.31	0.24	7.13	6.42
1970-2004	2.86	-1.95	9.01	-0.04	0.38	12.37	12.16
3d				Social Se	rvice		
1970-1983	-0.75	-1.40	4.59	0.01	-0.52	4.03	3.13
1984-1997	-0.40	-4.13	12.16	-0.46	1.28	11.64	8.15
1998-2004	-3.64	-4.74	4.80	0.84	0.24	2.79	0.37
1970-2004	-1.20	-3.22	7.75	-0.01	0.38	6.91	4.63

Notes: y: GDP per capita; A: TFP; x: Capital intensity; e: Employment rate; K/N: capital-labor ratio; K/E: Capital-employment ratio.

Table 2. Relative Contribution of Factors and TFP: Korea (1970–2004)

Period	y			Average Gr	owth Rates of Fa	actors	
Period	y	A	x=K/Y	h	e=E/N		
Period	y	A	x=K/Y	h	e=E/N	K/N	K/E
				Economy	-wide		
1970-1983	3.89	-2.09	3.74	0.42	1.83	8.07	6.20
1984-1997	5.00	-0.08	3.93	-0.75	1.90	9.98	7.97
1998-2004	3.18	0.52	1.74	0.37	0.55	4.97	4.53
1970-2004	4.20	-0.77	3.45	-0.08	1.60	8.22	6.58
1			Ag	griculture, Fores	try and Fishing		
1970-1983	4.48	-1.51	7.12	-0.38	-0.74	11.90	13.62
1984-1997	6.43	4.97	5.31	0.20	-4.06	13.72	18.89
1998-2004	3.74	1.12	-2.61	0.24	4.99	1.05	-4.50
1970-2004	5.13	1.90	4.17	-0.01	-0.92	10.42	12.06
2		•	Mining/Manut	acturing/Electri	city, Gas and W	ater Supply	•
1970-1983	4.62	2.11	1.09	0.52	0.90	6.14	4.96
1984-1997	5.87	4.31	2.44	-1.01	0.13	9.14	9.09
1998-2004	6.54	7.92	-2.01	0.39	0.23	5.85	4.08
1970-2004	5.53	4.08	1.14	-0.14	0.45	7.31	6.48
2a		•	ICT (Computer,	Manufacture of	Communication	n Equipment)	•
1970-1983	17.31	19.49	-3.24	-0.15	1.22	12.52	17.57
1984-1997	24.96	27.60	-1.90	-0.89	0.14	20.27	10.31
1998-2004	21.01	22.32	-2.21	0.70	0.19	17.74	9.78
1970-2004	21.22	23.44	-2.50	-0.28	0.56	16.78	12.98
2b		C	ther Manufactur	ing/Mining/ Ele	ctricity, Gas and	l Water Supply	•
1970-1983	4.73	2.41	0.90	0.54	0.88	6.03	4.69
1984-1997	5.51	3.86	2.52	-1.02	0.15	8.88	9.07
1998-2004	5.80	7.58	-2.41	0.39	0.23	4.54	3.05
1970-2004	5.27	3.93	1.03	-0.13	0.44	6.90	6.16
3		•		Servi	ce		•
1970-1983	1.11	-1.83	3.21	0.25	-0.52	4.90	5.41
1984-1997	2.55	-2.67	4.53	-0.59	1.28	8.05	6.95
1998-2004	0.94	-3.89	4.19	0.40	0.24	4.60	6.16
1970-2004	1.67	-2.63	3.98	-0.07	0.38	6.14	6.20
3a				Producer	Service		
1970-1983	1.95	-10.25	12.92	-0.19	-0.52	5.39	13.08
1984-1997	0.48	0.88	-1.80	0.11	1.28	1.65	-2.07
1998-2004	-0.44	-33.32	32.43	0.21	0.24	1.18	17.08
1970-2004	0.85	-9.53	9.99	0.01	0.38	2.98	7.67
3b				Distribution	n Service		
1970-1983	2.62	4.49	-1.81	0.47	-0.52	1.39	2.72
1984-1997	4.32	0.08	3.76	-0.80	1.28	7.24	5.62
1998-2004	3.19	1.52	1.07	0.36	0.24	5.55	3.64
1970-2004	3.44	1.87	1.27	-0.08	0.38	4.65	4.10
3c				Consumer	Service		
1970-1983	3.61	-4.39	8.09	0.42	-0.52	15.13	13.75
1984-1997	2.50	-4.21	6.08	-0.65	1.28	12.43	13.55
1998-2004	2.19	-0.07	1.70	0.31	0.24	7.13	6.42
1970-2004	2.86	-3.18	5.70	-0.04	0.38	12.37	12.16
3d				Social Se	ervice		
1970-1983	-0.75	-1.90	1.66	0.01	-0.52	4.03	3.13
1984-1997	-0.40	-5.61	4.39	-0.46	1.28	11.64	8.15
1998-2004	-3.64	-6.51	1.79	0.84	0.24	2.79	0.37
1970-2004	-1.20	-4.39	2.82	-0.01	0.38	6.91	4.63

Notes: y: GDP per capita; A:TFP; x:Capital intensity; e:Employment rate; K/N: capital-labor ratio; K/E: Capital-employment ratio.

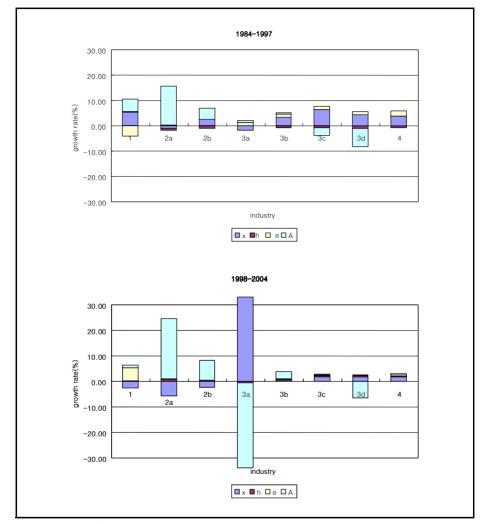


Figure 2. Relative Contribution of Factors and TFP: Korea (1970–2004)

Notes: 1) Agriculture, Forestry and Fishing

- 2a) ICT(Computer, Manufacture of Communication Equipment)
- 2b) Other Manufacturing/Mining/Electricity, Gas and Water Supply
- 3a) Producer Service, 3b) Distribution Service
- 3c) Consumer Service, 3d) Social Service
- 4) Economy-wide

We have also conducted 72-sector growth accounting by using the actual capacity utilization rate and unemployment rate (Figure 2). The results are presented in Tables 3 and 4. The consideration of the capacity utilization ratio and employment rate into growth accounting results in a lower growth rate of capital intensity and higher growth rate of TFP. For example, the per-capita GDP growth (5.0%) during the pre-crisis period is now decomposed by TFP growth (0.41%) and augmented capital intensity growth (3.75%) while, during the post-crisis period, the per-capita GDP growth (3.18%) is decomposed by TFP growth (0.49%) and capital intensity growth (1.44%).

Figure 3. Historical Data of Capacity Utilization Ratio and Employment Rate

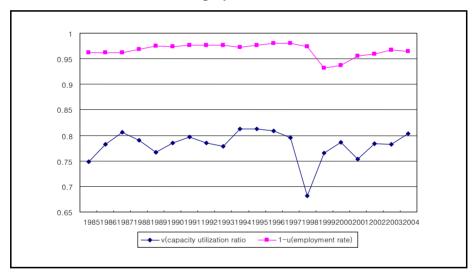


Table 3. 72-sector Growth Accounting with Capacity Utilization and Unemployment Rate Considered: Korea (1970–2004)

Period	у	Factors of growth							
Period	y	A	x*=vx	h*=h(1-u) e=E/N					
Period	y	A	x*=vx	h*=h(1-u)	e=E/N	v	1-u		
_	Í			Economy-	-wide		Į.		
1970-1983	3.89	-0.59	3.07	0.40	1.83	0.75	0.96		
1984-1997	5.00	0.41	3.75	-0.73	1.90	0.79	0.97		
1998-2004	3.18	0.49	1.44	0.35	0.55	0.77	0.96		
1970-2004	4.20	0.02	3.00	-0.07	1.60	0.77	0.96		
1			Agriculture, Forestry and Fishing						
1970-1983	4.48	0.14	5.61	-0.37	-0.74	0.75	0.96		
1984-1997	6.43	3.49	5.60	0.20	-4.06	0.79	0.97		
1998-2004	3.74	0.30	-2.78	0.23	4.99	0.77	0.96		
1970-2004	5.13	1.57	3.87	-0.01	-0.92	0.77	0.96		
2			Mining/Manuf	facturing/Electric	ity, Gas and W	ater Supply			
1970-1983	4.62	1.28	0.92	0.50	0.90	0.75	0.96		
1984-1997	5.87	2.71	2.49	-0.98	0.13	0.79	0.97		
1998-2004	6.54	3.82	-1.61	0.38	0.23	0.77	0.96		
1970-2004	5.53	2.34	1.03	-0.13	0.45	0.77	0.96		
2a			ICT (Computer,	Manufacture of	Communication	n Equipment)			
1970-1983	17.31	8.62	-2.08	-0.15	1.22	0.75	0.96		
1984-1997	24.96	15.21	-1.90	-0.86	0.14	0.79	0.97		
1998-2004	21.01	9.95	-1.41	0.67	0.19	0.77	0.96		
1970-2004	21.22	11.27	-1.87	-0.27	0.56	0.77	0.96		
2b		C	ther Manufactur	ing/Mining/ Elec	tricity, Gas and	d Water Supply	•		
1970-1983	4.73	1.42	0.78	0.52	0.88	0.75	0.96		
1984-1997	5.51	2.47	2.58	-0.99	0.15	0.79	0.97		
1998-2004	5.80	3.62	-1.95	0.37	0.23	0.77	0.96		
1970-2004	5.27	2.26	0.94	-0.13	0.44	0.77	0.96		
3			Service				•		
1970-1983	1.11	-0.54	2.80	0.24	-0.52	0.75	0.96		
1984-1997	2.55	-0.96	4.44	-0.58	1.28	0.79	0.97		
1998-2004	0.94	-1.64	4.20	0.38	0.24	0.77	0.96		
1970-2004	1.67	-0.94	3.74	-0.06	0.38	0.77	0.96		
3a				Producer S	ervice		•		
1970-1983	1.95	-3.08	7.58	-0.19	-0.52	0.75	0.96		
1984-1997	0.48	0.21	-1.02	0.10	1.28	0.79	0.97		
1998-2004	-0.44	-9.06	13.52	0.20	0.24	0.77	0.96		
1970-2004	0.85	-2.96	5.36	0.01	0.38	0.77	0.96		
3b				Distribution	Service				
1970-1983	2.62	1.62	-0.90	0.45	-0.52	0.75	0.96		
1984-1997	4.32	0.38	2.33	-0.78	1.28	0.79	0.97		
1998-2004	3.19	0.88	0.80	0.35	0.24	0.77	0.96		
1970-2004	3.44	0.94	0.75	-0.07	0.38	0.77	0.96		
3c				Consumer S	Service				
1970-1983	3.61	-1.34	8.13	0.41	-0.52	0.75	0.96		
1984-1997	2.50	-1.81	7.77	-0.63	1.28	0.79	0.97		
1998-2004	2.19	0.24	2.93	0.30	0.24	0.77	0.96		
1970-2004	2.86	-1.13	6.91	-0.04	0.38	0.77	0.96		
3d				Social Se	rvice	<u></u>	·		
1970-1983	-0.75	-1.09	3.44	0.01	-0.52	0.75	0.96		
1984-1997	-0.40	-3.45	9.56	-0.44	1.28	0.79	0.97		
1998-2004	-3.64	-4.40	3.67	0.80	0.24	0.77	0.96		
1970-2004	-1.20	-2.74	5.94	-0.01	0.38	0.77	0.96		

Notes: v: capacity utilization ratio; 1-u: employment rate.

Table 4. Relative contribution of Factors and TFP with Capacity Utilization and Unemployment Rate Considered: Korea (1970–2004)

Period	y	Factors of growth					
Period	y	A x*=vx h*=h(1-u) e=E/N					
Period	y V	A	x*=vx	h*=h(1-u) e=E/N v		V	1-u
Terrou		71	A VA	Economy-		•	ı u
1970-1983	3.89	-1.13	2.80			0.75	0.96
1984-1997	5.00	0.74	3.09	-0.73	1.90	0.79	0.97
1998-2004	3.18	0.95	1.33	0.35	0.55	0.77	0.96
1970-2004	4.20	0.04	2.64	-0.07	1.60	0.77	0.96
1		•	Ag	riculture, Forest	ry and Fishing		
1970-1983	4.48	0.26	5.32	-0.37	-0.74	0.75	0.96
1984-1997	6.43	6.10	4.18	0.20	-4.06	0.79	0.97
1998-2004	3.74	0.52	-2.00	0.23	4.99	0.77	0.96
1970-2004	5.13	2.87	3.20	-0.01	-0.92	0.77	0.96
2				cturing/Electric		ater Supply	
1970-1983	4.62	2.41	0.81	0.50	0.90	0.75	0.96
1984-1997	5.87	4.80	1.92	-0.98	0.13	0.79	0.97
1998-2004	6.54	7.47	-1.54	0.38	0.23	0.77	0.96
1970-2004	5.53	4.34	0.88	-0.13	0.45	0.77	0.96
2a				Manufacture of			
1970-1983	17.31	18.67	-2.42	-0.15	1.22	0.75	0.96
1984-1997	24.96	27.17	-1.49	-0.86	0.14	0.79	0.97
1998-2004	21.01	21.83	-1.69	0.67	0.19	0.77	0.96
1970-2004	21.22	22.85	-1.92	-0.27	0.56	0.77	0.96
2b				ng/Mining/ Elec			
1970-1983	4.73	2.66	0.67	0.52	0.88	0.75	0.96
1984-1997	5.51	4.37	1.98	-0.99	0.15	0.79	0.97
1998-2004	5.80	7.04	-1.84	0.37	0.23	0.77	0.96
1970-2004	5.27	4.16	0.79	-0.13	0.44	0.77	0.96
3				Servic			
1970-1983	1.11	-1.01	2.40	0.24	-0.52	0.75	0.96
1984-1997	2.55	-1.72	3.57	-0.58	1.28	0.79	0.97
1998-2004	0.94	-2.89	3.20	0.38	0.24	0.77	0.96
1970-2004	1.67	-1.70	3.05	-0.06	0.38	0.77	0.96
3a	1.05	7.00	0.65	Producer Service		0.75	0.06
1970-1983	1.95	-7.00	9.67	-0.19	-0.52	0.75	0.96
1984-1997	0.48	0.50	-1.41	0.10	1.28	0.79	0.97
1998-2004 1970-2004	-0.44 0.85	-25.69 -7.20	24.81 7.66	0.20	0.24 0.38	0.77 0.77	0.96
3b	0.83	-7.20	7.00	Distribution		0.77	0.90
1970-1983	2.62	4.05	-1.36	0.45	-0.52	0.75	0.96
1984-1997	4.32	0.86	2.95	-0.78	1.28	0.79	0.96
1984-1997	3.19	1.79	0.82	0.35	0.24	0.79	0.97
1970-2004	3.19	2.16	0.82	-0.33	0.24	0.77	0.96
3c	J. 44	2.10	0.77	Consumer S	0.00	0.77	0.70
1970-1983	3.61	-2.33	6.05	0.41	-0.52	0.75	0.96
1984-1997	2.50	-2.33	4.78	-0.63	1.28	0.79	0.97
1998-2004	2.19	0.35	1.30	0.30	0.24	0.77	0.96
1970-2004	2.19	-1.85	4.37	-0.04	0.24	0.77	0.96
3d	2.00	-1.05	7.31	Social Se		0.77	0.70
1970-1983	-0.75	-1.49	1.24	0.01	-0.52	0.75	0.96
1984-1997	-0.73	-4.69	3.45	-0.44	1.28	0.79	0.97
1998-2004	-3.64	-6.05	1.37	0.80	0.24	0.77	0.96

Notes: v: capacity utilization ratio; 1-u: employment rate.

Based on the growth accounting with capacity utilization rate and unemployment rate, we have estimated potential per capita GDP and its growth rates based on two definitions. The results indicate that the post-crisis Korean economy during 2001–2004 could have achieved an average growth rate of 6.2% in potential per capita GDP but the actual average per capita GDP growth rate during the period was only 3.2% due mainly to very sluggish demand as documented in Pyo (2006) and Pyo and Ha (2007). The results are presented in Figure 3 and Tables 5 and 6.

Figure 4. Actual GDP Per Capita and Potential GDP Per Capita(Korea)

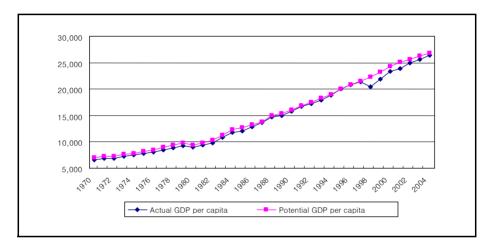


Table 5. Growth Rates of Actual GDP and Potential GDP per capita: Korea (1970–2004)

Year	Growth rate of	Potential GDP1 Growth rate	Potential GDP2 Growth rate
Tear	Actual GDP	(with u* and v*)	(with u* and v*)
1971	4.17	4.15	9.38
1972	0.08	0.17	5.18
1973	6.23	6.25	11.66
1974	2.20	2.17	7.40
1975	3.51	3.52	8.79
1976	3.89	3.95	9.25
1977	6.10	6.00	11.47
1978	4.32	4.20	9.48
1979	4.49	4.43	9.60
1980	-3.41	-3.41	1.32
1981	4.53	4.56	9.68
1982	4.70	4.69	9.84
1983	9.84	9.78	15.17
1984	8.86	8.90	14.19
1985	2.81	2.81	7.85
1986	6.79	4.65	9.78
1987	5.70	4.20	7.11
1988	7.52	8.09	9.54
1989	2.00	2.95	4.88
1990	5.64	4.64	7.59
1991	5.49	4.67	6.60
1992	3.40	4.06	5.16
1993	4.18	4.68	6.46
1994	5.01	3.22	5.48
1995	6.03	5.80	6.27
1996	4.17	4.16	4.39
1997	2.43	3.19	3.41
1998	-4.17	3.56	4.55
1999	7.48	4.07	13.54
2000	6.11	4.42	10.31
2001	2.35	3.41	7.51
2002	4.59	2.35	7.52
2003	2.90	2.55	5.42
2004	3.02	1.97	4.46
average	4.20	4.08	7.95

Notes: Potential GDP1 is the growth rate defined as $(Y_t^* - Y_{t-1}^*)/Y_{t-1}^*$. Potential GDP2 is the growth rate defined as $(Y_t^* - Y_{t-1})/Y_{t-1}$.

Table 6. Estimates of Potential GDP

(unit: thousands of Korean Won)

	(unit: thousands of Korean Won)
Actual GDP	Potential GDP
6,600	6,931
6,876	7,219
6,881	7,232
7,309	7,684
7,470	7,850
7,732	8,127
8,033	8,448
8,523	8,954
8,891	9,330
9,290	9,744
8,973	9,412
9,380	9,841
9,821	10,302
10,787	11,311
11,742	12,317
12,072	12,664
12,892	13,252
13,627	13,809
14,651	14,926
14,945	15,366
15,788	16,080
16,655	16,831
17,220	17,513
17,939	18,332
18,838	18,922
19,975	20,020
20,808	20,852
21,313	21,517
20,424	22,283
21,952	23,190
23,293	24,216
23,840	25,043
24,935	25,632
25,659	26,287
26,433	26,804
	6,600 6,876 6,881 7,309 7,470 7,732 8,033 8,523 8,891 9,290 8,973 9,380 9,821 10,787 11,742 12,072 12,892 13,627 14,651 14,945 15,788 16,655 17,220 17,939 18,838 19,975 20,808 21,313 20,424 21,952 23,293 23,840 24,935 25,659

4. CONCLUDING REMARKS

According to Hayashi and Prescott (2002), the TFP growth rate of Japan declined by more than 2% points from the 1980s to the 1990s. Fukao and Kwon (2005) argue that this corresponds to a 3% point decline in the balanced growth rate. On the other hand, Jorgenson and Motohashi (2003) found that the TFP growth of Japan in the 1990s was not substantially lower than that in the 1980s.

We have applied the growth accounting model of the Hayashi and Prescott type to 72 industry data of the EU-KLEMS Korea Dataset. First, the decomposition of 72 sectors into several groups reveals striking patterns of growth in different sub-sectors. For example, in ICT Manufacturing after 1998, the dominant growth of per capita GDP (21.01%) of the sector is mostly accounted for by the growth rate of TFP (9.95%) while its capital intensity has grown at the rate of–1.41% implying that capital productivity (Y/K) has increased tremendously during the period reflecting the ICT boom. Among Service sectors, Distribution Service ranks first in both the growth rate of value added (3.44%) and TFP (0.94%) for the entire period.

We have conducted a multi-sector growth accounting to the EU-KLEMS Japan Data set (May 2007 version) and JIP Database. The Japanese economy as a whole grew at the rate of per capita GDP (1.23%), TFP (-0.30%), capital intensity (1.85%) with average hours worked (-0.57%), and employment rate (0.71%) which is the difference between the capital-labor ratio (3.08%) and capital-employment ratio (2.35%) during the period of 1982–2004. The higher-growth of per capita GDP during the earlier period of 1982–1992 was mainly contributed by the fast growth of capital intensity (2.18%) not by TFP growth (-0.33%). On the other hand, the post-1992 period's slower growth of per capita GDP (0.75%) was due mainly to the reduction in the growth rate of capital intensity (1.55%) and employment rate (0.43%). It was not due to the slowdown of TFP (-0.30%), contrary to the argument by Hayashi and Prescott (2002) and in support of Jorgenson and Motohashi (2003) and Fukao and Kwon (2005).

The estimates of the present paper indicate that Korea could have maintained a 5.0%–7.0% level of potential GDP growth rate and Japan could have maintained a 3.0%–4.0% level during the first half of the 2000s. In order to achieve this goal, we have found the faster growth of capital intensity alone or the improvement of capacity utilization and employment rate through expansionary fiscal and monetary policy cannot be a sufficient

factor. Both economies need to improve upon higher employment and higher capacity utilization and total factor productivity.

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Appendix

Table A-1. Industry Classification of EU KLEMS

1	Agriculture	37	Railroad equipment and transport equipment nec
2	Forestry	38	Manufacturing nec
3	FISHING	39	Recycling
4	Mining of coal and lignite; extraction of peat	40	Electricity supply
5	Extraction of crude petroleum and natural gas and services	41	Gas supply
6	Mining of uranium and thorium ores	42	WATER SUPPLY
7	Mining of metal ores	43	CONSTRUCTION
8	Other mining and quarrying	44	Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel
9	Food products and beverages	45	Wholesale trade and commission trade, except of motor vehicles and motorcycles
10	Tobacco products	46	Retail trade, except of motor vehicles and motorcycles; repair of household goods
11	Textiles	47	HOTELS AND RESTAURANTS
12	Wearing Apparel, Dressing And Dying Of Fur	48	Inland transport
13	Leather, leather products and footwear	49	Water transport
14	WOOD AND PRODUCTS OF WOOD AND CORK	50	Air transport
15	Pulp, paper and paper products	51	Supporting and auxiliary transport activities; activities of travel agencies
16	Publishing	52	POST AND TELECOMMUNICATIONS
17	Printing and reproduction	53	Financial intermediation, except insurance and pension funding
18	Coke, refined petroleum products and nuclear fuel	54	Insurance and pension funding, except compulsory social security
19	Pharmaceuticals	55	Activities related to financial intermediation
20	Chemicals excluding pharmaceuticals	56	Imputation of owner occupied rents
21	Rubber and plastics products	57	Other real estate activities
22	OTHER NON-METALLIC MINERAL PRODUCTS	58	Renting of machinery and equipment
23	Basic metals	59	Computer and related activities
24	Fabricated metal products	60	Research and development
25	MACHINERY, NEC	61	Legal, technical and advertising
26	Office, accounting and computing machinery	62	Other business activities, nec
27	Insulated wire	63	PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY
28	Other electrical machinery and apparatus nec	64	EDUCATION
29	Electronic valves and tubes	65	HEALTH AND SOCIAL WORK
30	Telecommunication equipment	66	Sewage and refuse disposal, sanitation and similar activities
31	Radio and television receivers	67	Activities of membership organizations nec
32	Scientific instruments	68	Media activities
33	Other instruments	69	Other recreational activites
34	Motor vehicles, trailers and semi-trailers	70	Other service activities
35	Building and repairing of ships and boats	71	PRIVATE HOUSEHOLDS WITH EMPLOYED PERSONS
36	Aircraft and spacecraft	72	EXTRA-TERRITORIAL ORGANIZATIONS AND BODIES

Sources: EUKLEMS (2007); EU KLEMS growth and productivity accounts, Version 1.0, March 2007, pp. 11–12.

Table A-2. Classification of Seven Industries

Code	Industry	EU-KLEMS code
1	Agriculture, forestry and fishing	1~3
2a	ICT (Computing and communication equipment)	26, 30
2b	Other manufacturing/Mining /Electricity, Gas, Water Supply	4~25, 27~29, 31~43
3a	Producer service	52~62
3b	Distribution service	44~46, 48~51
3c	Consumer service	47, 68~71
3d	Social Service	63~67

Notes: We categorized the Service Sector into four industry sectors according to J.H. Kim, "Reviving Manufacturing in Korea," KDI Report.

Comments on "Productivity Growth and Structural Changes in Korean Economy before and after the Financial Crisis"

Chin Hee HahnKorea Development Institute

After the financial crisis, the GDP growth rate slowed down significantly from 7.5% per annum from 1991 to 1995 to only 4.4% for the period from 2001 to 2005. This was accompanied by a significant reduction in the investment rate and investment growth rate. There have been contrasting views about the post-crisis growth and causes of the growth slowdown.

At the risk of oversimplification, it could be said that there are two main contrasting views. One view is that pre-crisis growth was unsustainable. That is, the pre-crisis input-driven growth had been sustained by over investment by *chaebols* under the implicit guarantee provided by the government, which is somehow no longer sustainable. The other view held that there is something wrong with the post-crisis growth. More often than not, those who held this view criticized *chaebol* reforms, such as reforms on capital structure, corporate control and governance, allowing foreign M&A, as being misdirected and weakening growth potential. Although not widely discussed, there could be other factors behind the growth slowdown: convergence, lasting effects from the crisis, deteriorating world economic conditions, cyclical factors, and competition from China. Unfortunately, there seem to be no consensus yet on this issue.

This paper has two objectives. Firstly, it examines the sources of the growth slowdown after the crisis and tries to evaluate the respective roles of TFPG and accumulation of inputs, using growth accounting methodology involving the capital-output ratio, as in Klenow and Rodriguez-Clare (1997) and Hayashi and Prescott (2002). Secondly, this paper tries to estimate potential GDP and examines how the Korean economy performed relative to its potential after the crisis.

This discussant's first comment on this paper is on growth accounting methodology. The paper uses growth accounting methodology involving the capital- output ratio rather than the conventional one involving the capital-labor ratio. As is well known, growth accounting involving the capital-output ratio attributes changes in capital stock induced by changes in TFP to the contribution from TFP. This procedure presumes instant adjustment of capital stock in response to changes in TFP to keep balanced growth. This presumption has been pointed out as being unrealistic, so that it might exaggerate the absolute contribution from TFP changes. So, with growth accounting results from both methodologies at hand, readers will be able to have a more balanced view of the sources of the growth slowdown.

The second comment is on comparison of TFPG estimates before and after the crisis. One main result of this paper seems to be that TFPG has improved after the crisis, from 0.0% per annum for the 1984–1997 period to 0.34 per annum for the 1998–2004 period. Though this result seems plausible, can we say that TFPG "clearly" improved after the crisis? The answer to this question seems negative. Above all, the magnitude of the improvement seems to be too small. Given that growth accounting results are usually sensitive to data and methodology employed, this seems to be too small an improvement to justify a strong conclusion. Also, if a "too large" capital income share was employed in this paper, it will amplify the role of changes in capital stock and bias the results toward finding "improved TFPG," given the significant slowdown in capital accumulation after the crisis.

So, the third comment, which is related to the second, is about the capital income share. The capital income share which is implied by other numbers in Pyo's paper seems about 0.47. This number seems indeed to be too large. According to the national account, the compensation to employees for the 1990–2003 period is between 58% and 63%. Considering the self-employees and unpaid family workers, the capital income share 0.47 seems too high. This could have biased the result in favor of finding improved post-crisis TFPG.

This discussant's fourth comment is on the potential growth rate estimate. Even following Pyo's definition of potential GDP, the growth rate implied by the estimated potential GDP path is only 2.57% per annum for the period from 2001 to 2004. This is much lower than Pyo's estimate of 6.2%, but this number seems to be based on a somewhat unusual definition of potential GDP growth (Potential GDP2 in the paper).

So, Pyo's question "Has the potential growth been halved after the

crisis?" still does not seem to have been answered by the paper. Growth accounting results, on which Pyo's paper has a contribution, are helpful, but they provide only proximate causes, not ultimate causes, of growth. Given that the slowdown in capital accumulation more than explains away a GDP growth slowdown, this discussant is inclined to suggest that we understand why the capital accumulation slowed down after the crisis, in order to adequately evaluate the post-crisis growth performance of Korea.

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Session III

What is the Agenda for the Next 10 Years?

Changes in Labor Quality among New College Graduates in Korea

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This paper measures the changes in labor quality among new college graduates based on their labor market wages. After controlling for aggregate skill prices and market experience effect, the estimates indicate that the quality of male college graduates has fallen in Korea both absolutely and relatively. Two hypotheses are considered for the quality deterioration. First, the average ability of college graduates may have fallen as an increasing share of population goes to college. Second, Korea's education system, which has gone through many changes, may have not been as productive as in the past, at least as the labor supplier in the market. The empirical results are generally consistent with both hypotheses.

I. INTRODUCTION

The economic growth of a country highly depends on, among other things, the quality of its workforce. A large body of growth literature has emphasized labor quality and education as one of the most important requirements for growth at all stages of economic development.¹⁾ In addition, recent literature has shown that labor demand has shifted toward skilled workers in many advanced economies through increased globalization and skill-biased technological progress, and as a result, the economic importance

¹⁾ In his seminal paper, Lucas (1988) emphasizes human capital accumulation for the requirements for economic development.

of an elastic supply of skilled workers has rapidly grown.²⁾ At the same time, population has been rapidly aging in many countries including Korea, which strengthens the need for higher productivity among younger generations to finance additional fiscal burdens of social security systems.

Worker quality depends on many things, and education is probably one of the most important determinants of worker quality. As will be shown later, Korea has achieved a quantitatively impressive improvement in college education, which may be considered as a positive change for the country. The advance rate into a college among high school graduates rose from 32.2% in 1965 to 82.1% in 2006, and the number of four-year college graduates increased from 36,180 to 270,546 and that of two-year college graduates increased from 7,841 to 222,973 during the same period.³⁾

Although tertiary education has quantitatively expanded in such an impressive manner, there have been rising concerns for the quality of labor among newly entering cohorts. College graduates as well as less educated workers have had lots of trouble finding jobs, and the unemployment rate has been high. Firms have spent a greater amount of resources to screen abler workers from less able, and still report labor shortages in high skill jobs despite the share of college graduates exceeding 70% among recent cohorts. Education has expanded quantity-wise quite rapidly, but the labor market outcomes suggest that college graduates may not possess the skills demanded in the market. Sluggish total factor productivity growth in the late 1990s and the early 2000s is also suggestive of these concerns.⁴⁾

In this paper, the author attempts to measure the changes in labor quality of college graduates among birth-year cohorts. Because labor quality is difficult to directly measure, the real wages of workers are used as a proxy for labor quality. College graduates are grouped into birth-year cells, and their wages are modeled as a function of market price for skills, experience and the cohorts' labor quality. The estimates indicate that the quality of male college graduates has fallen in Korea both absolutely and relatively to less educated workers. Two hypotheses are considered for the quality deterioration.

²⁾ For the discussions on skill-biased labor demand shifts, see Bound and Johnson (1992), Katz and Murphy (1992), and Juhn, Murphy and Pearce (1993). For the debate on causes of the demand shifts, Cline (2001) offers a comprehensive survey.

³⁾ Statistical Yearbook of Education, the Ministry of Education.

⁴⁾ TFP growth rate is estimated to have fallen from 3.5% in the 1980s to 1.5% in the 1990s and the 2000s in several studies (Hahn *et al.* 2002; Kwark 2007).

First, the average ability of college graduates may have fallen as an increasing share of population goes to college. Second, Korea's education system, which has gone through many changes, may have not been as productive as in the past, at least as the labor supplier in the market. The empirical results are generally consistent with both hypotheses.

This paper unfolds in the following way. Section II documents the recent educational expansion in Korea. Section III briefly discusses the data used in the analysis, and documents labor market outcomes of college graduates in Korea. It also illustrates the empirical strategy for the estimation of labor quality and the results. Section IV concludes with a brief closing remark.

2. EXPANSION OF TERTIARY EDUCATION IN KOREA

Korea has been known for the high educational attainment of its people. Korea's highly educated workforce has been counted as one of the main factors behind its rapid economic growth despite the fact that the economy started from the ruins of the Korean War and lacked natural resources. High educational attainment in Korea has at least partly been a result of Korean parents' emphasis on education of their children, due to their strong belief in the effectiveness of educational achievement as a tool for upward social mobility.

Educational attainment in Korea is still expanding. Figure 1 shows the advance rates into high school and into colleges. In 1965, 70% of middle school graduates advanced to high school, and the share reached almost 100% in 2003. Reflecting the increasing trend, the number of high school graduates has increased more than five times from 115,776 in 1965 to 590,413 in 2003.⁵⁾ The share of high school graduates advancing to college was 32.3% in 1965, but it rose to 79.7% in 2003. As a result, the number of college graduates has increased seven times from 36,180 to 258,126 during the same period.

⁵⁾ The number of high school graduates peaked at 764,712 in 2000; since then it declined somewhat as the cohort size decreased.

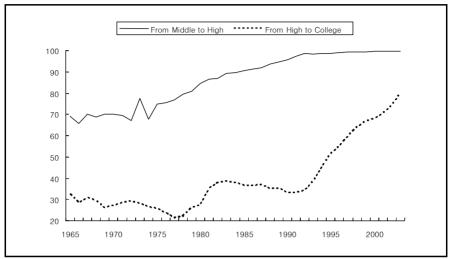


Figure 1. Advance Rates into Higher Education

Source: The Ministry of Education, various years, Statistical Yearbook of Education.

One important difference is that the advance rate into high school has been increasing monotonically but the rate into college has shown some fluctuations. The latter pattern mostly reflects the government- initiated expansion of college education. The Ministry of Education has tightly regulated the entry of new colleges through controlling the size of existing colleges and new entry, and it continues to do so. The number of applicants to a college has always exceeded total admission, and the share and actual number of those entering college have been determined mostly by the government-controlled supply. The advance rate into colleges shows a sudden jump in the early 1980s, which is attributable to the deregulation on school size at that time.⁶ The rate took off in the early 1990s again, which

⁶⁾ The Ministry of Education more than doubled college size in 1981 announcing that colleges should screen students for graduation, whose size was held unchanged. In principle, this meant that three out of five college entrants would have failed to receive a diploma. But in practice, all entrants received a diploma, and the policy turned out to increase college size permanently.

was a joint effect of another deregulation and decreasing cohort size.⁷⁾

This increase in educational attainment can also be shown in terms of *completed* education among birth cohorts. Figure 2 shows the predicted distribution of completed education for those born between 1920 and 1989, where the prediction is made in the following way. First the distribution of completed education for each birth cohort in each year between 1985 and 2004 are obtained using the Economically Active Population Survey.⁸⁾ Following the model in Juhn, Kim and Vella (2005), the equation is estimated below.

$$(1) \ \ s_{ct}^e = \delta_c^e + \varphi_a^e + \varepsilon_{ct}^e$$

In the above, S_{ct}^e is the share of those with education level e among birth cohort c at time t. Birth cohort is defined as the year of birth, and four levels of education, middle school diploma or less, high school diploma, two-year college diploma, and four-year college diploma. δ_c^e is the cohort effect for the education level e, and φ_a^e is the age effect where age is defined as a = t - c. The age effect captures the possibility that not all complete their education at the same age, and also the possibility that death rates along ages may differ among differently educated people. The last term, ε_{ct}^e , is the estimation error.

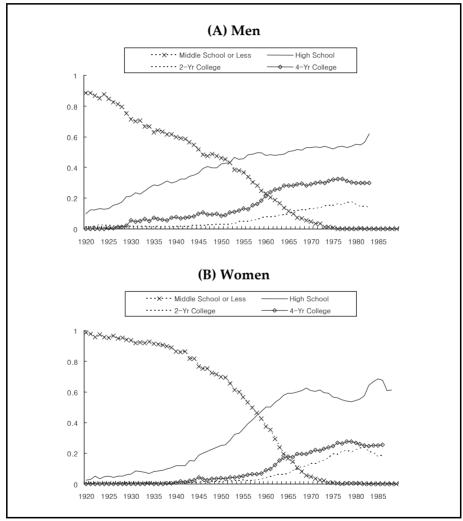
The predicted distribution of completed education among birth cohorts in Figure 2 is obtained from the predicted educational shares, \hat{s}_c^e , at age 30. According to the figure, the share of those with middle school diploma or less (less than 12 years of education) was 90% in the male 1920 cohort, but it has virtually fallen to zero among the post-1980 birth cohorts. This implies that most Korean men born in 1980 or after have advanced at least to high school. The share with high school diploma increased to 65% among those born in 1985, and that with a four-year college diploma increased to 30%, too. A similar pattern is found among women, and the only gender difference is

⁷⁾ The deregulation in the early 1990s included allowing two-year colleges to convert into four-year colleges and admitting new colleges.

⁸⁾ This is an annual household survey administered by the National Statistical Office in Korea. The main advantage of the data set is that it covers the entire population. This data set is not used in the analysis of labor quality later in this paper, however, as it lacks the information on individual income.

that the increase in college education is somewhat less pronounced among women.

Figure 2. Distribution of Completed Schooling among Birth Cohorts



Source: The National Statistical Office, The Economically Active Population Survey, micro-files

Educational expansion in Korea has not been limited to quantitative expansion, and the variables associated with school quality have improved as well, though not evenly so among various levels of schools. Figure 3 shows the student-teacher ratio at various levels of schools, and the ratios have fallen steadily in elementary schools since 1965. Among middle and high schools, the ratio initially increased reflecting high population growth, but it has fallen since 1980. The student-teacher ratio among colleges had similarly increased until the mid-1980s when it finally started to fall. Although the student-teacher ratio has been falling in all schools since 1985, it is important to note that such improvement in the educational environment has been slower in the upper level schools.

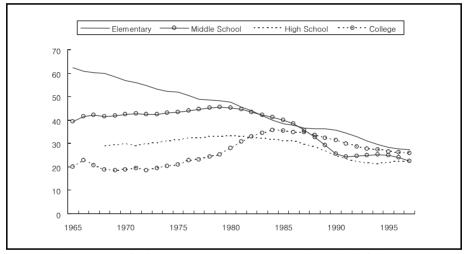


Figure 3. Student-Teacher Ratio by School

Source: The Ministry of Education, various years, Statistical Yearbook of Education.

Expenditure per student has also been increasing at all school levels, but much less so at the higher levels of schooling. The expenditure grew 317 times in nominal terms from 12,000 won to 3,800,000 won between 1970 and 2006 in elementary schools, and 168 times from 25,000 won to 4,210,000 won in middle schools. It grew 183 times from 32,000 won to 5,873,000 won in high schools, and only 47 times from 157,000 won to 7,632,000 won in

colleges.⁹⁾ In comparison to the OECD countries, Korea's educational expenditure per student in secondary schools amounts to 92% of the OECD average in 2003, but it amounts to only 63% in tertiary schools.¹⁰⁾ In sum, Korea's education has improved in terms of both student-teacher ratios and expenditure per student, but such improvement has been least impressive in colleges.

3. LABOR MARKET OUTCOMES AND THE ESTIMATION OF LABOR QUALITY

It is important to understand what effects the above described educational expansions have brought in for the Korean economy. Given the demand shift toward skilled workers during the past decades in Korea, such quantitative and qualitative expansions of education must have been a positive supply change, but it is still not clear how effective such change has been. In particular, one needs to focus on the possibility that the supply change has not been sufficiently effective as it has not been a market-driven change but a change following the government's deregulation. For example, one needs to consider that it took only 10 years for the advance rate into colleges to rise from 38% in 1993 to 80% in 2003.11) Such an explosive quantitative change is not very likely to take place without compromising quality, despite the continuous improvement of quality measures, and this section attempts to quantify this quality issue. In particular, this paper focuses on labor quality of college graduates for two reasons. First, as shown in the previous section, the improvement in the schooling environment has been slowest in college education. Second, more than 80% of recent cohorts advance to college, and thus the representative worker in Korea is now very likely to have a college diploma.

3.1. Data

The primary indicator of labor quality in the market should be labor

⁹⁾ Statistical Yearbook of Education, various years, the Ministry of Education.

¹⁰⁾ OECD (2005).

¹¹⁾ Given that almost 100% of young cohorts currently have a high school diploma, this means that 80% of young Koreans will be a college graduate.

productivity, but it is not usually measurable at the individual worker level. Thus wages are used as a proxy for labor productivity or quality, and this method is a reasonably valid one as long as wages equal productivity on average or over one's work life. Wages are obtained from the Wage Structure Survey administered by the Ministry of Labor, covering the 1978–2003 period.

The survey is a firm-level micro-data, which the Ministry has collected since 1968 covering firms with 10 or more regular workers. ¹²⁾ The "regular" workers are defined by the Ministry as those satisfying at least one of the following four: 1) a worker who has a fixed-term contract in excess of one *month* or an unspecified-term contract, 2) a temporary or daily worker who has worked for no fewer than 45 days during the previous three-month cycle, 3) high ranking workers (executives) who are on the payroll and physically present at the establishment, or 4) the family members of the firm's owner who are on the payroll and physically present at the establishment. The resulting data set contains the information on worker characteristics and their wages for approximately 450,000 to 500,000 workers each year.

One caveat in using the data is that the size restriction affects sampling rates unevenly across sectors in such a way that manufacturing is over-sampled while retail/wholesale trades and services are under-sampled. Such unevenness arises because manufacturing firms tend to be greater samples than others. Further, the data set does not contain any information on self-employed workers and unpaid household workers, who account for 28% of the total labor force. The non-randomness of the sampling scheme is a non-trivial setback for the data, but to the extent that the non-randomness has been stable over time and across birth cohorts, the analysis in this paper is not likely to be subject to a serious selectivity bias. However, it is possible that such bias is more serious and changing over time among women, whose labor market participation has steadily increased, and for that reason, the focus in the analysis is on men.

3.2. Labor Market Outcomes

The college premium had steadily fallen until the mid-1990s in Korea,

¹²⁾ The sampling criteria was extended to firms with five or more regular workers in 1998, but the analysis in this paper uses the information on firms with 10 or more workers only, in order to maintain comparability in the time series data.

reflecting the ever-rising supply of college-educated workers, but it has been on an increasing trend in recent years. Figure 4 below shows the time-series pattern of the college premium in Korea's labor market. In the figure, the age distribution within each education group is fixed to control for any changes in absolute and relative wages arising from a change in age distribution. In other words, the college premium is defined in the following manner.

(2) Log College Premium at t =
$$\log \left(\frac{\sum_{a} W_{at}^{U} v_{a}^{U}}{\sum_{a} W_{at}^{H} v_{a}^{H}} \right)$$

In the above, W_{at}^E is the wage of a-year-old workers with education E at year t, where E takes two values, U for four-year college and H for high school. v_a^E is the time-fixed share of age group a among the workers with education level E, which is obtained as the average of the shares over the 1978–2003 period.

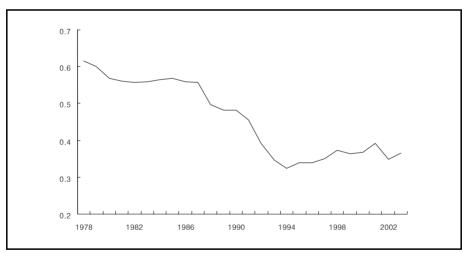


Figure 4. Changes in Log College Premium among Men

Source: The Ministry of Labor, various years, *Wage Structure Survey*.

Log college premium among male workers in the figure had been on a declining trend until 1994 when it started to increase. It was as high as .615

in 1978, but it had fallen to .325 by 1994. The increase in the premium since 1994 has been somewhat gradual; it rose by .040 between 1994 and 2003. Many previous studies have shown the early declining pattern matches well with the pattern of relative supply changes.¹³⁾

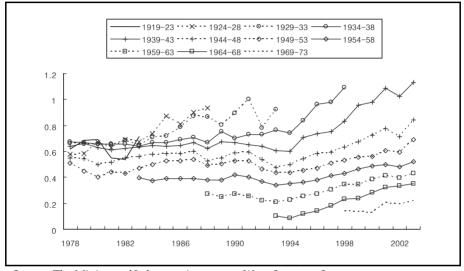


Figure 5. College Premium by Birth Cohorts

Source: The Ministry of Labor, various years, Wage Structure Survey.

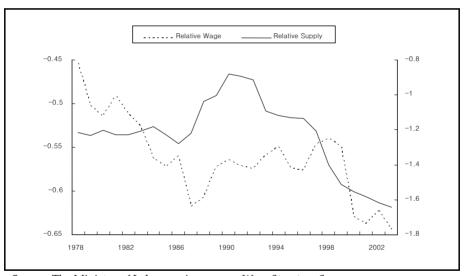
The time series pattern of aggregate college premium shown in Figure 4, however, masks an important pattern among birth cohorts. The premium is plotted in Figure 5 for each of five-year birth cohort groups to show the pattern. The figure shows that the declining pattern of aggregate college

¹³⁾ Almost all the changes in the college premium until the mid-1990s can be accounted for by relative supply (Kim and Topel, 1995). More recently, Kim (2005) shows that almost 90% of the time-series variation in the premium can be explained by relative supply and time trend. The elasticity of complementarity between college and high school graduate men is estimated at .591, which translates into an elasticity of substitution of 1.692, and the coefficient on the time trend variable is .002, reflecting the demand shift toward skilled workers well cited in the literature (e.g. Choi and Jung, 2002).

premium between 1978 and 1994 is the result of each successive cohort earning a smaller college premium. Further, the cohort-level premiums show a similar movement over time.

The co-movement of the college premium among various birth cohorts suggests that wages vary similarly over time among workers with varying ages within education groups. Indeed, this observation motivates the wage determination model discussed in the next section. One may alternatively interpret the pattern as indicating age-separability in aggregate production function, but its theoretical background is weak and so is its empirical support; if age-separable, college premium must show a similar age-pattern, not a similar time-pattern.

Figure 6. New Entrant's Relative Wages and Supply among College Graduate Men



Source: The Ministry of Labor, various years, Wage Structure Survey.

Another interesting finding from the figure is that the post-1994 increase in college premium is more pronounced among older cohorts. The usual interpretation for the rise in aggregate college premium during the latter half of the 1990s has been based on demand shift toward skilled workers, and technological progress and changes in trade structure have been cited as the

cause of demand shift.¹⁴⁾ The interpretation is consistent with the commonly rising pattern of college premiums among various cohorts, but it does not explain why the rise should be more pronounced among older workers. It would be more logical to expect that such demand shifts would favor younger workers at entry level.

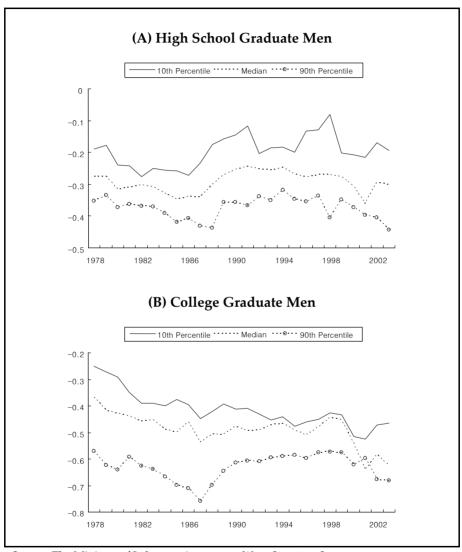
The more pronounced increase in college premium among older workers is not well explained by the substitution effect, either. Figure 6 shows the log relative wages and supplies of 25–29 year-old workers to 30–64 year-old workers among college graduate men. The relative supply of young college graduates rose between 1986 and 1990, but since then the relative supply has been declining despite the increase in college enrollment rates. The reason is that the cohort size has been shrinking because of falling birth rates. The relative wages show some fluctuation during the period, but the pattern is not necessarily a mirror image of the time-series pattern of the relative supplies. In particular, the wages of young college graduates fell a lot relative to older college graduates after 1998 although their relative supply significantly fell. As a result, the correlation coefficient between the two is positive at .329 for the 1978–2003 period.

These results, when put together, imply the possibility that demand and supply alone may not be sufficient to account for the wage patterns of variously skilled workers born in different years. Demand shift toward skilled workers originating from technological progress and/or increased international trade is more likely to have favored young college graduates, but their wages have not risen relative to older college graduates. The relative supply of young college graduates has fallen, which would have raised, not lowered, young college graduates' wages relative to older college graduates. These results suggest the possibility that the quality of entry level workers has been falling.

The decline in labor quality among young college graduate men, if any, appears to be concentrated among the lower end of skill distribution. Figure 7 compares the relative wages of young to old workers at various points of wage distribution. Wage distributions are identified separately for young (25–29 years old) and old (30–64 years old) workers, and wages at the 10th, 50th and 90th percentiles in each distribution are drawn to construct the

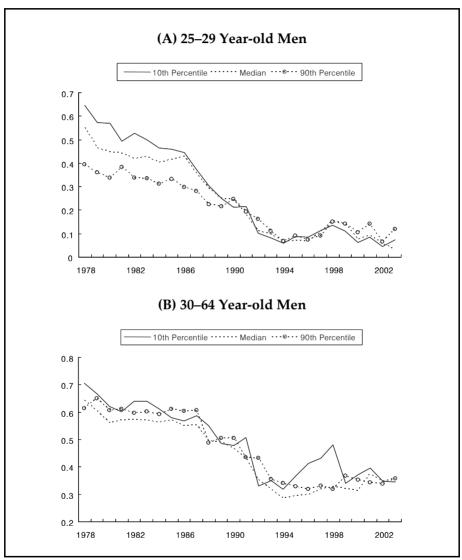
¹⁴⁾ For example, see Kim (2005) and Choi and Jung (2002) for the discussion on demand shift toward skilled workers.

Figure 7. Age Premium at the 10th, 50th, and 90th Percentiles within Education Group



Source: The Ministry of Labor, various years, Wage Structure Survey.

Figure 8. College Premium by Age Groups at the 10th, 50th, and 90th Percentiles



Source: The Ministry of Labor, various years, Wage Structure Survey.

relative wages of young to old workers at respective percentile. The relative wages of young to old workers move similarly at all percentiles among high school graduates, but they do not among college graduates. In particular, the wages of young college graduates at a lower percentile have fallen more relative to old college graduates at the same percentile. At the 90th percentile, for example, the relative wages of young to old college graduates have been relatively stable until recently, but they fell somewhat in the late 1990s and the early 2000s.

College premiums show different time-series patterns at the top and the bottom of the wage distributions. In particular, the premiums have fallen faster at the bottom of the wage distribution relative to the top among young workers, but no such pattern is found in the changes of college premiums among older workers. Figure 8 compares college premiums at various points of wage distribution, where the percentiles are defined separately from high school and college graduate men's wage distributions. Among young (25–29 year-old) workers, college premiums at lower percentiles fell faster and did not rise much after 1994. In contrast, college premiums at various percentiles moved quite closely among old (30–64 year-old) workers, and they fell much less than among young workers.

3.3. Estimation of Cohort Labor Quality

The results shown in the previous section indicate that young college graduates have been losing ground relative to older college graduates and also to high school graduates despite a demand shift toward skilled workers. In particular, such loss appears to be concentrated among the young college graduates at the lower end of wage distribution. These findings are suggestive for the hypothesis that college graduate men's quality has been deteriorating among the recent cohorts. In this section, an estimate for labor quality of college graduates among birth-year cohorts is offered to evaluate the hypothesis.

Labor quality of college graduates is estimated from wages in the following model. College graduates are grouped based on their birth year and each birth-year cohort's mean wages are modeled.

(3)
$$W_{ct} = \pi_{xt} \Gamma(x) \mu_c$$

 W_{ct} is the mean wage of male college graduates at time t who were

born in c. π_{xt} is the market price for a unit of human capital service at time t that is supplied by a college graduate with x years of market experience. Marker experience is defined as age minus years of education minus six. For example, a male college graduate born in c has market experience at time t equaling t-c-16-6 because his age then is t-c. $\Gamma(x)\mu_c$ is the human capital service supplied by a college graduate who was born in c and has x years of experience, and it is assumed that the service is a product of worker quality, μ_c , at the time of market entry, and time-invariant experience profile $\Gamma(x)$, which represents on-the-job accumulation of human capital.

Taking natural logarithm on equation (3) yields the following equation that can be estimated from data separately for each education level.

(4)
$$\log (W_{ct}) = \log \pi_{xt} + \log \Gamma(x) + \log \mu_c$$

The market price for human capital service, π_{xt} , is allowed to vary among experience groups because differently experienced workers may not be perfect substitutes for each other within education groups. Kim (2005) reports that young and old college graduates are not perfect substitutes for each other in Korea's labor market. Given imperfect substitution, the market price is affected by relative supply within education groups, and the substitution effect is modeled as in equation (5).

(5)
$$\log \pi_{xt} = \omega_t + \theta_{xt} = \omega_t + \rho \log(s_{xt})$$
 where $s_{xt} = N_{xt} / N_t$

In the above, ω_t is the "common" price for college graduates with various experience levels at time t, which is determined by demand and supply of workers with various education levels. That is, any changes in the price for the skills possessed by college graduates induced from a change in labor supply of high school graduates, for example, will be picked up in a change in ω_t . θ_{xt} represents the substitution effect across experience groups within college graduates, which is primarily determined by each experience group's relative supply to others. For simplicity, it is assumed that the substitution effect is determined solely by each experience group's own relative supply, and thus, $\theta_{xt} = \rho \log(s_{xt})$. s_{xt} is the share of college graduates with x years of experience at time t (N_{xt}) in total employment of college graduates (N_t).

The cohort quality at entry level, $\log \mu_c$, is the key variable to estimate, and the final equation for estimation can be written as in (6). In the equation, the "common" component in the market price (ω_t) is estimated as year effects through year dummy variables. The experience profile, $\Gamma(x)$, is estimated as a quadratic function of market experience, and the cohort quality, $\log \mu_c$, is estimated as cohort effects through birth-year cohort dummy variables.

(6)
$$\log(W_{ct}) = \omega_t + \rho \log(s_{xt}) + \lambda_1 x_{ct} + \lambda_2 x_{ct}^2 + \log \mu_c + \varepsilon_{ct}$$

The first two terms in Equation (6) estimate skill prices, the next two terms estimate the experience profile, $\log \mu_c$ estimates the cohort effects, and the final term, ε_{ct} , is the error term. The equation is estimated separately for two-year and four-year college graduates, and the estimation results are provided in Table 1 and Figure 9. Table 1 also reports the estimation result for high school graduates as a benchmark estimate.

Table 1. Estimation of Cohort-level Wage Equations

	High School	2-Yr College	4-Yr College
	Graduates	Graduates	graduates
Own Employment Share	017	027	005
	(.006)	(.006)	(.003)
Experience	.089	.089	.074
Experience Squared	016	016	012
	(.000)	(.000)	(.000)
No. of Observations	1,144	1,092	1,040
Adjusted R ²	.985	.949	.989

Note: Standard errors are provided in parentheses.

Source: The Ministry of Labor, various years, Wage Structure Survey.

The coefficients reported in Table 1 are all significant at the 5% level. The own relative employment variable, $\log(s_{xt})$, is estimated to have a significantly negative coefficient among both two-year and four-year college

graduates, and also among high school graduates. The experience profile is estimated to be a concave function as expected. The estimated time effects, or the "common" components in market price, are plotted in Figure 9 for each education group. In the figure, the common prices are measured relative to the price for high school graduates by subtracting the common price estimate of high school graduates from those of college graduates. The figure indicates that relative to high school graduates' price, two-year and four-year college graduates' market prices fell until 1994, when they started to rise. These patterns are consistent with various educational wage differentials, and they mostly accounted for the changes in relative supplies and demands.

0.7 0.6 0.5 0.4 0.3 0.2 0.1 0 1978 1982 1986 1990 1994 1998 2002

Figure 9. Estimates of Time Effects (Relative to High School Graduates)

Source: The Ministry of Labor, various years, *Wage Structure Survey*.

The estimated cohort quality, $\log \mu_c$, is shown in Figure 10 for those born between 1926 and 1978. Estimated cohort quality declined among old college graduates, but it tended to be on a rising trend among those born after 1940. The rising trend reversed among both two-year and four-year college graduates around the cohorts born in the mid-1950s. The decline in cohort quality accelerated among those born in the 1970s. For example,

four-year college graduates born in 1978 are less productive than those in 1964 by .256 log points, or by 29.1%. This is quite a substantial drop in labor quality, and needs attention. Although less dramatic, the productivity of two-year college graduates has also declined recently. The two-year college graduates born in 1978 are less productive than those born in 1968 by .068 log points, or by 7.0%.

There could be many reasons for declining cohort quality among highly educated workers. Juhn, Kim and Vella (2005) suggest the possibility that an increase in college enrollment induces a lower cohort quality through the composition effect in the US, and such possibility is strong in Korea because college enrollment has been rising very fast, and

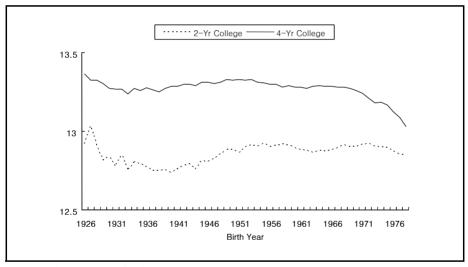


Figure 10 Estimated Cohort Effects by Education Level

Source: The Ministry of Labor, various years, *Wage Structure Survey*.

also because the improvement in the educational environment has been least pronounced in college education. In addition, it is possible that the MOE's various education policies in the 1980s and the 1990s have indeed deteriorated the efficacy of education, despite the increased expenditure in education.

One of the most frequently raised arguments about educational policies in Korea has been college entrance examinations. Two points can be made about the possible connection between the labor quality of college graduates and the entrance exams. First, given the high demand for college education, the college entrance exam defines what is being taught in lower-level schools.

The Ministry of Education has made the exam easier in an attempt to discourage private tutoring, but it has been argued that an easier test has distorted the type of learning in middle and high schools.¹⁵⁾ Second, a change in the college entrance exam can also induce a change in screening effectiveness. In particular, an easier test works against abler and more creative students, and to the extent that screening becomes less precise, the educational output of college decreases.

In the following, how these factors may have affected the labor quality of recent college graduates are investigated. The factors considered here are the share of college graduates in each birth cohort, school expenditure, student-teacher ratio, and college entrance exam-related variables. The share of college graduates is expected to reflect the potential decline in average innate ability among college graduates (Juhn, Kim and Vella, 2005), and school expenditure and student-teacher ratio are expected to capture any effect arising from an improved educational environment.

To empirically determine the effects of various factors on cohort quality, the cohort effect in Equation (6), $\log \mu_c$, is replaced with a series of education-related variables. Such variables include student-teacher ratio, expenditure per student, and educational policy variables.

(7)
$$\log(W_{ct}) = \omega_t + \rho \log(s_{xt}) + \lambda_1 x_{ct} + \lambda_2 x_{ct}^2 + \tau s_c + X_c \beta + Z_c \delta + \varepsilon_{ct}$$

 S_c in the above equation is the share of those who have completed the

¹⁵⁾ Kim and Rhee (2004) show that an easier test reduces the effectiveness of screening and induces a greater, not smaller, amount of private tutoring. A survey shows that more than 80% of middle school students in Korea received private tutoring, and more than 60% of high school students received it in the early 2000s (Chae *et al.* 2005). As private tutoring is quite expensive, parents' earnings determine how much tutoring a student receives. An estimate indicates that private tutoring expense per student is 24 times higher in households with the top 10% earnings compared to those with the bottom 10% earnings (Kim 2007).

e level of schooling among the cohort c. X_c represents the school quality variables such as educational expenditure per student and student-teacher ratio, and Z_c is the vector of variables representing the educational policy variables affecting cohorts c. In particular, Z_c consists of a set of dummy variables indicating which type of entrance exam each cohort faced when they were at schools. The estimation results are provided for four-year college graduates in Table 2.16)

The first column shows the relationship between college share, educational policies and cohort quality. The share of college graduates in their cohorts has a significantly negative coefficient implying a composition effect in the column. Also how they entered college seems to matter. In particular, the college-level entrance exam is positively associated with cohort quality, and the first stage national test (National Test I) is also positively associated with cohort quality. In contrast, however, National Test II is negatively associated with cohort quality. This is the test with easier questions on a reduced number of subjects.

One important drawback when school quality variables, educational expenditure per student, and student/teacher ratio are considered in columns (2) and (3) is that the number of observation significantly decreases. The reason is that the expenditure variable is available only for the period after 1970. This means that only those born in 1963 or later can be used in the regression because these variables are constructed to cover the entire schooling period for each cohort. The immediate problem from this is that a few educational policy variables have to be dropped from the regression because they are commonly applicable to all the cohorts in the regression.

When school quality variables, expenditure per student, and student/ teacher ratio are considered instead of the educational policy variables, the composition effect measured by the coefficient on the share of college graduates in cohorts loses statistical significance, although it is greater and negative. Expenditure per student has a negative coefficient, which is contrary to expectation. It is possible that the expenditure has not really

¹⁶⁾ Because cohorts are grouped based on the "completed" education, it is difficult to define composition effects and cohort quality for those who did not advance to tertiary education. For this reason, only the four-year college graduates are considered. Juhn, Kim and Vella (2005) did the same.

 $(1)^{3}$ (2) $(3)^{3}$ % with the diploma $-.684^{+}(.196)$ -2.116 (1.333) -.595 (1.709) Log expenditure/student -1.023+ (.266) -.217 (.395) Log student/teacher -2.456+ (.620) -.470 (1.000) College-level exam .182+ (.031) .134* (.078) National college test I1) .177+ (.039) National college test II1) -.094+ (.028) -.190** (.076) High School GPA2) .037** (.019) 302 No. of Observations 302 1.176 Adjusted R² .972 .986 .986

Table 2. Determinants of the Cohort Effects

Note: Standard errors are in parentheses. The estimates significant at 1%, 5% and 10% levels are denoted with *, ** & $^+$.

- 1) The national college admission test that replaced college-level entrance exam underwent a structural change in 1994 in which the number of subjects was reduced and the exam questions were made easier.
- 2) The Ministry of Education has since 1981 forced colleges to use each student's high school GPA in screening in addition to the score on the national tests and to ignore any potential differences in students' ability across high schools.
- 3) Colleges' efforts to supplement the national tests in screening, writing test and interviews, are also included in the regressions.

helped improve school quality, but it is also possible that the variable does not have sufficient variations to yield a reliable estimate. Student/teacher ratio has a strongly negative coefficient, which is consistent with the usual expectation.

When both school quality and educational policy variables are put together in the regression (column (2), coefficients on many variables lose statistical significance. However, the college-level entrance exam variable maintains a statistically significant and positive coefficient, and the second stage national test (National Test II) maintains a significantly negative coefficient. These results strongly suggest the possibility that the MOE's

regulation on college entrance exams has affected schooling outcome negatively.

Based on the estimates in column (3), the changes in cohort quality can be decomposed into the effects arising from a change in school quality variables and those from a change in educational policy (college entrance exam types). Between the cohorts born in 1963 and 1978, the quality of college graduates fell by .254 log points. The estimates suggest that .201 log points, or 79% of the total decline, can be attributed to the changes in college entrance exams. School quality variables account for 13% of the decline, but one should not place too much emphasis on the effects of school quality because their estimates are insignificant. Although similarly insignificant in the statistical sense, the composition effect arising from the increase in enrollment accounts for 11% of the decline.

4. CONCLUDING REMARKS

The empirical results documented in this paper indicate that the quality of recent college graduates has significantly declined in Korea, and that most of the decline can be empirically linked to Korea's educational policy, or in particular, the recent change in college entrance exams. As the labor quality of recent cohorts is measured based on wages, this result implies that Korea's education has been increasingly less effective in supplying quality labor to the market.

Given that more than 80% of the young cohorts advance to college, the decline in labor quality among college graduates implies a decline in labor productivity. Korea's education system has produced many "college" graduates, but their lower quality in fact indicates that skilled labor has not sufficiently been supplied in the market. As the Korean economy is shifting toward a more skill-intensive industrial structure, falling labor quality of the young generation means only higher inequality and slower economic growth. At the same time, falling labor productivity also poses a serious problem in the rapidly aging society because the share of prime-age workers in the population will decline.

This paper does not offer strong evidence to be used to induce the implication on what needs to be done to improve the effectiveness of Korea's education in supplying quality labor to the market. The strongly negative effect on college graduates' labor quality by the National Test II, however,

suggests that an easier test on a reduced number of subjects is unlikely to help. Further, the positive effect of labor quality of college-level entrance exams suggests that choice by both students and schools and their autonomy in the recruiting process must not be ignored.

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Comments on "Changes in Labor Quality among New College Graduates in Korea"

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Human capital has been the key in the economic development of Korea. Fifty years ago, Korea was the one of the poorest countries in the world. The Korean peninsula was devastated by the Korean War, and South Korea, especially, has almost no natural resources. Now Korea has become the 13th largest country in the world in terms of GDP. And nobody can deny that it is human capital that has built South Korea so far. So the education system of Korea has trumped its own success.

Education system in Korea is in deep trouble now. Certainly, every Korean person here agrees that Korea's education system is in deep trouble. But we have to acknowledge that it is never easy to prove common knowledge. Professor Kim tried to show in this paper that it is true that the education system in Korea are indeed in deep trouble by showing that the quality of male college graduates has fallen in Korea both absolutely and relatively. His findings are quite suggestive. But there is one caveat here.

Comments on Professor Kim's paper. The paper used real wages of male college graduates as proxies of the quality of male college graduates. So what was actually found was that real wages of male college graduates has fallen in Korea both absolutely and relatively. The author basically assumed that there is one-to-one matching or at least there is a positive correlation between real wages and the quality of workers. But the problem we face is that the quality of workers is not affected by the demand side of labor, while the level of real wages is influenced by the demand side as well as the supply side. So it might be the case that even though the average level of the quality of college graduates actually increases, the level of their real wages decreases because the force of demand is dominated by the force of supply.

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At present, there is no data such as the labor productivity of male college graduates in Korea that can be used as a proxy for the quality of male college graduates. In that sense, Professor Kim's paper is appreciated. Also certainly that everybody present agrees with the conclusion of the paper, which is that it is urgent to improve the efficiency of Korean education in supplying quality labor to the market. Trade Structure, FTAs, and Economic Growth.

Trade Structure, FTAs, and Economic Growth: Implications for East Asia

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I. INTRODUCTION

What is the relationship between trade and economic growth? Does trade positively affect economic growth? Is that growth import-led or export-led? The conventional wisdom for these questions is that growth is export-led and has a positive impact on trade.

Despite of a number of multi-country empirical studies, however, the relationship remains ambiguous. Recently, Baldwin (2003) and Rodriguez and Rodrik (2001) showed that they could not identify any robust positive relationship between trade and growth based on previous studies. Rodriguez and Rodrik borrowed data from the authors of the most significant of recent researches, including Dollar (1992), Ben-David (1993), Sachs and Warner (1995), and Edwards (1998), and repeated the same empirical tests. They only identified methodological problems with the papers and found little evidence that trade is significantly associated with economic growth. Lawrence and Weinstein (1999) also showed import-led growth rather than export-led growth.

The ambiguous result of the relationship between trade and growth is due to two main aspects. One is that most previous research uses a different definition of *trade*: it sometimes refers to *trade openness* but at other times to the *trade volume*. Rodriguez and Rodrik showed that confusion with the concept of trade generates many methodological problems. The other is that the empirical estimation attempts all fail to isolate the *pure* impact of trade

on economic growth. In most research, the measures of trade, either in trade openness or trade volume, are heavily contaminated with other influences arising from exchange rate systems, monetary and fiscal policies, and other non-trade factors. Although some research does show a positive relationship between trade (trade volume in particular) and growth as in Frankel and Romer (1999), the general consensus is that *trade* in openness or volume seems to be no guarantee of faster economic growth.

As such, Rodriguez and Rodrik (2001) and Baldwin (2003) concluded, "the challenge of identifying the connections between trade and economic growth is one that still remains before us" and "because of the ambiguity of the relationship between trade and growth, the empirical relationship remains an open one." A recent study by Lederman and Maloney (2003) searches for an empirical relationship between trade and growth, responding to Rodriguez and Rodrik, and Baldwin.

This paper attempts to take a new look at the relationship between trade and growth. It introduces *trade structure* variables, borrowed from the spirit of Lederman and Maloney, instead of *trade*. A dynamic panel estimation for the data of 66 countries during 1991–2004 is used to verify the validity and robustness of the relationship. Particular attention is given to the role of an institutional trade structure variable, namely a free trade agreement or area (FTA), in a trade-growth relationship. Then the same estimations are attempted for East Asia.

The paper is organized as follows: In the next section, we review three trade models that link trade to the economic growth of an economy. Six trade structure variables that represent each of the different trade models are introduced. In Section III, we conduct an empirical analysis. The model, data and empirical results are discussed in this section. Section IV concludes the paper.

2. TRADE STRUCTURE AND GROWTH

2.1. Use of Trade Structure

We introduce *trade structure* to investigate the relationship.¹⁾ Use of trade

¹⁾ Following Lederman and Maloney (2003), this paper investigates the impact of trade structure on economic growth.

structure can eliminate any confusion arising from the definition of trade. The notion of trade can be identified as a structure, conduct, or performance variable. Trade openness deals more or less with trade policies; thus it will be a conduct variable. Trade volume is an outcome of trading behavior; it will be a performance variable. The capital-labor ratio of a country, for example, will be a trade structure variable, as it characterizes the trade pattern of the country.

Borrowing the "SCP (structure-conduct-performance) paradigm" framework of Industrial Organization literature, we can eliminate two aforementioned problems: The application eliminates any confusion about the definition of trade; it also precludes contamination through other influences, as trade structure can be more easily isolated from other economic variables. In particular, if we use the SCP paradigm and assume that the trade liberalization policy or trade openness (that is, the trade conduct variable) and trade volume (that is, the trade performance variable) are embedded in the trade structure, we may be able to isolate the impact of trade on growth from other non-trade structure variables arising from exchange rate, monetary and fiscal policies, and other macroeconomic policies.

As such, all the conduct variables such as export-oriented vs. import-substituting trade policies or liberalization vs. protection measures and performance variables such as export vs. import volumes are nested in the trade structure variable. The introduction of trade structure is a parallel effort to the recent boom in research that looks at the impact of financial structure on growth.

2.2. Three Models Linking Trade to Growth

There are three theories that relate trade structure to economic growth. Each of the theories represents a different channel that explains how trade structure affects productivity or the growth of an economy.

The first channel is found in a dynamic Rybczynski theorem. In a Ricardian or Heckscher-Ohlin model, an increase in the endowment of one factor causes a more than proportionate increase in the output of the commodity using that factor relatively intensively and an absolute decline in the output of the other commodity. When we assume the abundant factor to be capital, the Rybczynski theorem suggests so-called ultra-biased growth along the capital expansion path. At the same time, the capital-intensive sector has higher productivity, as the economy has a comparative advantage

in capital-intensive products (the Heckscher-Ohlin theorem), which it exports (Ricardian theory). That shows a dynamic efficiency coming from continuous resource reallocations of capital into the production and export of capital-intensive commodities.

The second channel can be found in the Product Differentiation Model. This Krugman and Helpman model explains the trade pattern under increasing returns. The model with product differentiation provides a rationale of how intra-industry trade occurs. Product differentiation assumes that trade is undertaken in imperfect competition and under the presence of economics of scale. As such, the model relates trade (here, intra-industry trade) to the economies of scale: The more they trade, the bigger the economies of scale effects are. The increase of the scale effect engenders productivity increases and thereby the economic growth of the country.

The third channel is located in the Endogenous Growth Model. According to this model, the relationship between trade and growth is straightforward. Trade and foreign direct investment increases knowledge spillovers across countries. The spillovers increase the productivity of physical capital as well as human capital. The enhancement of the productivity of endogenous growth factors can be further expanded with additional R&D, or with the learning-by-doing effect. In the model, trade or investment first affects the productivity of those endogenous growth factors, and then the growth of the economy.

2.3. Trade Structure Variables

This paper incorporates the following six *trade structure* variables. Each of them corresponds to one of the above three channels.

The first trade structure variable reflects the Ricardian or Heckscher-Ohlin type of trade-growth relationship. A new trade structure variable, called the Heckscher-Ohlin variable, is defined by the ratio of exports of capital-intensive goods to exports of labor-intensive goods divided by the capital-labor ratio, that is, $(X_K/X_L)/(K/L)$. This measure reflects an H-O type of economic growth by looking at export and import performance with respect to factor endowment structure. We anticipate a positive sign for growth if there is an H-O type of growth engendered through resource reallocation efficiency along the dynamic Rybczynski expansion path.

The second variable related to the H-O type of growth is the ratio of exports of primary goods to GDP. This measure tests the so-called

"Sachs-Warner (1995) assertion" or "Dutch Disease" that explains the detrimental effect of resource abundance on growth.

A trade structure variable that reflects the Krugman-Helpman type of trade-growth relationship is the third variable. We introduce the intraindustry trade variable to identify the relationship. The Grubel- Lloyd IIT measure reflects the K-H type of economic growth that comes from the effects of economies of scale. That is, the intra-industry trade of differentiated products enhances scale effects, thereby engendering growth.

The fourth trade structure variable reflects the growth effect in the endogenous growth model. We use the ratio of foreign direct investment (FDI) to trade to reflect the relative composition of investment to trade. This measure is to identify the knowledge spillover effects of investment (FDI). FDI becomes particularly relevant for technology diffusion as global protections of intellectual property are strengthened.

In addition, following the results of Lederman and Maloney, we use an export concentration measure, the export Herfindahl index, to identify the competitive structure of trade and the degree of inter-industry specialization of the country. This measure is a mirror image of the industrial structure of the country, and captures whether a concentrated export structure retards economic growth or not. The measure can also encompass the type of competition arising from trade expansion, thereby relating *trade competition* to economic growth: a Darwinian versus a Schumpeterian growth path.

Finally, in addition to the five variables above, we introduce a new trade structure variable, namely a free trade agreement/area (FTA) variable. This variable reflects the institutional trade structure of countries.

In sum, we use six trade structure variables: an H-O variable; a Natural resource abundance variable; a K-H variable (IIT); an FDI-Trade variable; an Export concentration variable; and an FTA variable.

3. EMPIRICAL ANALYSIS

3.1. Estimation method

In this section, we present a formal model to estimate the effect of trade structure on economic growth. Most empirical work on economic growth focuses on the relationship between trade flows and the rate of economic growth, based on estimations using cross sectional regressions. In the presence of country specific effects, however, this specification may induce substantial bias by the correlation of unobserved country- specific factors and the variables of interest.

In the following analysis of the trade structure on economic growth, we use a dynamic panel data model. The dynamic model has been used in the existing empirical studies including Lederman and Maloney (2003). Heckman (1981) provides a detailed discussion of the estimation of dynamic models. To control for unobserved heterogeneity, we use a dynamic model with fixed effects. The lagged endogeneity can be corrected by first differencing and using second and third lags as instruments, as suggested by Arellano and Bond (1991). Given the large number of observations in the sample and the large variation in unobserved country specific effects, the widely used linear generalized method of moments (GMM) estimator provides substantial computation advantages.

Following the spirit of existing work on the empirics of economic growth, we begin with a basic specification:

$$y_{it} = \alpha + \beta Z_{it} + \gamma X_{it} + F y_{it-1} + \varepsilon_{it}, \qquad (1)$$

where y_{it} is the log difference of the per capita GDP of country i in period t, X_{it} is the vector for conditioning variables for initial income, terms of trade, and real exchange rate, among others. Z_{it} is the particular trade variable of interest. The β coefficient shows the effects of the trade variable on economic growth.

The basic problem faced in the estimation of this model is that this specification cannot control for unobserved heterogeneity. Unobserved effects tend to persist over time, and so ignoring these effects of unobserved individual effects (heterogeneity) creates serial correlations with the error term, ε_{it} . If these are not properly controlled, the estimates become clearly inconsistent. Heckman (1981) indicates that this is a problem of spurious state dependence in the empirical literature on labor market participation. A proper test for dependence should control for unobserved individual specific effects.

To control for this unobserved heterogeneity, we consider a simple

linear regression model with fixed effects:2)

$$y_{it} = \alpha + \beta Z_{it-1} + F y_{it-1} + u_{it}$$

 $u_{it} = \eta_i + \varepsilon_{it}$ is the usual 'fixed effects' decomposition of the error term.

Due to its computational ease, this model is useful in avoiding the problem of unobserved heterogeneity. A problem arises, however, with the fixed effects treatment. The within estimator (least squares after transforming the variables to deviations from means) is inconsistent because the within transformation induces a correlation of order 1/T between the lagged dependent variable and the error term. To address this problem, we first difference the equation to remove the fixed effects, and then estimate with instrumental variables, using the values of the dependent variable lagged two or more periods. This treatment leads to consistent estimates. Thus, we estimate the linear dynamic models in first differences, using Z_{it-2} , Z_{it-3} , y_{it-2} and y_{it-3} as instruments, as:

$$\Delta y_{it} = \beta \Delta Z_{it-1} + F \Delta y_{it-1} + \Delta \varepsilon_{it}$$
 (2)

To allow the use of lagged differences of y_{it} as instruments in the equation (2), the condition of $E(u_{it}\Delta u_{i,t-1})=0$ for t=4,5,...,T is satisfied. This condition relates directly to the absence of serial correlation in ε_{it} , therefore under this condition the efficiency could be improved. In contrast to non-linear restrictions, we allow this model to satisfy a linear condition, $E(u_{it}\Delta y_{i,t-1})=0$ for t=4,5,...,T. This provides a consistent estimator under heterogeneity.

²⁾ There is still debate about whether the random or fixed effects approach is the more accurate in the dynamic framework. One of our criteria is based on the nature of the sample. If the whole population is represented in the sample, fixed effects is the more appreciate choice.

³⁾ See Wooldridge (2001) for more details.

⁴⁾ See Hsiao (1986) and Arellano and Bond (1991) for more detail.

3.2. Data

Factor Abundance: The trade structure regression uses the Human-Capital-to-Labor ratio and Capital-to-Labor ratios from Hall and Jones (1999). This data is available for 123 countries. To construct human capital, we rely on the Barro and Lee data set for the ratio of the population with at least a secondary education over a population with at most a primary education. The data on international testing of students in mathematics and science are from the Barro and Lee data set. We sum the two scores and divide the sum by its mean of 1,000. Changes in capital to labor ratios are calculated using Penn World Tables 6.1 and a World Bank data set for the sum of durable goods capital and non-residential construction capital.

Factor Intensive Exports: Trade data for each country comes from the UN COMTRADE database. This database is mapped into SITC classifications. To construct a ratio of a country's capital-intensive goods to labor-intensive goods exports, we use Romalis's (2002) factor intensity for each industry. However, his database uses four-digit US SIC classifications. For this, our data is mapped from SITC into SIC classifications using a concordance maintained by Jon Haveman.

Terms of Trade: We directly take the ratio of the overall import and export price from the World Tables. The disadvantage of this measure is that it also reflects changing trade prices with third countries—countries that are not part of the 66 countries for which we also have output and endowment data (Appendix Table 3 provides a complete list of countries). To address this disadvantage, we construct another term of the trade index that is consistent with the set of countries that we use in our dataset. As in Baxter and Kouparitsas (2000), we construct for each country an aggregate import price P_{it}^{M} with countries' export prices. We combine the export prices of the other 66 countries from which a country imports with the shares of these countries in total imports to construct a fixed-base geometric-means price index.

GDP Per Capita at PPP: World Bank World Development Indicators CD-ROM for 2006. Penn World Tables 6.1 for earlier years.

Natural Resource Exports: Primary exports comprise the commodities in SITC sections 0, 1, 2 (excluding 22), 3, 4, and 68.

Intra-Industry Trade: We construct a Grubel-Lloyd index of IIT. Krugman (1979) argues that scale economics arising from intra-industry trade are thought to lead to more rapid productivity gains and hence faster growth. The IIT is constructed trade data disaggregated at four-digit SITC from a UN COMTRADE dataset. The index is defined as:

$$HT = 1 - \frac{\sum_{i}^{n} |X_{i} - M_{i}|}{\sum_{i}^{n} (X_{i} + M_{i})}$$

Export Concentration: We construct an Export Herfindahl index using export data disaggregated at four-digit SITC. The index ranges from zero to one and increases with concentration. The index is defined as:

$$H = \sum_{i}^{n} \left[\frac{x_{i}}{\sum_{i}^{n} x_{i}} \right]^{2}$$

where i is a particular product and n is the total number of products.

FTA: We construct an FTA index. The FTA index of a country is measured from the ratio of the sum of FTA partner countries' GDP to the GDP of the country. For example, if country A has FTAs with country B and C, the FTA index of country A is the ratio of the sum of the GDPs of A, B, and C divided by its own GDP, that is, the GDP of A. When a country has no FTA, the FTA index remains at one.

3.3. Results

3.3.A. The World

Our empirical strategy is to introduce the trade variable of interest first to a set of controlling variables and then to progressively add new variables. The basic controlling set includes the log of initial GDP of the period and the degree of openness. The second conditioning set is a capital accumulation that includes the share of investment in GDP and a log of years of schooling, which is the preferred measure of the stock of human capital. Next, we add

growth in terms of trade as a possible channel to growth. Finally, we include the stability of the real exchange rate over the period as a measure of the macro stability of particular importance to the trade sector.

Table 1 shows the dynamic panel estimation results, and Table 2 reports the estimation results after being combined with our trade variables. The tables report the coefficient and significance level of the particular trade variable in regression containing the control variables.

In Table 1, a natural resource abundance variable is negatively correlated with growth, but the coefficients are insignificant. This variable, however, shows a significant and negative relationship to economic growth once combined with the other H-O variable. We confirm Sachs-Warner's significant negative impact of resources on growth. In all regressions, the H-O variable, $(X_K/X_L)/(K/L)$, is positive and significantly correlated with growth. This result confirms that there are substantial growth effects from resource reallocation efficiency.

Table 1. Estimates of Trade Structure Regression for the World:

Dynamic Panel Estimator

	(1)	(2)	(3)	(4)	(5)	(6)
	NRX/	(Xk/Xl)	FDI /	Exp.	IIT	FTA
	GDP	/(K/L)	Trade	Herfin.	Index	
Basic	-1.44	1.61	1.04	-2.33	2.93	0.08
Controlling						
+	(-0.98)	(1.90)*	(1.91)**	(-2.69)***	(2.66)***	(1.86)*
Capital Accum.	-1.08	0.89	1.07	-3.13	5.59	0.07
+	(-0.76)	(1.13)**	(2.04)***	(-2.90)***	(2.16)***	(1.67)*
Growth in TOT	-1.38	1.01	1.16	-3.37	2.73	0.21
+	(-0.97)	(1.17)*	(2.21)***	(-2.12)***	(1.93)**	(2.85)***
Macro Stability	-1.25	0.64	0.8	-2.27	2.55	0.23
	(-0.89)	(1.73)**	(1.51)**	(-1.89)**	(2.12)***	(3.09)***

Notes: 1) The dependent variable is the per capita GDP growth rate.

²⁾ Basic controlling includes the log of initial GDP of the period and degree of openness. Capital Accumulation includes the share of investment in GDP and log of years of schooling. Macro Stability is the deviation of the real exchange rate over the period.

³⁾ t-statistics in parentheses.

^{4) ***, **,} and * denote significance at the 1%, 5%, and 10% levels, respectively.

On the other hand, export concentration has significantly negative effects on growth. This result is broadly consistent with the findings of recent empirical literature. In particular, intra-industry trade shows positive impacts on growth, as predicted by theory. This result suggests that countries with more IIT also tend to have more product differentiation. This induces higher productivity growth. FDI/Trade has a positive impact on growth, but when taken together with other structural variables, its impacts are dispensed into other variables. This result implies that FDI/Trade is a relevant trade structure variable that has an effective impact on growth, but its impact cannot be correctly assessed. The FTA index shows significant positive effects on growth in all estimations. The variable remains very robust to the addition of conditioning variables.

Table 2. Estimated Effects of Trade Structure on Growth: 1991–2004 The World

Dependent variable: GDP per capita growth rate					
	(1)	(2)	(3)	(4)	(5)
Constant	3.91	3.92	5.15	6.01	6.82
	(2.43)***	(2.01)**	(2.28)**	(1.22)*	(2.12)**
NRX/GDP	-0.31	-0.3	-0.31	-0.32	-0.33
	(-3.46)***	(-2.97)***	(-3.65)***	(-3.29)***	(-3.23)***
(Xk/Xl)/(K/L)	0.11	0.12	0.11	0.15	0.11
	(1.89)**	(2.04)**	(2.29)***	(2.92)***	(2.38)***
Herfindahl	-3.63	-3.75	-3.32	-3.01	-2.19
	(-2.95)***	(-2.81)***	(-2.57)***	(-2.63)***	(-3.19)***
IIT index	1.21	1.24	1.29	1.41	1.12
	(2.84)***	(2.38)**	(2.71)***	(2.92)***	(1.97)**
FTA	0.17	0.14	0.14	0.18	0.12
	(1.99)**	(2.00)**	(2.01)**	(2.99)***	(2.11)**
Basic controlling					
Initial GDP	0.01	0.01	0.01	0.01	0.01
	(0.33)	(0.34)	(0.34)	(0.13)	(0.18)
Openness	0.21	0.26	0.28	0.29	0.2
	(1.89)**	(1.83)**	(1.95)**	(2.37)***	(1.92)**
Capital Accum.					
Inv / GDP		0.98	0.29	0.23	0.32
		(1.95)**	(2.11)***	(0.48)	(0.2)
Schooling		0.22	0.29	0.37	0.41
		(2.98)***	(1.94)**	(1.72)**	(2.39)***
Terms of trade			-0.93	-0.91	-0.92
			(-0.75)	(-0.62)	(-1.18)
Macro Stability				0.06	0.06
				(2.20)***	(1.23)*
R-square	0.35	0.39	0.39	0.43	0.44

Notes: 1) Macro Stability is the deviation of the real exchange over the period.

²⁾ t-statistics in parentheses.

^{3) ***, **,} and * denote significance at the 1%, 5% and 10%, respectively.

3.3.B. East Asia

Now we apply the same estimation for the data of nine East Asian countries: China, Japan, Korea, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, and Thailand.

Table 3. Estimates of Trade Structure Regression for East Asian Countries: Dynamic Panel Estimator

Table	(1)	(2)	(3)	(4)	(5)	(6)
	NRX /	(Xk/Xl) /	FDI /	Exp. Herfin.	IIT Indov	FTA
	GDP	(K/L)	Trade	Exp. Herrin.	III IIIdex	TIA
Basic Controlling	-0.55	0.94	0.09	-0.30	0.37	0.05
+	(-0.99)	(1.60)	(1.69)*	(1.98)**	(1.85)**	(1.04)
Capital Accum.	-0.38	0.11	0.04	-0.32	0.34	0.03
+	(-0.66)	(1.85)**	(1.74)**	(1.99)**	(2.62)***	(1.80)*
Growth in TOT	-0.28	0.10	0.03	-0.27	0.39	0.08
+	(-0.57)	(1.47)	(0.51)	(-1.48)	(1.62)	(1.69)*
Macro Stability	-0.32	0.13	0.02	-0.31	0.42	0.09
	(-0.63)	(1.80)*	(0.21)	(-1.67)*	(1.74)*	(1.16)

Notes: 1) The dependent variable is the per capita GDP growth rate.

- 2) Basic controlling includes the log of initial GDP of the period and degree of openness. Capital Accumulation includes the share of investment in GDP and log of years of schooling. Macro Stability is the deviation of the real exchange rate over the period.
- 3) t-statistics in parentheses.
- 4) ***, **, and * denote significance at the 1%, 5%, and 10%, respectively.

Table 4. Estimated Effects of Trade Structure on Growth: 1991–2004 East Asian Countries

D	1	:. 0	'DD 41		
Depe	ndent variable				
	(1)	(2)	(3)	(4)	(5)
Constant	1.49	1.86	1.92	1.86	1.82
	(3.38)**	(2.91)***	(2.69)***	(2.57)***	(2.87)***
NRX/GDP	-0.13	-0.14	-0.13	-0.11	-0.16
	(-3.93)***	(-3.47)***	(-3.11)***	(-2.39)***	(-3.58)***
(Xk/Xl)/(K/L)	0.02	0.02	0.02	0.02	0.05
	(0.59)	(0.84)	(0.85)	(1.11)*	(0.93)
Herfindahl	-0.11	-0.17	-0.12	-0.13	-0.17
	(-2.31)***	(-0.96)	(2.11)***	(-1.19)	(-2.22)***
IIT index	0.19	0.19	0.17	0.16	0.16
	(2.01)**	(2.24)**	(1.99)**	(2.23)***	(1.95)**
FTA	0.04	0.05	0.05	0.05	0.06
	(0.99)	(1.26)*	(1.00)	(0.98)	(0.83)
Basic controlling					
Initial GDP	1.47	0.89	0.86	0.95	0.94
	(0.91)	(0.36)	(0.79)	(0.66)	(0.92)
Openness	0.16	0.18	0.16	0.17	0.18
	(2.96)***	(2.79)***	(1.59)*	(1.96)**	(2.12)***
Capital Accumulation					
Inv / GDP		0.11	0.12	0.11	0.09
		(2.38)***	(2.32)***	(1.98)**	(2.33)***
Schooling		2.72	2.53	2.06	2.00
		(4.91)***	(3.96)***	(3.56)***	(2.38)**
Terms of trade			-0.01	-0.01	-0.03
			(-0.08)	(-0.03)	(-0.08)
Macro Stability				0.02	0.04
-				(1.12)	(0.99)
R-square	0.28	0.34	0.38	0.36	0.37

Notes: (1) Macro Stability is the deviation of the real exchange over the period.

⁽²⁾ t-statistics in parentheses.

^{(3)***, **,} and * denote significance at the 1%, 5%, and 10% levels, respectively.

Tables 3 and 4 show the estimation results of the East Asian case that correspond to Tables 1 and 2, respectively.

In Table 3, all coefficients are significantly smaller than those in the case of the world. With the smaller coefficients, all the regressions show weaker t-values as well. This result suggests that the relationship between the trade structure and growth in East Asia is not as strong as in the world. Most variables are unable to explain the relationship. Only the capital accumulation variable turns out to be significant for economic growth.

The full regression results shown in Table 4 are also rather weak. The H-O variable is surprisingly insignificant in explaining the growth of East Asian countries. This means that the growth of East Asian countries did not follow the Heckscher-Ohlin type or the dynamic Rybczynski type of growth. An interesting phenomenon is shown from the significant IIT variable that is different from our conjecture. The IIT is supposed to be significant for trade between developed countries. In fact, the product differentiation type of trade structure was an important factor in explaining East Asian economic growth. The impact of FTAs also remains very weak in East Asia: this may perhaps reflect the loose trade integration of the ASEAN free trade area.

Factor input variables turn out to be important in the case of East Asia. Natural resources, capital accumulation, and years of schooling are all very significant in explaining growth. Table 4 shows high t-values for the variables. The result shows us that East Asia's economic growth is a fundamentally factor-input driven one. It may remind us of the famous debate between Young-Amsted versus Krugman on where the growth in the East Asian economies comes from: factor-inputs or productivity growth. While our results do not identify whether the input increases engender an endogenous type of growth or a simple one-time quantity increase, our results could have important implications for the debate.

4. CONCLUSION

The conclusion drawn from our empirical analysis is that economic growth can be well explained by *trade structure* variables that are free from definition and separation problems. In the empirics, the estimating equations have the goodness of fit of about 0.4, showing a relatively significant relationship between trade structure and growth. In addition, the dynamic panel estimation for the data of 66 countries during 1991–2004 verified the

strong validity and robustness of the relationship.

While a natural resource abundance variable is not significant enough to induce growth by itself, once combined with the other H-O variable, it shows a significantly negative impact on economic growth. Our empirical results confirm the so-called Dutch Disease hypothesis.

In particular, the H-O variable, $(X_K/X_L)/(K/L)$, explains economic growth well, showing that neoclassical resource reallocation efficiency enhances growth.

Export concentration has a negative effect on growth. This result reflects that focusing on a few exports retards growth. However, with a jump in logic, we can reinterpret the results to reflect a Darwinian path for the relation between trade competition and growth rather than a Schumpeterian one. In other words, monopolistic rents do not accelerate economic growth, whereas trade competition does.

Intra-industry trade shows positive impacts on growth as predicted by theory. This measure reflects the K-H type of economic growth that comes from economics of scale effects.

Trade structure variables that represent the Heckscher-Ohlin model and Product Differentiation model respectively show strong evidence of positive effects on growth.

Although the endogenous growth model variable, FDI/Trade has a positive impact on growth by itself, once combined with other structural variables its impacts are disperse into other variables. This result implies that FDI/Trade is a relevant trade structure variable that effectively affects growth. However, in order to assess its impact correctly, we need to introduce a new model, equation or theoretical rationale.

The impact of FTA in the relationship between trade structure and economic growth is that an FTA strongly enhances growth. While the results are relevant in the global economy, they do not apply to the East Asian region. In East Asia, the effect of FTAs seems very weak, although the estimated sign remains right. It perhaps reflects the loosest trade integration in AFTA.

Finally, this research is an attempt to open up a new look at the relationship between trade and growth. There are, however, many problems that remain before this study can be complete and consistent. In particular, a new model that incorporates the effects of FDI on growth is needed. Further robustness analysis for the stability of equation and the robustness of the relationship of trade structure to growth will also be needed.

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APPENDEX

Table A-1. Data Definitions and Sources

Variables	Definition	Sources
Real GDP	Real GDP (constant 1995 US\$)	Penn-World Tables 6.1 (PWT 6.1)
Growth Rates		PWT 6.1 and WDI 2006
NRX / Total Exports	Primary exports / total exports	UN COMTRADE
NRX / GDP	Primary exports / GDP Sum of (1) durable goods	WDI and UN COMTRADE
Capital	capital, and (2) non-residential construction capital	PWT 6.1
Labor	Total Population	PWT 6.1
Human Capital	Ratio of population with at least a secondary	Barro and Lee Data Set
	education over population with at most	
	a primary education.	
FDI / Export	Total foreign direct investment / export	WDI and World Investment Report 2005
K/L	Capital / Labor	PWT 6.1 and Hall and Jones (1999)
H/L	Human Capital / Labor	PWT 6.1 and Hall and Jones (1999)
Openness		The Global Competitiveness Report
Terms of Trade	Export price index / import price index	WDI
Exchange Rate	-	WDI
Export Herfindahl	Herfindahl index of export value	UN COMTRADE
Grubel-Lloyd IIT index	Grubel and Lloyd intra industry trade index	UN COMTRADE
FTA index	RTA member countries' total GDP/ Own GDP	PWT 6.1 and WTO
Land	Total area	CIA, The World Factbook 2005

Table A-2. Descriptive Statistics

Variables	Obs	Mean	Std Dev	Min	Max
GDP Per Capita growth rate	924	1.6893222	3.27302577	-8.838102	13.25293
Log of GDP	924	24.834021	2.0293619	19.037152	31.042942
NRX / Total Exports	924	0.39052852	0.252951	0.0232819	0.94296721
NRX / GDP	924	0.0823616	0.0668210	0.00122581	0.2830211
Degree of Openness	924	6.119329	0.6902177	4.1	7
FDI / Total Imports	924	0.4907346	0.46689162	0.005243	2.8630231
K-intensive Exp / L-intensive Exp	924	21.603571	66.92012	0.1175283	611.482
Years of Schooling	904	7.1682901	2.4962001	2.5	12.32
Export Herfindahl	924	0.120378	0.104819	0.0133720	0.88932014
Grubel-Lloyd IIT index	924	0.3592015	0.21341893	0.0283482	0.84367816
Log of FTA index	924	1.61728312	1.8923015	0	7.36267

Table A-3. Country List

	Country	Code		Country	Code
1	Algeria	DZA	34	Jordan	JOR
2	Argentina	ARG	35	Kenya	KEN
3	Australia	AUS	36	Korea, Rep.	KOR
4	Austria	AUT	37	Malaysia	MYS
5	Bolivia	BOL	38	Mauritius	MUS
6	Brazil	BRA	39	Mexico	MEX
7	Canada	CAN	40	Nepal	NPL
8	Chile	CHL	41	Netherlands	NLD
9	China	CHN	42	New Zealand	NZL
10	Colombia	COL	43	Nicaragua	NIC
11	Congo, Rep.	COG	44	Norway	NOR
12	Costa Rica	CRI	45	Pakistan	PAK
13	Denmark	DNK	46	Panama	PAN
14	Dominica	DMA	47	Paraguay	PRY
15	Ecuador	ECU	48	Peru	PER
16	Egypt, Arab Rep.	EGY	49	Philippines	PHL
17	El Salvador	SLV	50	Poland	POL
18	Finland	FIN	51	Portugal	PRT
19	France	FRA	52	Romania	ROM
20	Germany	DEU	53	Senegal	SEN
21	Greece	GRC	54	Singapore	SGP
22	Guatemala	GTM	55	Spain	ESP
23	Honduras	HND	56	Sri Lanka	LKA
24	Hong Kong, China	HKG	57	Sweden	SWE
25	Hungary	HUN	58	Switzerland	CHE
26	Iceland	ISL	59	Thailand	THA
27	India	IND	60	Trinidad and Tobago	TTO
28	Indonesia	IDN	61	Turkey	TUR
29	Ireland	IRL	62	United Kingdom	GBR
30	Israel	ISR	63	United States	USA
31	Italy	ITA	64	Uruguay	URY
32	Jamaica	JAM	65	Venezuela, RB	VEN
33	Japan	JPN	66	Zimbabwe	ZWE

Comments on "Trade Structure, FTAs, and Economic Growth: Implications for East Asia"

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The purpose of this paper is to examine the relationship between trade structure and economic growth using a dynamic panel estimation for the data of 66 countries from 1991 to 2004. Previous research on this topic includes a reference to a study by Lederman and Maloney (2003) which showed that natural resource abundance has a positive effect on growth, whereas export concentration hampers growth, while intra- industry trade has no meaningful effect on growth.

The main results of the research include an identification of variables which impact growth. Variables having a positive impact include $(X_K/X_L)/(K/L)$, the Grubel-Lloyd IIT index, and FTA partner countries' total GDP over home country's GDP. Variables which show a negative impact on growth include exports of primary goods to GDP (NRX/GDP) and export Herfindahl index, which measures export concentration.

Regarding the theoretical justification for relating trade structure and economic growth, economic growth is defined as a positive change in the level of production of goods and services by a country over a certain period of time, usually brought about by technological innovation and positive increases in resources such as capital and labor. However, there is a need for a more rigorous explanation for how trade structure relates to technological innovation or changes in resources.

Recently, there has been much empirical research on economic growth. Most empirical literature uses cross-sectional regressions whose dependent variable is the rate of economic growth for "long" periods of time (e.g. 10, 20, or 30 years); however, this kind of approach suffers from a substantial bias induced by the correlation of unobserved country-specific factors and the variables of interest. Therefore, a number of authors have also broken up the period of analysis into sub-periods (for example, Lederman and Maloney

(2003)), and have done panel analysis. This paper also employs a panel analysis specification and looks at the determinants of the yearly growth of GDP per capita during the period from 1991 to 2004. However, using high frequently data highlights the short run relationship among variables relative to the long run. Therefore, it is suggested that the authors look at longer periods of time (e.g. 20, 30, or 40 years) and break up the periods of analysis into sub-periods so as to be able to employ a panel specification.

The paper shows that trade structure is an important factor contributing to the growth of per capita GDP. In regard to economic growth, this discussant would like to argue that a more impending issue for Korea in the next few decades is the consequences on economic growth of the aging population in Korea which is projected to rank neck and neck with Japan as the oldest in the world with a median age of 55 years by 2050.

Crisis, Adjustment, and Long-run Economic Growth in Korea

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1. INTRODUCTION

The Korean Economy has showed a quick recovery after the 1997– 1998 financial crisis. Since then, ten years, which is considered to be a sufficient period to delineate any possible changes in the structure of the economy, have passed. Before the financial crisis, the Korean economy had accomplished a rapid annual growth rate of 6%–7%. In 1998 the Korean economy experienced a serious downturn with a 7% GDP growth and over 7% unemployment.¹⁾ The Korean won-dollar exchange rate doubled. Even though the economy recovered quickly in 1999, the crisis is considered as the most serious turmoil that the Korean economy has ever suffered. Even though the economy seemed to recover from the crisis, the performance of the economy did not get back to the pre-crisis rapid growth path.²⁾

Ten years after the crisis, the debate is now on the post-crisis structure of the economy. The main characteristics of the Korean economy after the crisis include an apparent decline in the long-run growth rate, a higher unemployment rate, and a slowdown in capital accumulation. Why is the

¹⁾ The average unemployment rate of Korea during the period of 1990-1997 was 2.4%.

²⁾ The average growth rate of the Korean economy over the period of 2000-2006 was 4.5% compared to the high growth rate of 7.0% over the period of 1990-1997.

Korean economy showing these behaviors? Is the potential growth rate of the Korean economy lower, indicating the slowdown of the long-run growth trend? Is the lower investment a natural adjustment process of the overinvestment in the past? This study starts with these questions and attempts to diagnose the economy, in particular, in terms of the comparison to the other experiences with currency crises, the decomposition of growth accounting, and the determinants of the productivity in service sector as an important factor for the future growth path.

We first examine the currency crisis experiences across countries and compare the process of the crisis and the recovery in various macroeconomic aspects. In particular, we would like to identify whether the behaviors of the Korean economy after the crisis have been unique compared to the patterns of other crises. The main macroeconomic variables of interest are real GDP growth rate, inflation rate, current account balance, and the ratio of fixed investment to GDP. Following the convergence idea, it is expected to have a lower GDP growth rate and a lower capital accumulation rate as the income grows. Korea recorded a significant slowdown in the GDP growth rate from 7% to 4.5%. Unlike the Latin American countries that have experienced financial crises, the crisis-hit East Asian countries including Korea showed a significant drop in the GDP growth rates as well as the investment rates.

To investigate the Korean economy in detail in terms of the decomposition of determinants of the growth before and after the crisis, growth accounting, in particular, growth accounting analysis by industry has been done. A significant drop has been found not only in the capital accumulation but also in the total factor productivity (TFP, hereafter) after the 1997 financial crisis. As Young (1995) points out, the quantitative increase in the production factors such as labor input and capital accumulation played an important role in the rapid growth of the Korean economy, accounting for about two-thirds of GDP growth. The productivity growth and human capital accumulation as qualitative aspects of the growth also account for one-third of the growth. However, after the crisis we see a slowdown in the increase in inputs and TFP growth in most industries, especially in the service sectors, which are becoming a more important component for national income.

From a cross-country regression analysis to look for determinants of service sector productivity, it is found that the service sector productivity tends to be lower when employment moves from manufacturing to service. Another important factor in determining the productivity of the service

sector is an administrative regulation, which has a negative effect on the productivity. Therefore, we argue that the most important factor in improving the performance of the Korean economy in the future is service sector productivity. To do that requires the improvement in the efficiency of the service sector by making the market more competitive and reducing restrictive regulations.

The paper is organized as follows. Section 2 examines the differences of the post-crisis macroeconomic adjustment of the Korean economy and from other crisis-hit countries. The examination focuses in particular on the regional difference of the recovery patterns between East Asian countries and Latin American countries. Section 3 presents a growth accounting analysis of the Korean economy by industry and examines the contribution of factors in the growth rate since the crisis. Section 4 analyzes a cross-country regression focusing on the determinants of service sector productivity growth. Section 5 concludes.

2. CROSS-COUNTRY COMPARISON OF FINANCIAL CRISES

This section compares the post-crisis macroeconomic adjustment of the Korean economy during the last 10 years with those of other countries that have experienced financial crises before. In particular, we are interested in the regional differences in recovery patterns between Asia and Latin America. Our data set consists of 191 developing countries that have experienced at least one financial crisis over the period from 1974 to 2005. We compare the adjustment process of key macroeconomic variables such as real GDP growth rate, inflation rate, current account balance, and fixed investment over GDP ratio.

2.1. Identification of Financial Crises

In the literature, a currency crisis is typically defined as occurring when the nominal exchange rate of a currency depreciates sharply relative to a threshold rate that is assumed to be common to all countries. Frankel and Rose (1996), for example, believed that a country would experience crisis if its currency depreciated by at least 25% in a quarter and the current rate of depreciation exceeded the previous quarter by at least 10 percentage points. Eichengreen *et al.* (1996), Kaminsky and Reinhart (1999), and Sachs *et al.*

(1996) include additional variables such as changes in interest rates and foreign reserves in order to capture instances of speculative pressure that do not lead to large depreciations. However, the latter approach is subject to a number of problems. In particular, a significant change in foreign reserves or domestic interest rates can occur even in the absence of a speculative attack. Moreover, it is hard to compile interest rates and foreign reserves data for many developing countries. Therefore, this paper adopts the approach of Frankel and Rose (1996) in identifying crises. As in Frankel and Rose (1996), we use a three-year window and the crises identified within a three-year period are treated as a continuation of the same crisis rather than a new episode.

To supplement Frankel and Rose's indicator, we adopt a second measure. Countries experiencing financial difficulties often seek IMF financial arrangements. The second indicator identifies the incidence of financial crises by the dates when countries agree with the IMF on the terms of a stabilization program. An IMF program can come in the form of Stand-by Arrangements (SBA) or through the Fund's Extended Fund Facility (EFF), the Structural Adjustment Facility (SAF), or the Enhanced Structural Adjustment Facility (ESAF). Among these, SBAs and EFF loans are the main types of programs designed to provide short-term balance of payments assistance to IMF member countries. On the other hand, the SAF and the ESAF were introduced in the late 1980s to aid structural adjustment for low-income countries, mostly sub-Saharan African countries and former centrally planned economies. Reflecting the different characteristics among IMF programs, our second indicator is based on whether a country has agreed to either an SBA or an EFF program with the IMF. We also use an exclusion window of three years around the event.

Our data set consists of 191 developing countries spanning the period 1960–2006.³⁾ Among OECD countries, only Korea and Mexico are included in the sample. More than 60% of 191 developing countries have experienced crises at least once. Throughout the period, 119 countries have experienced currency crises according to the exchange rate depreciation measure (henceforth denoted as the FX indicator crises), and 114 countries have sought IMF financial assistance (henceforth denoted as the IMF program indicator crises). Moreover, the number of countries that experienced crises more than twice by the FX indicator and the IMF program indicator are 69

³⁾ The data were drawn from World Development Indicators (2007).

and 85, respectively. Some countries experienced crises as many as six times. It is found that the probability of crisis recurrence is still very high even though the conditional probability of crises tends to fall as the number of crises increases. After a country experiences a crisis, the probability that it will suffer from a second one is calculated as 57% or 74%, respectively, depending on the indicator.

2.2. Macroeconomic Adjustments

In this section, we compare the post-crisis adjustment patterns of key macroeconomic variables. In the following figures, t denotes the year in which a crisis erupts; t-i and t+i imply i years prior to and after the crisis, respectively. We also divide pre- and post-crisis periods into six parts: $(t-10 \sim t-6)$, $(t-5 \sim t-2)$, $(t-1 \sim t)$, $(t+1 \sim t+2)$, $(t+3 \sim t+5)$, and $(t+6 \sim t+10)$. The average values of concerned macroeconomic variables are plotted in the figures for those sub-periods.⁴

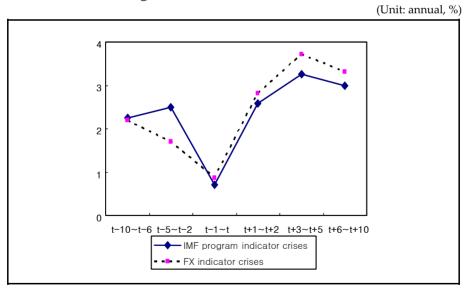


Figure 1. Real GDP Growth Rates

⁴⁾ The pattern does not change much when median is used instead of mean.

Figure 2. Inflation Rates

Figure 3. Current Account/GDP Ratio

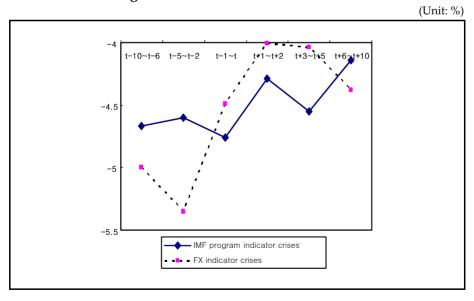


Figure 4. Fixed Investment/GDP Ratio

In Figure 1, the real GDP growth rates exhibit a V-type recovery pattern immediately after the crisis. When the IMF program indicator is used, the average GDP growth rates are 2.5% two to five years prior to the crisis and they decline sharply to 0.69% during the crisis period. But they quickly recover to its pre-crisis level (or even to a higher level) two years after the crisis. The FX indicator shows a similar pattern. This cross-country recovery pattern is broadly consistent with the V-type recovery that the Korean economy experienced recently. However, the average growth rate in Korea from 2001 to 2005 which is three to seven years after the 1997–1998 crisis, is about 4.6%, which is significantly lower than the pre-crisis average of 7%.

Figure 2 shows the adjustment process of inflation rates. It exhibits a reverse V-type pattern. Inflation rate soars at the onset of a crisis but declines quickly to its pre-crisis level. Contractionary monetary policies during the adjustment process might be a reason. Note also that the countries with the FX indicator crises had higher inflation rates than those with the IMF program indicator crises. It indicates a high correlation between inflation rates and currency depreciation. The behavior of current account balance is shown in Figure 3. Countries that have experienced the FX indicator crises have the highest current account deficit, almost 5% of GDP before the outbreak of crises, indicating that current account imbalance is one of the

main causes of the crisis. However, after the crisis, the current account improves sharply. Immediately after the crisis, large currency depreciation must have a strong stimulating impact on export growth, while import demand remains sluggish.

Figure 4 shows the adjustment process of fixed investment over GDP ratio. The investment rates in Korea are currently only two-thirds of the pre-crisis level. Many economists wonder whether the sharp decrease of investment rates in Korea is a common phenomenon across crisis-hit countries or a Korea- or Asian-specific characteristic. Figure 4 suggests that the answer is hard to generalize. In general, cross-country pattern also confirms that the investment ratio drops sharply immediately after the crisis. However, as for the longer run impact, the evidence is mixed. Investment rates return to pre-crisis level after five years in the cases of the FX indicator crises, but the rates are significantly lower in the cases of the IMF program indicator crises.

2.3. Crisis in Asia and Latin America: Similarities and Differences

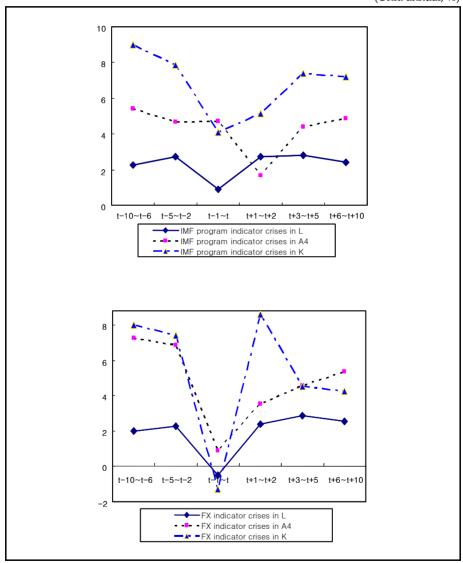
We now try to analyze whether there is a regional difference in the adjustment process. We compare the adjustment pattern of key macroeconomic variables among Latin American countries, four East Asian countries that went into crisis in 1997 (Malaysia, Indonesia, Thailand and Philippines), and Korea. In cases of the Latin American and the East Asian countries, about two thirds of the crises occurred before 1990. On the other hand, Korea had never experienced a crisis by the FX indicator until the one that broke out in 1997. By the IMF program indicator, Korea experienced two crises in 1980 and 1997.

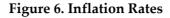
The pattern of real GDP growth rates by region is shown in Figure 5. In the figure, 'L' stands for Latin American countries, 'A4' for Malaysia, Indonesia, Thailand, and Philippines, and 'K' for Korea. The speed is much faster in the East Asian countries and Korea even though the same V-type recovery pattern in growth rates is exhibited in all the cases. We believe the difference can be partly explained by the impact of the currency depreciation on current accounts as will be explained later when we discuss the behavior of current account balances. Another regional difference is the longer run post-crisis growth rates. Five years after the crisis, the growth rates of the Latin American and the East Asian countries seemed to recover to their pre-crisis level. However, in Korea, the recent growth rates are much lower than the pre-crisis level in the cases of the FX indicator. In other words, even

though Korea shares the same V-type recovery pattern, her long run growth rates seem to be more severely affected by the crisis after 1997.

Figure 5. Real GDP Growth Rates

(Unit: annual, %)







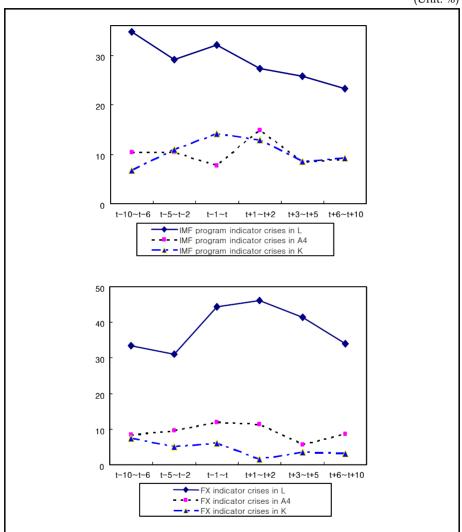


Figure 6 compares the inflation rate adjustment. In the cases of the FX indicator, inflation rates in Latin America increase after the onset of the crisis but return to its pre-crisis level. In the case of the IMF program indicator,

0 -2 -6 IMF program indicator crises in L - IMF program indicator crises in A4 -IMF program indicator crises in K FX indicator crises in L - - - FX indicator crises in A4 FX indicator crises in K

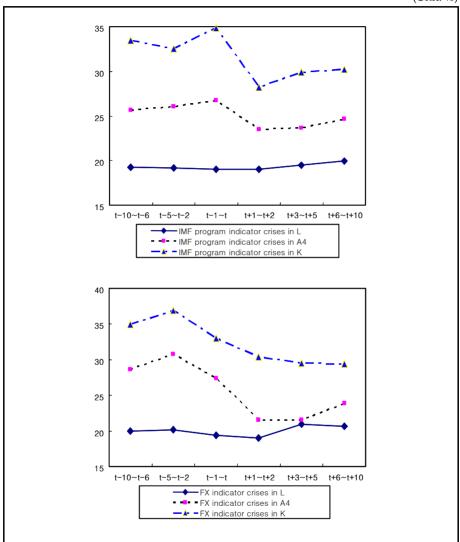
Figure 7. Current Account/GDP Ratio

inflation rates continue to decline after the crisis. The East Asian countries show similar patterns but at much lower rates. In contrast to the cases of Latin American countries that suffered from hyperinflation, in Asia, disinflation

(Unit: %)

Figure 8. Fixed Investment/GDP Ratio





was not a major goal of monetary policy but rather a result from a severe recession following the crisis.

On the other hand, the adjustment of current account balance is more conspicuous in East Asia as shown in Figure 7. The current account balance remains unchanged or slightly improves after the crisis in the Latin American countries. But a large turnaround of the current account is clearly shown in the East Asian countries including Korea. As the East Asian economies have a more export oriented industrial structure, they could have benefited more from the gains in export competitiveness by a substantial depreciation of real exchange rates. That might explain why the speedy recovery was possible in East Asia compared with the Latin American cases.

Figure 8 compares fixed investment rates. Fixed investment rates are much lower in Latin America than in Asia throughout the period. As such, there are not many differences between the pre- and the post-crisis periods or the post-crisis investment rates are slightly higher than the pre-crisis rates in the Latin American countries. On the other hand, the investment rates in Asia drop significantly after the crisis and remain at two-thirds of their pre-crisis level even in the long run. This result suggests that the sharp drop of investment rates is an Asian specific phenomenon. It might imply that investment rates in Asia have been too high and have to be corrected to a sustainable level. Or it might indicate that Asian investors become excessively risk averse after the crisis. Depending on the answer, there are different implications for the long-term growth forecasts for the crisis-hit Asian countries.

3. GROWTH ACCOUNTING ANALYSIS OF THE KOREAN ECONOMY BY INDUSTRY

This section provides a growth accounting analysis of the Korean economy by industry. In particular, we focus on any difference in the accounting analysis before and after the crisis. The method for analyzing the factors for economic growth is based on a neoclassical production function, that is, a function of the production of goods and services through capital and labor.

$$Y_t = A_t F(K_t, h_t N_t),$$

where Y_t , K_t , h_t , and N_t denote total output, physical capital stock, human capital stock, and labor input, respectively, and A_t

represents the productivity level. If we assume a Cobb-Douglas production function, the following equation is derived.

$$\begin{split} Y_t &= A_t K_t^{\alpha} \left(h_t N_t \right)^{1-\alpha}, \\ \frac{\Delta Y_t}{Y_t} &= \frac{\Delta A_t}{A_t} + \alpha \frac{\Delta K_t}{K_t} + (1-\alpha) \frac{\Delta h_t}{h_t} + (1-\alpha) \frac{\Delta N_t}{N_t}. \end{split}$$

In other words, the growth rate of output can be decomposed into four parts: the contribution by the growth of capital stock, the contribution by the growth of labor input, the contribution by human capital accumulation, and the remainder, total factor productivity (TFP) growth, also often referred to as Solow residuals. A growth accounting analysis of industry in may take the following form.

$$\frac{\Delta Y_t^i}{Y_t^i} = \frac{\Delta A_t^i}{A_t^i} + \alpha_i \frac{\Delta K_t^i}{K_t^i} + (1 - \alpha_i) \frac{\Delta h_t^i}{h_t^i} + (1 - \alpha_i) \frac{\Delta N_t^i}{N_t^i}.$$

Through the growth accounting analysis, we seek to compare the relative importance of each growth factor by industry and draw some implications for an outlook on the future potential growth rate.

3.1. Data Construction and Human Capital Index

The industries have been classified into nine categories: 1) agriculture, forestry, and fishing, 2) mining, 3) manufacturing, 4) electricity, gas, and water supply, 5) construction, 6) wholesale & retail trade, restaurants, and hotels, 7) transport, storage, and communications, 8) financial intermediation, real estate, renting, and business activities, 9) social and other service activities.⁵⁾ In the following analysis the agriculture, forestry, and fishing industries and the mining industries are not reported even though the

⁵⁾ Social and other services include the following detailed categories: public administration and defense, education, health and social work, recreational, cultural, sporting services, and other public and private service activities.

growth accounting was conducted.⁶⁾ Although it is possible to conduct an analysis with more refined categories, there is a difficulty in compiling consistent data for the labor and capital inputs.

Table 1. GDP Growth Rates by Industry

(Unit: %)

Period	Total	Manufact uring	Electricity, gas, water supply	Construc tion	Wholesale & retail, restaurants, lodging	Transport, storage, communic ations	Finance, insurance, real estate	Social and other services
1970-80	6.7	15.0	16.6	9.8	7.1	12.3	7.9	3.9
1980-90	8.2	11.3	14.4	9.9	9.0	7.9	9.6	5.5
1990-97	6.6	7.2	9.6	6.6	5.8	8.5	8.8	4.9
1990-00	5.6	7.8	8.8	2.4	5.0	8.7	6.7	3.8
2000-05	4.5	6.4	6.6	3.6	1.8	7.8	3.9	3.1
1970-05	6.5	10.7	12.3	6.8	6.3	9.4	7.5	4.2

Table 2. Growth Rates of Employment by Industry

(Unit: %)

Period	Total	Manufac turing	Electricity, gas, water supply	Constru ction	Wholesale & retail, restaurants , lodging	storage,	Finance, insurance, real estate	
1970-80	3.5	8.5	3.2	11.0	4.1	4.4	9.0	6.0
1980-90	2.8	5.1	4.6	4.7	4.1	4.0	9.9	5.7
1990-97	2.3	-1.1	1.5	5.8	5.1	3.4	8.8	4.7
1990-00	1.6	-1.3	-0.9	1.6	3.7	3.1	7.2	4.2
2000-05	1.5	-0.3	2.1	2.8	0.2	2.5	5.5	4.9
1970-05	2.5	3.4	2.3	5.3	3.4	3.7	8.2	5.2

⁶⁾ The importance of these industries has been decreasing. As of 2006, the share of the two industries' output in the GDP were 3.7% and 0.3%, respectively.

Table 1 shows the GDP growth rates by industry. From 1970 to 2005, the average annual growth rate for all industries was 6.5%, and from 2000 to 2005, the growth rate was recorded the lowest level at 4.5%. The manufacturing industry, the electricity, gas and water supply industries, and the transport, storage, and communications industries have shown relatively high growth rates. The wholesale & retail, restaurants, and lodging industries and social and other service industries have recorded growth rates which are lower than the average for all industries.

Data on labor inputs are composed of quantitative indices, such as the number of employed workers and average hours of work, and qualitative human capital indices which are further explained below. As a quantitative indicator, labor input has been calculated using employment rates and average working hours. The growth rates of employment by industry are shown in Table 2.

Employment has been steadily increasing over the entire period, recording an average annual growth rate of 2.5%; however, the growth rate has been gradually decreasing, falling to 1.5% after 2000. Employment in the service industries has been steadily increasing, and, in particular, the growth rate of employment in the finance, insurance, and real estate industries and in the social and other service industries has been high. Working hours, which is another quantitative measure comprising labor inputs along with employment, has showed a decreasing trend. The average monthly working hours in all industries has fallen from 224.1 in 1970 to 195.9 in 2005, implying a decline in the weekly working hours from 51.7 to 45.2, and this phenomenon has occurred in all industries regardless of category.⁷⁾

The data on capital stock for the period between 1970 and 2005 were gathered using net fixed capital stock figures by industry established by Pyo (2007) as in Table 3. All the industries except the finance, insurance, and real estate industries show a significant decline in the growth rate of capital stock after the financial crisis. The high capital accumulation in the finance, insurance, and real estate industries might reflect a structural reform in the financial sector.

⁷⁾ The table showing the trend of monthly working hours by industry was not reported due to space limitation.

Table 3. Growth Rate of Capital Stock by Industry

(Unit: %)

Period	Total	Manufac turing	Electricity, gas, water supply	Constru ction	Wholesale & retail, restaurants , lodging	storage,	Finance, insurance , real estate	Social and other services
1970-80	13.5	14.0	13.5	11.4	13.9	13.0	15.7	13.3
1980-90	10.5	10.7	10.9	4.7	11.1	7.1	12.2	13.0
1990-97	10.6	10.1	7.5	14.9	15.0	6.1	5.2	11.6
1990-00	9.0	9.0	6.1	12.7	11.3	4.9	12.2	8.5
2000-05	6.0	6.5	3.3	1.6	3.1	4.2	13.6	6.3
1970-05	10.3	10.6	9.2	8.4	10.8	7.8	13.4	10.8

The labor income share for each industry was calculated by finding the ratio of employee compensation to the total value added of each industry; however, due to the fact that there are many industries reliant on non-wage workers, the wage level of non-wage workers was assumed to be a fixed ratio to the wage level of paid labor. In the cases of the agricultural, forestry and fishing industries, non-wage workers comprise roughly 90% of the employment. In the cases of the wholesale & retail, restaurants and lodging industries, the figure is approximately 50%, and even in the cases of the other service industries, the figure ranges between 20% and 30%. Therefore, when determining the labor income shares, the influence of non-wage workers must be considered. Using ratios implemented in the prior research (Lee and Song, 2005), we assume that non-wage workers in service industries receive two-thirds of the wages of paid workers and non-wage workers in other industries receive four-fifths of the wages of paid workers in those industries. The labor income shares calculated in this manner show figures of 0.7 to 0.9 for agricultural, forestry and fishing industries, 0.55 to 0.6 for the manufacturing industry, and 0.8 to 0.9 for wholesale and retail, restaurants and lodging industries. It also shows that these figures change over time.

In order to measure the qualitative aspect of labor input, the human capital index was calculated as in the research conducted by Han et al. (2002),

by finding the difference in human capital through the relative wages of the labor force in each group, and the human capital index for each industry was calculated using a weighted average in accordance with the educational composition of each industry.

$$h_t^i = \sum_{s} \sum_{e} \sum_{g} w_{s,e,g,t}^i l_{s,e,g,t}^i,$$

where h_t^i is the human capital index of industry i and time t. The relative wages, $w_{s,e,g,t}^i$, of the workers in each group are assumed to reflect the level of human capital across the status of workers (wage workers, non-wage workers; s), educational attainment (middle school or lower, high school graduate, university graduate or higher; e), and gender (male, female; g). The human capital index is calculated as a weighted sum of relative wages using the employment share by group, $l_{s,e,g,t}^i$, as a weight. As before, when we construct the human capital index, we assume that non-wage workers receive a fixed proportion of what paid workers receive. Although the relative wage in each group is time-varying, we use the fixed relative wages calculated from the averages over the entire period to see the effects of changes in educational, status, and gender compositions on the human capital index.⁸

⁸⁾ The relative wages of paid workers by group based on employment status, educational attainment, and gender in each industry are not reported due to space limitation.

Table 4. Growth Rates of the Human Capital Index by Industry

(Unit: %)

Period	Total	Manufac turing	Electricity, gas, water supply	Constru ction	Wholesale & retail, restaurants, lodging	storage,	Finance, insurance , real estate	Social and other services
1970-80	0.6	0.5	0.2	0.3	0.5	0.3	0.6	0.6
1980-90	0.8	0.3	0.1	0.1	0.6	0.3	0.3	0.7
1990-97	1.0	1.1	2.5	0.4	0.7	0.3	0.4	0.1
1990-00	1.0	1.0	0.1	0.6	0.7	0.5	0.8	0.2
2000-05	1.2	1.4	0.4	0.3	0.5	0.4	0.6	0.4
1970-05	0.8	0.7	0.1	0.3	0.6	0.4	0.6	0.5

Table 4 shows the average annual growth rate of the human capital index by industry. It shows that the human capital index has increased across the board. It seems that after 2000, the rise in the human capital index is a reflection of the rise in the population going on to higher education and an overall rise in the educational level after 1980 when the quota for college enrollment expanded greatly.

3.2. Growth Accounting by Industry

If we use the quantitative inputs of labor and capital accumulation and the qualitative index of the human capital measure, and apply the labor income shares, we can separate the contribution of each input factor in the growth rate of GDP by industry. The results of the growth accounting analysis for all industries as a whole and individually have been summarized in Table 5 and Figure 9 to Figure 16. By omitting the period between 1997 and 2000 which marked the Asian financial crisis period and the period of recovery following the crisis, we focus on whether there is any change in the trend between the period before the crisis and the period after the crisis which are highlighted as shaded rows.

Table 5. Growth Accounting by Industry

Industry	Period	Growth Rate of GDP	Decomposition					
Industry	Period	Growth Rate of GDP	Labor	Human capital	Physical capital	TFP		
All industries	1970-80	6.68	2.39	0.39	4.36	-0.47		
All industries	1980-90	8.16	1.56	0.56	2.73	3.31		
All industries	1990-97	6.59	1.36	0.77	2.68	1.78		
All industries	1990-00	5.63	1.04	0.74	2.42	1.44		
All industries	2000-05	4,51	0.35	0.82	1.85	1.48		
All industries	1970-05	6.49	1.48	0.59	3.00	1.42		
Manufacturing	1970-80	15.03	4.30	0.24	6.82	3.66		
Manufacturing	1980-90	11.25	2.61	0.19	4.42	4.03		
Manufacturing	1990-97	7.22	-1.06	0.69	3.87	3.72		
	1990-97		-0.86					
Manufacturing		7.77		0.62	3.65	4.35		
Manufacturing	2000-05	6.44	-0.69	0.74	2.99	3.39		
Manufacturing	1970-05	10.65	1.72	0.40	4.67	3.86		
Electricity, gas, water supply	1970-80	16.64	0.84	0.04	9.94	5.81		
Electricity, gas, water supply	1980-90	14.41	0.95	0.02	8.55	4.89		
Electricity, gas, water supply	1990-97	9.60	0.41	0.05	5.90	3.22		
Electricity, gas, water supply	1990-00	8.75	-0.16	0.01	4.87	4.04		
Electricity, gas, water supply	2000-05	6.58	-0.08	0.08	2.68	3.89		
Electricity, gas, water supply	1970-05	12.31	0.42	0.03	7.14	4.72		
Construction	1970-80	9.84	6.65	0.15	4.88	-1.84		
Construction	1980-90	9.89	2.61	0.09	1.40	5.78		
Construction	1990-97	6.62	4.05	0.28	3.81	-1.52		
Construction	1990-00	2.40	0.98	0.48	3.11	-2.17		
Construction	2000-05	3.61	1.64	0.28	0.28	1.41		
Construction	1970-05	6.84	3.49	0.24	2.59	0.52		
Wholesale & retail, restaurants, lodging	1970-80	7.05	3.68	0.40	2.55	0.42		
Wholesale & retail, restaurants, lodging	1980-90	8.96	2.45	0.42	3.20	2.89		
Wholesale & retail, restaurants, lodging	1990-97	5.78	3.53	0.54	2.79	-1.07		
Wholesale & retail, restaurants, lodging	1990-00	5.02	2.64	0.56	1.99	-0.17		
Wholesale & retail, restaurants, lodging	2000-05	1.76	-0.30	0.42	0.47	1.17		
Wholesale & retail, restaurants, lodging	1970-05	6.26	2.55	0.47	2.01	1.23		
Transport, storage,	1970-80	12.32	2.06	0.15	5.91	4.21		
Transport, storage,	1980-90	7.87	2.03	0.18	3.20	2.46		
Transport, storage,	1990-97	8.48	2.09	0.20	2.23	3.96		

Transport, storage, communications	1990-00	8.74	2.04	0.31	1.81	4.58
Transport, storage,	2000-05	7.75	0.63	0.26	1.47	5.40
Transport, storage, communications	1970-05	9.37	1.92	0.22	3.10	4.14
Finance, insurance, real estate	1970-80	7.87	3.39	0.25	9.36	-5.12
Finance, insurance, real estate	1980-90	9.57	4.22	0.15	6.81	-1.60
Finance, insurance, real estate	1990-97	8.82	4.43	0.19	2.79	1.40
Finance, insurance, real estate	1990-00	6.68	3.41	0.38	6.67	-3.78
Finance, insurance, real estate	2000-05	3.91	1.93	0.25	8.20	-6.47
Finance, insurance, real estate	1970-05	7.45	3.41	0.26	7.66	-3.88
Social and other services	1970-80	3.85	4.84	0.51	1.35	-2.85
Social and other services	1980-90	5.52	4.74	0.61	1.02	-0.85
Social and other services	1990-97	4.85	4.24	0.12	0.88	-0.38
Social and other services	1990-00	3.78	4.01	0.23	0.67	-1.13
Social and other services	2000-05	3.07	3.88	0.39	0.58	-1.79
Social and other services	1970-05	4.20	4.43	0.44	0.97	-1.64

Note: The growth accounting analysis for the agriculture, forestry, and fishing industries and the mining industries are not reported.

The findings of the growth account analysis by industry can be summarized as follows. First, when considering all industries, of the GDP growth rate during the entire period between 1970 and 2005 (6.5%), approximately 46% can be attributed to the capital accumulation, 23% to the quantitative growth of labor, 9% to the qualitative aspect of human capital accumulation, and the remaining 22% can be attributed to the increase in TFP. Second, there has been a decreasing trend in the growth rate of TFP since the 1980s. In the 1980s, the contribution of TFP was recorded at 3.31%, but it had declined to 1.78% in the 1990 to 1997 period and 1.48% in the 2000 to 2005 period. After the Asian financial crisis, there was a slowdown in the growth rate of TFP, which will be an obstacle to the future long-run growth path. Third, excluding the transport, storage, and communication industries, the electricity, gas, and water supply industries, the construction industry, and the wholesale & retail, restaurants, and lodging industries, there was a noticeable slowdown of the growth rate of TFP in the other industries. It is

inferred that in the cases of the transport, storage, and communications industries, the growth rate of TFP reflects the distinctive growth of the communications industry, namely, the information and telecommunications industry. Fourth, the finance, insurance, and real estate industries and the social and other service industries have experienced a notable negative growth in the TFP in the 2000–2005 period. These industries' bad performance appears to contribute to the slowdown in the TFP growth rate in all industries during the period since the share of these industries' output in the GDP has been 39.4% on average.

The main cause of the slowdown of the growth rate after the financial crisis, in particular, after 2000, may be due to the slowdown of the growth rate of TFP which occurred over most industries and due to the slowdown of the growth rate of the service industries which are increasingly carrying more weight in the national income. One of the characteristics that separate the growth accounting analysis of the Korean economy from other developed countries is that the growth rate of the productivity in the service industry is very low. From the growth accounting analysis, the majority of the service industries excluding the transport, storage, and communications industries show stagnation or even negative figures in their TFP growth rates. In particular, the finance, insurance, and real estate industries and the social and other service industries have recorded growth rates of TFP of -3.88% and -1.64%, respectively, for the period between 1970 and 2005. As of 2005, service industries were of such importance that they accounted for 56% of GDP and 65% of employment. Recently, the ability of service industries to create employment has been decreasing, the demand for labor in the manufacturing industry has been decreasing, and a phenomenon of growth without employment has arisen. It is predicted that the importance of service industries in the future will increase even further, such as the knowledge based industry which has been regarded as the engine of growth for the next generation. Therefore, it is obvious that promoting the productivity of the service industry will lead to the promotion of the potential growth rate overall. According to regressions on international panel data and time series data done by Kim (2006), while the expansion of service industries will negatively influence the productivity of the economy and create a tendency for the lowering of the growth rate, an expansion of highly productive services such as production services, distribution services, or knowledgebased services, leads to a positive effect on economic growth. It may be stated that this conclusion shows that the service industry may be a crucial factor for growth in the future.

We believe that the competitiveness of the service industry must be promoted through means such as enlargement and specialization. An environment in which the small-scale traditional services need to be restructured must be fostered, and there must also be radical reforms in the governmental sector in order to promote the efficiency of the social service industries including private and public fields. There is a need for the promotion of productivity through the introduction of market forces other than the traditional emphasis on the public sector. The following section examines the trend of the service sector and the determinants of service sector productivity based on a cross-country panel regression.

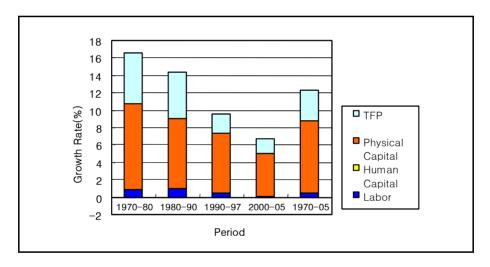


Figure 9. Growth Accounting in All Industries

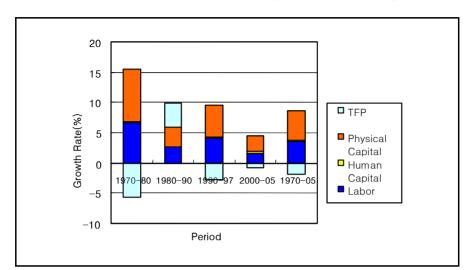
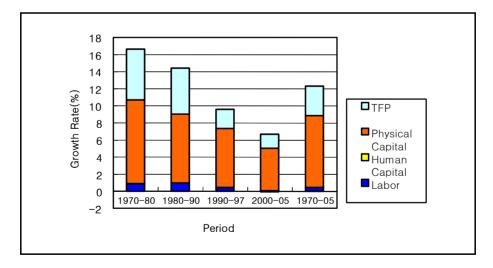


Figure 10. Growth Accounting in Manufacturing

Figure 11. Growth Accounting in Electricity, Gas, and Water Supply



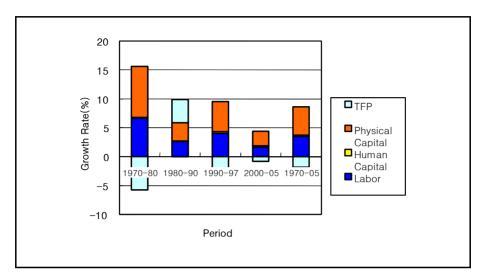
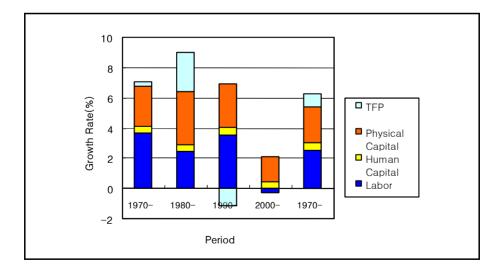
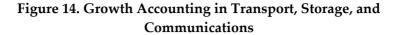


Figure 12. Growth Accounting in Construction

Figure 13. Growth Accounting in Wholesale & Retail Trade, Hotels, and Restaurants





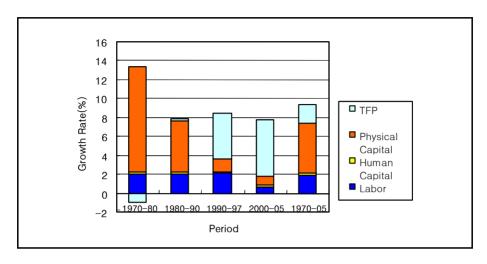
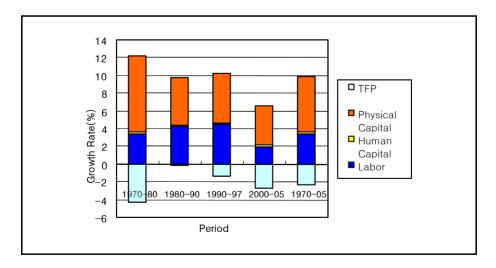


Figure 15. Growth Accounting in Financial Intermediation, Real Estate, Renting, and Business Activities



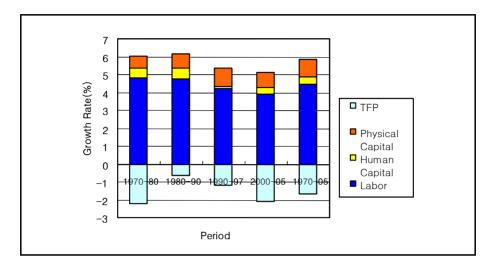


Figure 16. Growth Accounting in Social and Other Services

4. CROSSCOUNTRY COMPARISONS OF SERVICE SECTOR PRODUCTIVITY AND DETERMINANTS OF LABOR PRODUCTIVITY

The service sector has become quantitatively the most important sector in developed countries and has gained more weight in developing countries. Korea is not an exception. The need for better performance of the service sector stems from the fact that the service sector has made a large contribution to both productivity and employment growth over the last decade. Therefore, it is important to improve the service industry's productivity in order to enhance economic growth. In 2002 the service sector accounted for 70% of the total value added in developed countries and it has continuously increased since the 1970s. However, the cross-country differences are notable. The variation in the performance of the service sector can be attributed to differences in policies and institutions. This implies that there exists room for improvement of labor productivity in some countries. This section presents the international comparison of service sector productivity and analyzes the determinants of labor productivity in the service sector in order to examine the current status of service sector development in Korea and to determine how the performance of service sector in Korea can be improved.

4.1. Cross-Country Comparison of Service Sector Productivity.

The share of service industries to the total value added in OECD countries has increased over the past decade. This trend results primarily from the strong performance of market services such as telecommunications, transport, wholesale & retail trade, and finance (Wolfl 2003). These sectors are characterized by an extensive use of productivity-enhancing technologies, such as information and communication technologies (ICT) and by the increasing pace of innovation. Some of these sectors including telecommunications and business services have also been characterized by a high level of business activities, as demonstrated by high creation rates of new firms, rapid growth of successful new firms, and reallocation of resources from declining to growing firms. On the other hand, the weight of the service industry in Korea is far lower in comparison to other developed countries. Figure 17 shows the share of the service industry of the OECD nations in terms of total value added in 2003. The share of service industries in Korea is 57%, and along with the Czech Republic (59%) and Ireland (56%), Korea is among the lowest of the OECD nations. There is a vast difference when comparing these figures with Belgium (74%), Luxembourg (83%), England (75%), and the US (77%).

The previous research on the service sector in Korea suggested several reasons for the relatively low share of the service sector in Korea. First, when evaluated in terms of real value, although the economic weight of the service industry has increased in accordance with the increase of national income, the productivity and the level of specialization of the service industry in Korea are low and its role in raising the value added to other industries is still weak. The demand for manufacturing is still large and thus, the importance of the manufacturing industry in Korea has not diminished yet (Heo et al. 2007). Oulton (1999) also asserts that if we examine the interindustry relationship between the service industries and the manufacturing industries in Korea, the level of outsourcing in the service industries from manufacturing industries is considerably low compared to other OECD nations. Therefore, the importance of the service industry in determining GDP is relatively low, and the disparity between the productivity of the service and manufacturing industries is also big. Second, regulations on service sectors have been severe. There might be higher entry barriers in the service sector which are obstacles to developing competitive market structure. In addition, the productivity in the service sector has sometimes fallen due to its lack of autonomy from the public sector. Lastly, while the weight of low productivity service within service industries, such as distribution service, is significant, the high productivity area such as producer service is small. Consequently, the demand for services has increases in accordance with the rise in income due to economic development in Korea. However, the increase in productivity of the service industry has lagged behind the manufacturing industry and thus, the rate of the price increase of service goods is relatively high, causing labor to move from the manufacturing industry to the service industry and increasing the production of service goods. If there is no significant difference between the income elasticity of service goods across nations, the slower the rate of increase of service industry productivity a nation experiences, the more rapidly will the service sector expand, and the real exchange rates would appreciate as the Balassa-Samuelson effect predicts (Canzoneri *et al.* 1999).

The service sector also makes a sizable contribution to job creation. In the developed countries, most employment growth in the 1990s was due to services, in particular business services, which generated more than half of the total employment growth in most countries and often compensated for job losses in manufacturing sectors (OECD, 2004). From Figure 18 we can see that the employment share of the service industries in the total employment in Korea (64%) in 2003 is very low compared to the developed countries such as the US (81%), the UK (79%), and the Netherlands (79%). The share of the value added of the service industry is composed of two parts: the employment share of the service industry and the labor productivity of the service sector relative to the labor productivity of all industries. It is inferred that the labor productivity of the service sector in Korea does not appear to improve very much relative to the labor productivity of all industries since we observe a stagnation of the share of the value added of the service sector even with a higher growth rate of employment in the service sector.

As the share of the service sector in employment as well as the value added grow, the service sector has become more important in determining the labor productivity of all industries. Even though the service sector has traditionally been viewed as a sector with a low productivity growth, measurement problems are to some extent responsible. The production in the service sector is hard to measure since the changes in service qualities are difficult to measure. In some developed countries, the service sector has been a driving force for an increase in the labor productivity in all industries. The

Figure 17. Share of Service Industry in the Total Value Added of OECD Nations (2003)

Note: The data for Iceland, Poland, and Switzerland is from 2002, the data for Australia, Canada, and New Zealand is from 2001.

Source: OECD STAN.

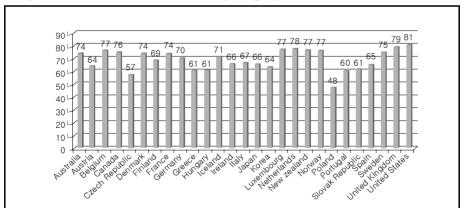


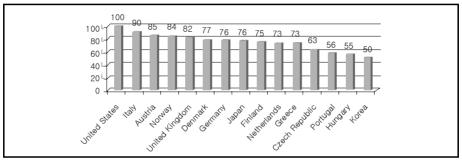
Figure 18. Share of Service Industry Employment of OECD Nations (2003)

Note: The data for France and Poland are from 2002, and the data for Australia is from 2001.

Source: OECD STAN.

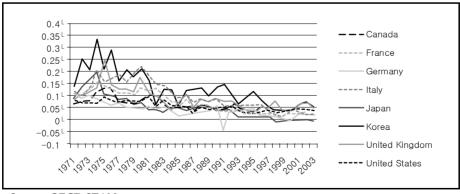
labor productivity in the service sector in Korea is still much lower than that in other developed countries (Figure 19). Setting the labor productivity of the US service sector to 100, the PPP adjusted labor productivity of the Korean service sector is merely 50. The labor productivity growth rate of the service sector in developed countries has shown a declining trend over the last three decades along with the decline in the labor productivity growth in all industries (Figure 20). The labor productivity of the service sector in Korea shows a similar trend but a more rapid decline after the financial crisis in 1997 (Figure 21).

Figure 19. Comparison of Labor Productivity in the Service Sector (2003, PPP, United States=100)



Source: OECD STAN.

Figure 20. Trends of Labor Productivity Growth in the Service Sector



Source: OECD STAN.

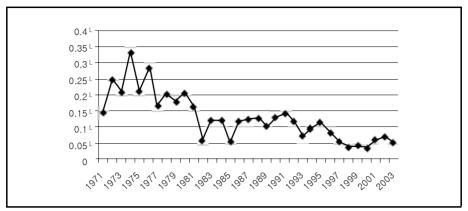


Figure 21. Labor Productivity Growth in Korea

Source: OECD STAN.

4.2. Determinants of Labor Productivity in the Service Sector

It is clear that the service sector has become more important in terms of the share of value added and the share of employment and the productivity growth in the service sector is very crucial for the future economic growth. The remaining question is what factors determine the labor productivity in the service sector.

It is generally considered that the demand for services increases as income grows. People with a higher income tend to change their consumption expenditure from manufactures to services. Typically the higher level of resource allocation implies a lower productivity. However, the service sector involves an adoption of advanced technologies or many intangible capital goods, which may in turn increase productivity. Therefore, the relationship between income and labor productivity in the service sector can be positive or negative. The marginal effect of an increase in the employment in the service industry due to an increase in the demand for services is of course expected to be negative on the labor productivity in the service sector according to the diminishing returns to labor.

The service sector has traditionally been a highly regulated sector. A number of examples of regulation in the services are observed in transport and communication services, and trade and business services. The empirical studies find sizable effects of regulation on service sector performance (Nicoletti and Scarpetta 2003).

Service industries are less confronted with international competition than manufacturing industries since services are often not tradable across countries. From this point of view a change in the real exchange rate may have an implication for the disparity of productivity between the tradable sector and the non-tradable sector. An appreciation of the domestic currency increases the relative price of non-traded goods (services) to traded goods, which shifts production factors from tradable sectors to non-tradable sectors. Then, this resource allocation may result in a decline in the productivity of the service sector. This is the so-called Balassa-Samuelson effect, which may explain in part that some Asian countries have experienced a relative high productivity in traded goods and a lower productivity in non-traded goods with an appreciation of the domestic currency. Therefore, a change in the real exchange rate may have an effect on the productivity growth in the service sector (Canzoneri, et al., 1999).

To examine the determinants of labor productivity in the service sector, we adopt a panel regression as in the following form:

$$\Delta \log Y_{it} = \beta_1 \Delta \log Y_{it-1} + \beta_2 PERGDP_{it} + \beta_3 ADREG_{it} + \beta_4 X_{it} + u_i + \varepsilon_{it},$$

where the subscripts, i (=1,2...., -N) and t (=1970,....2003) denote country i ⁹⁾ and year t, and Y is the growth rate of the labor productivity in the service sector measured by the GDP over the labor employment in the service sector, PERGDP and ADREG denote per capita GDP and the index of administrative regulation from the OECD indicators, respectively. X is a vector of the other explanatory variables such as the share of value added in the service sector in GDP, the share of employment in the service sector, the share of intermediary service in the total value added in the service sector, and the change in the real exchange rate measured by the real value of the domestic currency relative to the US dollar. To consider the possibility of reverse

⁹⁾ We use data from the OECD Industry Structural Analysis Database (STAN) for service industries and other macro-variables are collected from the IMF's International Financial Statistics. The countries included in the regression are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, the UK, the US.

causality we include lagged dependent variables. u_i considers a country specific effect and, thus ε_{it} implies a country i-specific disturbance at year t.

Table 6 demonstrates the estimation results. For all the specifications (1) through (7), the coefficients of per capita GDP and the square of per capita GAP are estimated significantly, even though the size of the effect of per capita GDP on the service sector productivity growth decreases sharply when the lagged service productivity growth is included in (6) and (7). The negative sign of the square of per capita GDP with the positive sign of per capita GDP implies a nonlinear relationship between the service productivity growth and per capita GDP that the labor productivity growth rate in the service sector increases with per capita income but at a decreasing rate with per capita income. The coefficient of administrative regulation is negative and statistically significant in most of the specifications. This result emphasizes the role of deregulation policies in raising the labor productivity growth in the service sector. Restrictive regulations could damage entrepreneurial initiatives, which, in turn, might limit the service sector growth. Regulations also impair the ability of the economy to trigger new economic frontiers.

In the regression (1) the share of value added in the service sector has a negative effect on the labor productivity growth in the service sector, but the coefficient becomes insignificant when the real exchange rate or the previous productivity growth in the service sector is included. The share of employment in the service sector has a negative effect on the productivity growth for various specifications, which may reflect the diminishing returns to labor. The share of fulltime employment has a positive effect on the productivity growth but the share of financial intermediary in the aggregate GDP is not statistically significant. The lagged real exchange rate has a positive influence on the labor productivity growth, which implies a currency appreciation (a lower value of the variable) reduces the labor productivity in the service sector

since resources shift to the service sector out of traded good sectors. The large and significant values of the coefficient on the lagged productivity growth illustrate a high persistency.

Table 6. Determinants of Service Productivity, 1980–2003, Random Effects

		Deper	ndent varial	ole: Δlo	g (Produc	ctivity)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Per capita GDP	0.139	0.150	0.667	0.217	0.147	0.007	0.007
-	(0.062)*	(0.056)*	(0.174)*	(0.063)*	(0.057)*	(0.003)*	(0.003)*
	*	**	**	**	**	*	*
(Per capita GDP)2	-0.009	-0.007	-0.036	-0.014	-0.007		
	(0.003)*	(0.003)*	(0.009)*	(0.003)*	(0.003)*		
	*	*	**	**	*		
Administrative	-0.003	-0.009	-0.015	-0.000	-0.010	-0.004	-0.004
regulation							
	(0.003)	(0.003)*	(0.007)*	(0.004)	(0.003)*	(0.001)*	(0.001)*
		**	*		**	*	*
Service value added/GDP	-0.207				-0.033	-0.038	-0.018
	(0.033)*				(0.037)	(0.023)*	(0.026)
	**						
Service		-0.288			-0.315	-0.093	-0.099
employment/Total							
employment							
		(0.026)*			(0.036)*	(0.025)*	(0.027)*
		**			**	**	**
Share of fulltime			0.194				
			(0.079)*				
Intermediary services/GDP				-0.090	0.113		0.012
				(0.087)	(0.078)		(0.044)
Lagged exchange rate					0.035	0.026	0.025
					(0.010)*	(0.011)*	(0.011)*
Lagged dependent variable						0.421	0.436
						(0.047)*	(0.047)*
	1					**	**
Constant	-0.348	-0.527	-3.168	-0.706	-0.497	0.046	0.037
	(0.287)	(0.258)*	(0.841)*	(0.294)*	(0.267)*	(0.028)	(0.028)
Observations	465	483	212	464	464	404	403
C D D C I V U U O I D	100	100		101	101	101	100

Note: standard errors in parentheses, * significant at 10%; ** significant at 5%; *** significant at 1%.

5. CONCLUSION

This study examines the post-crisis macroeconomic adjustment of the countries that have experienced financial crises to identify the processes of adjustment and its consequences for the long-term economic growth. We particularly investigated the regional differences of adjustment patterns between Asia and Latin America. This would shed light on the existing stumbling blocks and weaknesses in the Korean economy that could hinder long-term economic growth.

The economic growth rates exhibit a V-type recovery pattern immediately after the crisis for most crisis-hit countries. However, while the growth rates of the Latin American countries and the East Asian countries seem to recover to their pre-crisis levels, the recent growth rates of the Korean economy are much lower than the pre-crisis level. Along with economic recovery, export growth rates in the post-crisis period are much higher than those of the pre-crisis period. The most interesting difference between the East Asian countries and the Latin American countries is the trend of investment before and after the crises. While there is not much difference between the pre- and the post-crisis investment rates in the Latin American countries, the investment rates in the East Asian countries dropped significantly after the crisis and remain at two-thirds of their pre-crisis levels even in the long-run. It might imply that investment rates in the East Asian countries have been too high and have to be corrected to a sustainable level. Or it might indicate that Asian investors become excessively risk-averse after the crisis. Depending on the answer, they have different implications for the future long-term growth for the crisis-hit Asian countries.

Realized sluggish economic growth in Korea compared with other crisis-hit countries brings about the question of why the Korean economy has not recovered to her pre-crisis level of economic growth. We analyzed the contribution of each input factor in the growth rate of GDP by industry based on the growth accounting analysis. The findings of the growth accounting analysis by industry can be summarized as follows. First, capital investment has been a major factor for increasing the growth rate of GDP for last three decades. Second, after the Asian financial crisis, there was a slowdown in the TFP growth rate. Third, there has been a significant decrease in the TFP in the Korean service sector. To sum up, we argue that the main cause of the slowdown in the growth rate after the 1997 financial crisis could be a slowdown in the TFP growth rate in all industries, and in

particular, a slowdown in the TFP growth rate of the service industries which are continuously carrying more weight in the national income.

Acknowledging the growing importance of the service sector in Korea, we compare the labor productivity in the service sector across many developed and developing countries and examine the determinants of the labor productivity based on a panel regression analysis. We find that the share of the service sector in terms of value added and employment and the productivity level of the service sector in Korea are very low relative to the developed countries. The higher the per capita income is, the higher is the labor productivity growth in the service sector with a decreasing rate. One important factor in determining the productivity growth in the service sector is administrative regulation. The level of administrative regulation has a negative and significant effect on the labor productivity in the service sector. This might imply that higher regulations limit an increase in the labor productivity in the service sector. In this context we suggest that the Korean economy should make the service markets more competitive by implementing extensive reforms of service sector regulations in order to increase the labor productivity growth in the service sector, which in turn increases the potential growth rate of the Korean economy.

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Comments on "Crisis, Adjustment, and Long-run Economic Growth in Korea"

Kwanho Shin Korea University

This paper provides insight on the financial crisis, subsequent adjustment, and long-run economic growth in Korea through a before- and after-crisis comparison with Latin American countries, four Asian countries and Korea. Although all countries exhibited a V-type recovery, Asian countries (including Korea) showed a relatively faster rate of recovery with a significant improvement in the current account. However, investment is substantially lower for only Asian countries and Korea after the crisis and Korea alone suffered a significantly lower growth rate.

It was found that TFP growth slowed down continuously after the crisis, from 3.31% in 1980–1990 to 1.78% in 1990–1997 and 1.48% in 2000–2005. The main cause of the slowdown of the growth rate after the crisis has been diagnosed as the slowdown of TFP growth, especially in the service sector. It was also found that administrative regulation is a significant factor explaining lower labor productivity in the service sector.

Why has growth significantly lower only in Korea? A popular answer is low investment, and yet investment has been lower in other Asian countries as well. The current account has substantially improved in other Asian countries, but this applies to Korea as well. The paper argues that low TFP growth is the main factor for low growth.

According to the data, TFP growth has decreased from 1.78% to 1.48%. Contrary to their findings, much recent research has shown the opposite. Pyo (2007) showed that TFP growth has significantly increased after the crisis. Studies by Lee (2005) and Shin (2007) show over 0.6% increase from pre-crisis levels, and Hahn and Shin (2007) show a gradual increase from 0.01% in 1990–1995, 0.10% in 1995–2000, and 0.20% in 2000–2005.

It seems there is a consensus that TFP growth in the service sector is low; however, this is not a recent phenomenon. Some explanations for the

reason that low TFP growth in the service sector is significant are, a) the share of service sector is increasingly larger, b) the speed of de-industrialization is too fast, and c) the China factor. As evidence for the de-industrialization argument, Japan's 10 year growth rate was 9% before slowing down to 5% after de-industrialization in the early 1970s. Korea also experienced a growth slowdown (in 1989) but the difference was not significant, falling from 7.8% to 6.3%. This may be explained by overinvestment, which delayed a significantly greater slowdown. It seems that the "catch-up" phase through factor accumulations is over and the change in the demography and the increase of income inequality after the crisis aggravates the growth performance.

Seminar Program

Ten Years after the Korean Crisis

Date: September 20-21, 2007 Venue: Shilla Hotel, Seoul, Korea

- Organized by International Monetary Fund (IMF) and Korea Institute for International Economic Policy (KIEP)
- Sponsored by Korea Center for International Finance (KCIF)

Sep. 20 (Thu)
8:30~9:00	Registration
	Venue: Ruby room, YoungBinGwan
[Opening Sea	ssion]
9:00~9:30	Welcoming Remarks
	• Kyung Tae Lee, President, KIEP
	• John Lipsky, First Deputy Managing Director, IMF
[Session 1]	The Korean Crisis and Economic Changes
Chaired by Il Minister	SaKong, Institute for Global Economics Chairman and former Finance
Venue: Ruby	room, YoungBinGwan
09:40~10:10	1. Two Crises of International Economics, Michael P. Dooley, University of California Santa Cruz, Peter M. Garber, Deutsche Bank and Davis Folkerts-Landau, Deutsche Bank
10:10~10:20	Discussant: Naoyuki Yoshino, Keio University
10:20~10:40	Coffee Break
10:40~11:10	2. Macroeconomic Policy Management in a Global Village: Are There Lessens for Korea?, <i>Charles Wyplosz</i> , The Graduate Institute of International Studies and <i>Yung Chul Park</i> , Seoul National University, KIEP

11:10~11:20	Discussant: Hans Genberg, Hong Kong Monetary Authority
11:20~11:50	3. Ten Years After the Crisis: The Financial System Transition in Korea,
	Joon-Ho Hahm, Yonsei University
11:50~12:00	Discussant: Shinji Takagi, Osaka University
12:00~14:00	Lunch
	Venue: Topaz room, YoungBinGwan
14:00~14:30	4. Corporate Sector Restructuring in Korea: Current Status and New Challenges, Stijn Claessens, IMF and Dong Soo Kang, Korea Development Institute
14:30~14:40	Discussant: Youngjae Lim, Korea Development Institute
[Session 2] (Changes Looking Forward: Towards Long-Term Stable Economic Growth
	arc Uzan, Reinventing Bretton Woods Committee
v enue: Kuoy	room, YoungBinGwan
14:40~15:10	E Achieving Long town Figgal Sustainability in Voyce Toulor
14.40* 15.10	5. Achieving Long-term Fiscal Sustainability in Korea, Tarhan Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF
14.40* 15.10	
14:10~15:20	Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF
14:10~15:20	Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and
14:10~15:20	Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements.
14:10~15:20 15:20~15:40	 Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements. Coffee Break 6. Household Debt Sustainability and Macroeconomic Implications, Meral Karasulu, IMF and Jerald Schiff, IMF
14:10~15:20 15:20~15:40 15:40~16:10	 Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements. Coffee Break 6. Household Debt Sustainability and Macroeconomic Implications, Meral Karasulu, IMF and Jerald Schiff, IMF Discussant: Chang Seok Oh, Korea Center for International Finance 7. Productivity Growth and Structural Changes in Korean
14:10~15:20 15:20~15:40 15:40~16:10 16:10~16:20	 Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements. Coffee Break 6. Household Debt Sustainability and Macroeconomic Implications, Meral Karasulu, IMF and Jerald Schiff, IMF Discussant: Chang Seok Oh, Korea Center for International Finance 7. Productivity Growth and Structural Changes in Korean Economy before and after the Financial Crisis, Hak K. Pyo, Seoul
14:10~15:20 15:20~15:40 15:40~16:10 16:10~16:20 16:20~16:50	 Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements. Coffee Break 6. Household Debt Sustainability and Macroeconomic Implications, Meral Karasulu, IMF and Jerald Schiff, IMF Discussant: Chang Seok Oh, Korea Center for International Finance 7. Productivity Growth and Structural Changes in Korean Economy before and after the Financial Crisis, Hak K. Pyo, Seoul National University
14:10~15:20 15:20~15:40 15:40~16:10 16:10~16:20 16:20~16:50 16:50~17:00	 Feyzioglu, Michael Skaarup and Murtaza Syed, all IMF presenter: Jerald Schiff, IMF Discussant: Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements. Coffee Break 6. Household Debt Sustainability and Macroeconomic Implications, Meral Karasulu, IMF and Jerald Schiff, IMF Discussant: Chang Seok Oh, Korea Center for International Finance 7. Productivity Growth and Structural Changes in Korean Economy before and after the Financial Crisis, Hak K. Pyo, Seoul National University Discussant: Chinhee Hahn, Korea Development Institute

Sep. 20 (Thu)

[Session 3] What is the Agenda for the Next 10 Years?

Chaired by Chang Jae Lee (KIEP)

Venue: Ruby room, YoungBinGwan

9:00~9:30	8. Changes in Labor Quality among New College Graduates in Korea, Dae Il Kim, Seoul National University
9:30~9:40	Discussant: Yeongkwan Song, KIEP
9:40~10:10	 Trade Structure, FTAs, and Economic Growth: Implications for East Asia, Chan-Hyun Solm, Kangwon National University and Hongshik Lee, KIEP
10:10~10:20	Discussant: Hyun-Hoon Lee, Kangwon National University
10:20~10:40	Coffee Break
10:40~11:10	10. Crisis Adjustments and Long-run Economic Growth in Korea, Changyong Rhee, Seoul National University, Doo Yong Yang, KIEP and Noh-Sun Kwark, Sogang University
11:10~11:20	Discussant: Kwanho Shin, Korea University

[Panel Discussion]

11:30~13:00 Panel Discussion

- Moderator: Yung Chul Park, Seoul National University, KIEP
 - · Hans Genberg, Hong Kong Monetary Authority
 - James M. Lister, Korea Economic Institute
 - Naoyuki Yoshino, Keio University
 - Robert McCauley, Representative Office for Asia and Pacific, Bank for International Settlements
 - Thomas Willett, Claremont University

13:00 Closing Reman

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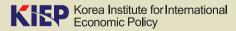


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