Republic of Korea: Selected Issues

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INTERNATIONAL MONETARY FUND

REPUBLIC OF KOREA

Selected Issues

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A. Introduction

1.   **Korea's population will age very rapidly in the coming decades, putting considerable pressure on age-related expenditures, particularly pensions.** This sweeping demographic change reflects the effects of rapid industrialization, urbanization, and income growth on fertility rates and life expectancy. As a result, Korea will become an "aged society" in two decades, and current pension systems will come under increasing financial strain. Health expenditures will also rise with the demographic transition, but these are of a lesser order of magnitude and will not be addressed here.

2.   **The authorities recognize the pension policy challenges ahead, and a first wave of reforms has already been launched.** As in many other OECD countries, Korea's defined benefit "first pillar" system is not fully funded, in large part due to overly generous benefit promises made in the past.[2] In recognition of the funding problem, the replacement ratio (pension benefits as a percentage of income at retirement) has been lowered, the retirement age and contribution rates for some are being increased gradually, coverage has been expanded to achieve universality and broader funding, and a series of operational and administrative reforms have been enacted. The government reviews the performance of the public pension systems every five years—the next review is in 2003, which will likely become a major issue for the newly-elected government. This paper aims to contribute to the debate on pension reform options in the context of that review.

3.   **Despite the reforms to date, much remains to be done. Without further reforms, the public pension systems in Korea are not financially sustainable.[3]** Although pension system assets are rising, they will peak near the end of the next decade due to mounting pension expenditures, and will be fully exhausted some 15–20 years later. In terms of annual flows, the current surplus of 2 percent of GDP will switch to a deficit of some 8 percent of GDP once the pension system matures; i.e., when the initial young cohort reaches retirement age. This outlook is robust to changes in key demographic and macroeconomic projections.

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[1] This paper was prepared by Paul F. Gruenwald (Resident Representative in Korea).

[2] World Bank (1994) pension nomenclature will be used throughout. "First pillar" refers to a publicly mandated, defined benefit system with the main goal of reducing poverty. "Second pillar" refers to a mandatory, defined contribution, privately managed system. A voluntary, private "third-pillar" system is not discussed.

[3] The public pension system is defined here as the National Pension System plus the occupational public pension schemes for veterans, teachers, and civil servants.

4.   **This paper considers options for moving to a funded first-pillar pension system.** Adopting a smoothing approach and using a partial equilibrium simulation model, it looks at combinations of changes to contribution and benefit parameters, and more aggressive portfolio investment that would put Korea's public pension systems on a sustainable path within a 60-year time horizon. The parametric reform options include: (i) a reduction in the replacement ratio of as much as 30 percent (in 10 percent increments) and (ii) an increase in the contribution rate of up to 100 percent (in 33⅓ percent increments).[4] An increase in the retirement age is already planned for the period in question, and is not considered as a candidate for reform in this paper. A second-pillar system based on the current "retirement allowance" system is discussed only briefly in terms of the sequencing of broader reform efforts. That system is also underfunded and is the subject of numerous reform proposals.

5.   **The main results show that a sustainable, funded pension system can be achieved in Korea with reasonably modest changes to key parameters and extra financing.** The paper does not come to a definitive view on the optimal reform-extra financing package. Rather, the results provide different combinations of parameter reforms, including benefit reductions, contribution rate increases, and equity allocations in the investment portfolio that would achieve given levels of additional financing in terms of GDP. For example, completely eliminating any additional financing need would require lowering the replacement ratio by 30 percent (20 percent) while increasing the contribution rate by two-thirds (100 percent), or some intermediate combination. Alternatively, generating a 1 percent of GDP annual financing requirement would require lowering the replacement ratio by 30 percent (10 percent) while increasing the contribution rate by one-third (100 percent), or some intermediate combination. The results suggest that pension system sustainability can only be achieved through a combination of reforms—choosing only one type of reform will generally not suffice.

6.   **Pension reform will also require attention to a host of institutional issues.** These include, but are not limited to: how to sequence the first- and second-pillar reforms to make them politically feasible (progress on the second-pillar reforms should arguably come first), the public-private split in first-pillar pension provision (the paper is agnostic as to what extent a reformed first-pillar system should be public or private, although some key trade-offs of that decision are discussed), and how and where to manage and invest the build-up of the large stock of assets necessary for sustainability. In addition, more work is required to assess the macroeconomic effects of pension system reforms.

7.   The remainder of the paper is organized as follows. Section B presents the demographics, a brief history of the evolution of retirement income in Korea, and the associated pension system challenges. Section C presents the model, simulation results, and

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[4] The parametric reform measures in this paper are broadly consistent with the recommendations of the Pension Reform Task Force—see Kong (2001) for details.

sensitivity analysis. Section D briefly touches on some operational and institutional issues that would need to be addressed in the context of the types of reforms under consideration. Section E concludes.

B. Demographics, the Retirement Income System, and Looming Challenges[5]

8.   **Support for the elderly in Korea has traditionally been provided by the family.** This was the norm in a largely rural society with a typical family size of over five children and relatively short life spans. In Korea's Confucian culture, children were largely responsible for the care—broadly defined to include any retirement income—of their elders. The idea of preparing for one's own retirement was virtually unknown. Thus, a central challenge for policymakers in the context of rapid development and urbanization has been how to move to a modern pension system.

Demographics and the Evolution of Retirement Income

9.   **Korea's still-young population reflects historical factors.** The average age of the population is only 33 years—the third lowest in the OECD—compared with the OECD average of 38 years. The elderly dependency ratio, defined as the population over 65 as a percentage of the working age population, is around 10 percent, one-half the OECD average. However, these apparently favorable statistics reflect relatively high birth rates and low life expectancy *in the past*, and are not indicative of future demographic trends.

10.   **With its rapid industrialization and the associated behavioral change, Korea is in the midst of sweeping demographic changes.** The change from an agrarian economy to an industrial power in less than fifty years has been accompanied by a marked fall in female fertility—by almost four children for each woman—and the largest increase in life expectancy among OECD countries—27 years. As a result, the aging of Korea's population will be among the fastest in the world. The population will peak at 52–53 million in the 2020s, and decline to current levels by 2050 (NSO, 2002). As a result, Korea will move from an "aging society" (defined by the United Nations as one where the population

Speed of Aging in Selected OECD Countries			
	Year when Share of Elderly Reached/s		
	7 percent	14 percent	Years
Korea	2000	2022	22
Japan	1970	1994	24
Finland	1958	1994	36
Germany	1932	1972	40
Greece	1951	1992	41
Portugal	1951	1992	41
Poland	1966	2013	47
United Kingdom	1929	1976	47
Switzerland	1930	1982	52
Italy	1927	1988	61
Canada	1945	2010	65
United States	1942	2013	71
Sweden	1887	1972	85
France	1864	1979	115

Source: OECD (2001).

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[5] This section draws on OECD (2001).

over age 65 is 7–14 percent of the total) to an "aged society" (where the population over age 65 is over 14 percent of the total) in only 22 years. This represents a small fraction of the transition time in most other OECD countries. Sensitivity analysis involving key demographic parameters suggests that this result is fairly robust.

11. **With the rise of incomes and urbanization, the family-centered model has begun to break down**. The most important change has been the dissolution of the multi-family household and the breakdown of the associated support system. The percentage of three-family households roughly halved from 1970 to 11 percent in the mid-1990s. While transfers from children still constitute the main source of retirement income, surveys show that these have fallen sharply, from 64 percent of retirement income in 1988 to 44 percent in 1994, replaced largely by increases in income from the government-mandated retirement allowance system. As of 1994, public and private pensions combined accounted for only 4 percent of retirement income for Koreans, compared with over 80 percent in other OECD countries.

12. **As Korea moved away from the family-based support system, a number of private and public retirement schemes were introduced**. Occupational schemes appeared in the early 1960s along with the retirement allowance system. The *National Pension Scheme* (NPS) and individual pension accounts appeared roughly one generation later.

- *Occupational schemes* were introduced for civil servants in 1960, military personnel in 1963, and private school teachers in 1975. Benefits are relatively generous, with a replacement rate of 76 percent, and portable across schemes. However, these schemes cover only 4 percent of the workforce, a share that is falling due to declining government employment.

- The *retirement allowance* is a mandatory payment to departing employees equivalent to at least one month's wage for each year of employment. It was established in 1961 for firms with more than 30 employees, and has since been expanded to firms with more than five employees. Over one-quarter of the workforce is entitled to the retirement allowance. Collective bargaining agreements typically specify the actual compensation, which is often more generous than the required minimum.

- Following a 15-year delay stemming in part from the economic crises of the 1970s, the *National Pension Scheme* (NPS) came into effect in 1988.[6] The NPS is a social insurance scheme with pension, insurance, and income redistribution elements. It is intended to cover workers not falling under any of the other public schemes.

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[6] For a history of Korea's public pension system as well as recent reforms, see National Pension Corporation (2001).

• *Individual private pension accounts* were introduced in 1994, and enjoy generous tax concessions. However, the number of accounts (one-tenth of the working population) and the average balances (one-half the average wage) remain low, due to low public awareness of—and hence demand for—pensions, as well as insolvency concerns for the institutions (insurance companies and investment trusts) managing these accounts.

Initial Reform Efforts

13.   **The shortcomings of the public pension system—fragmentation, inadequate coverage, and financial unsustainability—became increasingly apparent during the 1990s.** [7] The first major reform of the NPS began in December 1998, and included: expanding the coverage to include the urban self-employed, employees in workplaces with less than five workers, non-income earners, and foreign nationals;[8] lowering the average replacement ratio for workers with a 40-year history from 70 percent to 60 percent; and increasing the retirement age in five one-year steps every five years beginning in 2013, which will raise the retirement age from 60 to 65; and increasing the contribution rate of the self-employed from 3 percent to 9 percent, which will be done in one percentage point steps each July from 2000–05. Reforms in the other public pension systems took place more or less concurrently.

14.   **Administrative and operational reforms followed in 2000, including a ban on obligatory, subsidized lending to the government.** The size of the main operational committees was expanded to ensure a majority for representatives of insured persons groups—previously, government representatives and investment specialists held a majority of seats. Importantly, the "compulsory deposit" of National Pension Fund (NPF) resources with the government, which had received

National Pension Fund Asset Allocation (in percent)			
	1991	1996	2001
Government bonds	22	32	45
Corporate bonds	23	8	37
Equities	0	9	6
Trusts, Other	48	35	3
Short-term debt	8	16	8

Source: National Pension Corporation (2001).

below-market rates of interest, was phased out by June 2001. In addition, an external manager for the NPF was hired, management of a small part of NPF assets was outsourced to private firms, and the NPF was allowed to invest overseas as well as in futures and options.

[7] See World Bank (2000) for a detailed discussion of these issues.

[8] The system's initial coverage included workers in firms with 10 or more employees, which was extended in 1992 to workers in firms with five to nine employees.

Long-term Growth and the Pension Balance

15.   **GDP growth will decline in the coming decades owing largely to demographic trends and productivity convergence.** According to the OECD and the Korea Development Institute, annual employment growth will fall steadily to zero in 2020 and to -0.7 percent by 2050. This reflects broadly unchanged male labor force participation rates, a 20 percentage point rise in female participation rates to levels more in line with OECD averages, and population aging, which dominates the effect on labor force growth of higher female participation. Regarding labor productivity, the projections broadly follow OECD (2001) in assuming that Korean productivity converges to the one-half of the U.S. level, from less than one-third at present and one-tenth a generation ago.[9] This implies that the growth of labor productivity declines gradually from over 3 percent in the first decade of the century to 1¾ percent by 2050. As a result, the OECD-KDI study assumes that GDP growth falls from over 5 percent this decade to 1–1½ percent in the final decades of the projection period. Although this growth assumption is low compared with most estimates of potential growth in Korea, which undoubtedly refer to a much shorter time horizon, the assumed rate is not crucial for the analysis presented below.[10]

16.   **The rapid aging of the population and the associated maturing of the NPS will result in a sharp deterioration in the pension balance.** From a surplus of about 2 percent of GDP in 2002, the public pension balance declines steadily to a surplus of ¾ percent of GDP by 2020, falls sharply thereafter to a deficit of around 7 percent of GDP by 2045, and levels off at around 8 percent of GDP by 2060. Most of the deterioration comes from the NPF. The occupational schemes currently have a small overall deficit, which declines steadily before leveling off at 2–2½ percent of GDP around 2030. The projected deterioration

Pension System Balance

Sources: KDI (2002) and author's calculations.

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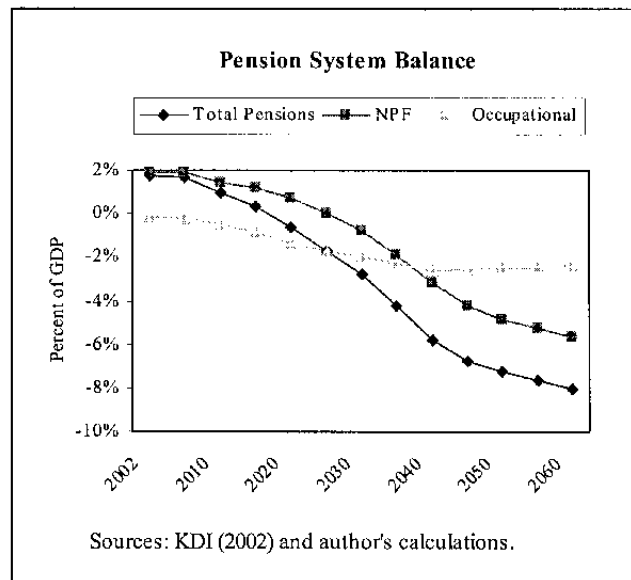
[9] This was labeled the "convergence" scenario in the OECD-KDI study. A "no convergence" scenario, where labor productivity in Korea is assumed to grow in line with the U.S., which would be less than in the convergence scenario, was also presented, but is not discussed here.

[10] Lee (2001) finds that changes in labor productivity growth, and hence output growth, have only a marginal impact on the pension balance: a 0.5 percentage point reduction (increase) in annual labor productivity growth resulted in a 15 percent decline (increase) in both pension-related revenues and expenditures by 2050, leaving the pension balance largely unaffected, as the reduction in pension contributions is offset in percentage terms by reduced benefits.

of the pension balance in Korea is the largest among the OECD countries, although net pension outlays as a percent of GDP would be in the middle range of OECD countries by the end of the projection period.

C. Simulations

17. **The analysis of pension system financial sustainability is undertaken using an approach that smoothes changes in contribution rates and in future consumption across generations.** Such an approach is attractive owing to the 10 percentage point of GDP deterioration in the pension balance noted above. Given a swing of such magnitude, the role for public policy is to minimize the reduction in the consumption of future generations, who would otherwise face sharp increases in taxes to finance future pension outlays (Gruber and Wise, 2001). In essence, the idea behind the model is to use politically feasible reforms and market-based assumptions on rates of return to construct a 60-year reform-investment plan that puts the pension system on a sustainable financial path and minimizes the variance in contribution rates and consumption across generations.[11]

18. **A summary of the model—which is formally presented in the Annex—is as follows:**

- Objective: given the demographic and macroeconomic framework described above and the pension-related parameters described below, the model calculates a constant annual resource requirement (as a percent of GDP) that is consistent with full funding by end-2060.[12] *Full funding is defined as an end-period asset level that is sufficient to generate returns to finance all future pension expenditures without requiring any additional non-pension system resources thereafter.* Thus, the model generates self-sustaining paths for pension system assets under various reform scenarios.

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[11] The methodology is based on Feldstein and Samwick (1997), who study the transition path from a partially-funded government-run pension system to a private, fully-funded plan for the United States. Their approach exploits the difference between the historical returns to equity and the implicit return in the current pension system to finance the transition to a fully-funded pension system. In a related model (Feldstein and Samwick, 1999), mandatory individual retirement accounts are set up and invested in a 60–40 equity-bond mix.

[12] The time frame is, of course, arbitrary. The adoption of 2060 as the end year accords with the latest pension projections of the Korea Development Institute. Feldstein and Samwick use a 75-year projection period.

- The simulations assume that any pension-related surpluses are "lock-boxed." This means that any pension surplus is invested and that there is no diversion, for example, into the government's general account. In addition, the government is assumed not to finance deficits in the occupational pension plans out of general revenues, which it is doing at present—those amounts are captured under the aggregate pension balance.[13]

- Baseline pension-related parameters are pension system assets of 15 percent of GDP at end-2001; a real interest rate on debt of 3 percent;[14] and an equity premium of 300 basis points.[15]

- The model considers two types of parameter reforms: a reduction in the replacement ratio and an increase in the contribution rate. For the replacement ratio, step reductions of 10, 20, and 30 percent over 10, 20, and 30-year

Pension Contribution Rates in OECD Countries, 1995 (As a percent of average earnings)	
United States	12.4
Japan	16.5
Germany	18.6
France	19.8
Italy	29.6
United Kingdom	13.9
Canada	5.4
Austria	22.8
Belgium	16.4
Denmark	1.0
Finland	17.9
Ireland	15.7
Netherlands	14.5
Norway	22.0
Portugal	13.9
Spain	28.3
Sweden	19.8
Switzerland	8.4
Unweighted average	16.5
Source: Blondal and Scarpetta (1998).	

time periods, respectively, are considered. These reforms are assumed to begin in 2010 and would reduce the replacement ratio to 42 percent in the 30 percent case, which is broadly consistent with a number of reform proposals currently on the table.[16] For the contribution rate, increases of 33, 67, and 100 percent are considered over periods of 10, 20, and 30 years, respectively, also beginning in 2010. These

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[13] Social security funds as defined in the consolidated fiscal balance released by the government exclude the government employees pension fund and the military pension fund.

[14] The aging model for a stylized OECD country assumes a 4 percent real interest rate (Dang *et al.*, 2001).

[15] The 10-year average equity premium is 340 basis points (bp) for the United States, 280 bp for Germany, and 360 bp for Japan (IMF, 2002). During 1926–91, the equity premium in the United States was 700 bp (Edleson, 1993).

[16] Moon (2002) argues that benefit reduction is more defensible than contribution increases since Korea's first-pillar replacement ratio is 60 percent compared with 40 percent in the U.S., U.K., and Canada, and in light of the (implicit) 25 percent replacement ratio in the second-pillar system. He notes from Schmitt (1985) that the aggregate replacement ratio for an OECD country should be 55–70 percent.

magnitudes take into account that contribution rates in Korea—9 percent for the NPS and 13–15 percent for the occupational plans—are relatively low by OECD standards (see text table), and were chosen to broadly match the impact of the step reductions in the replacement ratio. Indeed, as will be seen below, the presentation of all possible parameter reform scenarios results in a matrix of residual resource requirements that is nearly symmetric.

• The sensitivity of the results is tested by varying the equity premium by 100 bp in both directions, which could equivalently be interpreted as lower or higher real interest rates.

The sequence of the analysis is to first derive the path for pension system assets under the baseline scenario. The effects of adopting a more aggressive investment portfolio are then presented as well as the resulting resource requirements needed to fund the system. The magnitude of the residual resource requirement suggests that parameter reforms will be needed to bring the funding requirement down to a more politically feasible level. Parameter reforms are then added, and their effect on the pension balance is assessed. Finally, the trade-offs between all parametric reforms, more aggressive portfolio investment and additional financing, as well as a sensitivity analysis, are presented.

Financial Implications of the Current Pension System

19.   **Under the baseline scenario, pension system assets will peak in the mid-2010s, and will be fully exhausted two decades later; a more aggressive investment strategy will only marginally postpone the depletion date**. Assuming a debt-only portfolio,[17] the value of pension system assets will rise to just over one quarter of GDP in the middle of the next decade, and turn negative in 2033. (The NPF will run surpluses for another 30 years or so.) Allowing up to 75 percent of the

Pension System Performance Baseline Scenario			
Equity Share (in percent)	Peak Year	Peak (in percent of GDP)	Fund Depleted
0	2016	27	2033
25	2017	29	2034
50	2018	32	2036
75	2021	35	2038

pension portfolio to be invested in equities only pushes out the peak year and the year in which the funds are depleted by five years, with system assets peaking at 35 percent of GDP. The implications are twofold: first, the deterioration of the public pension balance outweighs the positive effects of the higher investment returns; and second, that an aggressive investment strategy alone will not ensure pension system sustainability.

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[17] This assumption is intended to approximate the end-2001 composition of the NPF, where equity investments comprised less than 10 percent of the portfolio.

20.   **Without parametric reforms, funding the pension system would require additional financial resources of 2¼–5¾ percent of GDP per year**. The results appear in the upper-left cell of Table I.1.a. The high end of the range represents the additional resources required if no equity investment were undertaken, while the low end reflects a 75 percent equity allocation.[18] These results are somewhat sensitive to the assumption for the equity premium. For example, for the 50 percent equity allocation, reducing (increasing) the equity premium by 100 basis points increases (reduces) the annual resource requirement to fund the system by around ½ percent of GDP. It is doubtful whether sustained fiscal surpluses of 2¼-5¾ percent of GDP are politically feasible, suggesting the need for further reforms to the public pension system to reduce its cost.

Reform Scenarios

21.   **Implementation of parametric reforms can substantially improve the pension balance**. Assuming a zero allocation to equity in the portfolio, each increment in the reforms to the replacement ratio and contribution rate outlined above (i.e., 10 percent reductions in the replacement ratio and 33 percent increases in the contribution rate) would improve the pension balance by around 1 percentage point of GDP by the end of the projection

Pension Balances at end-2060 Under Reform Scenarios
(in percent of GDP)

| | Increase in the Contribution Rate | | | |
	0%	33%	67%	100%
Reduction in the replacement ratio				
0%	-8.0	-7.1	-6.2	-5.3
10%	-7.0	-6.0	-5.1	-4.2
20%	-5.9	-5.0	-4.0	-3.1
30%	-4.8	-3.9	-3.0	-2.0

period. Thus, adoption of the strongest reforms to both parameters would reduce the pension balance deficit to 2 percent of GDP by the end of 2060.

22.   **Combined with parametric reforms, moderate allocations to equity in the portfolio provide a number of options to reduce the annual resource contribution necessary to fund the pension system to less than 1 percent of GDP** (Table I.1.a). Assuming an equity allocation in midpoint of the 25–50 percent range, the resource requirement could be reduced to under 1 percent of GDP per year by implementing a 30 percent reduction in the replacement ratio combined with a one-third increase in the contribution rate, a 10 percent reduction in the replacement ratio combined with a doubling of the contribution rate, or any combination in between. The elimination of any additional resource requirement could be achieved by increasing the strength of both parametric reforms by one additional increment. The stock of assets at end-2060 consistent with funding the system would fall by around one-half in these scenarios compared to the baseline. Regarding sensitivity, a 100 bp decrease (increase) in the equity premium would raise (lower) the annual resource requirement by roughly ½ percent of GDP (Tables I.2).

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[18] Alternatively, a one-time up-front funding of the pension system would require resources of some 200 percent of GDP for equity allocations in the 25–50 percent range (Table I.1.b, upper-left cell).

Table I.1. Pension System Baseline and Reform Scenarios
(in percent of GDP)

a. Resources Required to Fund Pension Systems

			Increase in the Contribution Rate					
	0%		33%		67%		100%	

Reduction in the Replacement Ratio

0%	5.77	4.19	4.65	3.23	3.73	2.49	2.99	1.93
	3.08	2.24	2.24	1.49	1.62	0.96	1.18	0.62
10%	4.82	3.43	3.68	2.47	2.76	1.72	2.02	1.16
	2.45	1.71	1.61	0.95	0.99	0.43	0.55	0.08
20%	3.92	2.74	2.79	1.77	1.86	1.03	1.12	0.47
	1.90	1.26	1.05	0.50	0.44	-0.02	0.00	-0.36
30%	3.14	2.16	2.00	1.19	1.08	0.45	0.34	-0.11
	1.45	0.91	0.61	0.16	-0.01	-0.37	-0.45	-0.71

b. End-2060 Pension System Assets

			Increase in the Contribution Rate					
	0%		33%		67%		100%	

Reduction in the Replacement Ratio

0%	274	219	243	195	212	170	180	145
	183	157	163	140	142	122	121	104
10%	238	191	206	165	175	140	143	115
	159	137	138	119	117	100	96	82
20%	201	161	169	136	138	111	106	85
	135	116	113	97	92	79	71	61
30%	164	131	132	106	101	81	70	56
	110	94	88	76	67	58	46	40

Note: The northwest, northeast, southwest, and southeast elements of each cell correspond to pension portfolio equity allocations of 0, 25, 50, and 75 percent, respectively. Negative figures in Table I.1.a indicate an excess of resources.

Source: Author's calculations.

Table I.2. Sensitivity Tests
(in percent of GDP)

a. Resources Required to Fund Pension Systems Under a 200 bp Equity Premium

	Increase in the Contribution Rate			
	0%	33%	67%	100%
Reduction in the Replacement Ratio				
0%	4.65 3.78　3.08	3.65 2.87　2.24	2.85 2.17　1.62	2.24 1.65　1.18
10%	3.83 3.07　2.45	2.82 2.15　1.61	2.02 1.45　0.99	1.41 0.94　0.55
20%	3.08 2.43　1.90	2.07 1.51　1.05	1.27 0.81　0.44	0.66 0.30　0.00
30%	2.44 1.90　1.45	1.43 0.98　0.61	0.63 0.28　-0.01	0.02 -0.23　-0.45

b. Resources Required to Fund Pension Systems Under a 400 bp Equity Premium

	Increase in the Contribution Rate			
	0%	33%	67%	100%
Reduction in the Replacement Ratio				
0%	3.78 2.49　1.57	2.87 1.72　0.89	2.17 1.16　0.44	1.65 0.79　0.16
10%	3.07 1.94　1.12	2.15 1.15　0.43	1.45 0.60　-0.01	0.94 0.23　-0.29
20%	2.43 1.46　0.75	1.51 0.67　0.06	0.81 0.12　-0.38	0.30 -0.25　-0.66
30%	1.90 1.08　0.47	0.98 0.30　-0.21	0.28 -0.25　-0.66	-0.23 -0.63　-0.94

Note: The northeast, southwest, and southeast elements of each cell correspond to pension portfolio equity allocations of 25, 50, and 75 percent, respectively. Negative figures indicate an excess of resources.

Source: Author's calculations.

D. Institutional and Operational Issues

23.   The reforms to the public pension systems currently under consideration, which are not limited to those discussed above, suggest a number of institutional and operational issues that will need to be addressed. These issues will tend to increase in importance as the system—in particular the NPS, given its predominance—matures and as pension assets increase.

24.   **Attention will need to be paid to the sequencing of pension reforms, including in combination with the second pillar system.** While there is consensus among Korean economists as to the source of the current sustainability problem, there is no consensus on the solution. Time will be needed to build momentum for the next round of reforms. On the link with the second pillar system, it will be important to establish a credible transition from the current, largely unfunded retirement allowance system to a joint employer-employee funded defined contribution plan in order to lay the groundwork for the reforms to the first-pillar system described above.[19] With that would come a welcome development in the investment culture and investor sophistication that would hopefully allow the kinds of reforms under discussion to become politically feasible.

25.   **The public-private split of any first-pillar system will need to be resolved.** As noted above, Feldstein and Samwick recognize that, in principle, pension contributions in their framework could be collected and invested by the government, although they preferred a decentralized system. This sentiment has been echoed by a U.S. expert panel on social insurance (Diamond, 1999), who argue that adoption of a private model would: (i) instill ownership in the retirement system on the part of citizens; (ii) offer individuals more choice regarding their investments, thereby better aligning their portfolios with individual preferences; (iii) reduce the influence of the government over both the investment of the funds and the workings of corporations whose stocks were held; and (iv) lessen the temptation for the government to spend the accumulated funds. That said, the public system still enjoys considerable support in Korea. The public-private issue will need to be debated against the backdrop of an increasingly sophisticated financial system and an increasingly financially sophisticated populace. However that debate is resolved, the need for appropriate firewalls and high transparency remain regardless of who manages pension system assets.

26.   **The issue of a passive or an active investment approach would need to be addressed.** The passive, or indexing, investment approach is based on efficient markets theory and would entail a strategy of trying to mimic—rather than outperform—a benchmark index. This approach would carry a number of advantages: operating costs tend to be lower since there is lower turnover; the need for investment advisors is lower since the main objective is to replicate (not beat) the performance of a selected benchmark; and the system would be more transparent and therefore less prone to political interference. If a more active

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[19] This has become particularly pressing since members of President-elect Roh's transition team have come out against promoting the development of a second-pillar system.

approach is chosen, consideration will need to be given to the issue of goal and instrument independence, with the owner of the funds setting the former and the managers having the latter. Management expertise will, of course, be a much more important issue in an active system, as will the issue of the appropriate level of competition amongst asset managers.

27.   **There are clear benefits from investing pension assets abroad, although this remains a delicate issue in Korea**. The main advantage of pension funds investing abroad would be to diversify the portfolio; indeed Korea, like most other countries, suffers from a "home country bias" in its public pension asset allocation. Local markets are not perfectly correlated with international markets, so investing abroad would improve the risk-return tradeoff. Moreover, the size of Korea's bond and equity markets remains modest by international standards, and managing and purchasing assets of the size discussed above— often over 100 percent of GDP—could have distortionary effects on the market. Furthermore, international investment would hedge against the high long-run correlation between real returns on human and physical capital in Korea. Foreign investment of pension funds would lead to foreign currency risk, which would need to be managed, though arguably not fully hedged over the long run.

E. Conclusions and Further Research

28.   **Sustained and relatively modest reforms should be sufficient to ensure the financial sustainability of Korea's first-pillar pension system**. These reforms include a phased reduction in the replacement ratio of up to 30 percent, a phased increase in the contribution rate of up to 100 percent, and the adoption of a significant—but still minority— allocation to equity in the pension asset portfolio. The results also hinge on "lock-boxing" the ongoing pension system surpluses, but not on continuing to finance deficits in the occupational plans out of general revenues. Under the assumption that achieving pension system sustainability would require additional fiscal resources (say, on the order of 1 percent of GDP per year), this would have implications for medium- and long-term budgeting. When these reform measures in the first pillar system are combined with the necessary reform of the current retirement allowance system into a private savings plan, the sum of the replacement ratios for the first and second pillar systems would be on a par with comparator countries.

29.   **Additional work should verify to what extent the results obtained here are model dependent**. Possible alternative specifications could include: a rolling smoothing period, varying the end-period objective, letting the fiscal savings rule vary over time, and consideration of a longer projection period. Whatever approach is taken, the margins of error involved in compounding and in adopting realistic assumptions on rates of return and equity premia argue for regular reassessment and recalibration of the system.

30.   **Finally, the macroeconomic effects of pension reform strategies need to be explored further**. The partial equilibrium framework employed above is sufficient to identify the "first round" effects and trade-offs involved in moving to a financially sustainable pension system. While useful, this approach arguably falls short of a definitive

assessment of the funding issues. Three key relationships that would need to be modeled in a computable general equilibrium model in the context of pension reform would be: the effects on national savings, or, alternatively, the amount of Ricardian offset; the response of labor supply to any tax changes and pension wealth; and the effects on the composition of the current account, particularly from investing large amounts of assets abroad. Ideally, a general equilibrium analysis would also capture the interaction of the defined-contribution and defined-benefit schemes under consideration, which would lead to a better informed investors and pensioners and more precise tools for policymakers.

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THE MODEL

The model is a discrete time, finite horizon optimization problem. The planner is given time paths for real GDP and pension expenditures as well as parameter values for the real riskless interest rate, equity premium, and portfolio allocation. Subject to these, she chooses a time invariant government savings rule so that the end-period pension fund asset stock is sufficient to generate resources to fund pension outlays for all subsequent years without reducing end-period principal. The model must be solved using algorithmic methods.[20]

Formally, the model is as follows:

Choose:

$$Y_t^* = Y^* \qquad \text{for } t = 2, 3, 4, \ldots, 60$$

Subject to:

$$\frac{A_{t-1}}{1+g_t} + X_t + Y_t + Z_2 - P_t + \frac{i_t \overline{A_t}}{2} = A_t$$

$$i_t = (1-\alpha)r_t + \alpha e_t = (1-\alpha)r_t + \alpha(r_t + s_t) = r_t + \alpha s_t$$

$$i_{50} A_{50}^* = P_{50}$$

$$A_1 = 15$$

Where:

A_t = end-period pension system assets in year t

$\overline{A_t}$ = the average pension system assets in period t

X_t = the fiscal policy rule (i.e., surplus excluding pension balance) in period t

Y_t = the additional fiscal surplus needed to fully fund the system

Z_2 = a one-off injection into the pension system in period 2

P_t = net pension balance (contributions less outlays) in period t

g_t = real GDP growth rate in year t

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[20] Simulations for the present model were solved using the "Goal Seek" function in Excel.

i_t = real riskless (government bond) rate of return in period t

α = share of portfolio allocated to equities

e_t = real return on equities

s_t = equity premium (in percentage points)

Scenario values:

$\alpha = \{0,.25,.5,.75\}$

$s = \{2,3,4\}$

All variables are real, and upper-case denotes variables expressed as a percentage of GDP. Time is indexed so that 1,2,3 ... correspond to 2001, 2002, 2003...:

The model was also used to simulate the "stock solution" to the problem where the objective is to choose Y_1^* with $Y_t^* = 0$ for $t = 2, 3, 4, ..., 60$. In these scenarios, the question is what about of resources is needed up front (i.e., in period 1 only) to fund the pension systems.

II. Budget Formulation and Implementation in Korea: A Macroeconomic Perspective[1]

A. Introduction

1.   Korea has an admirable tradition of fiscal conservatism, with a deep-rooted resistance to incurring fiscal deficits and public debt. On the eve of the financial crisis that erupted in late 1997, gross public debt was below 10 percent of GDP as a result of near balanced budget outcomes in the preceding decade. The fiscal accounts, however, have not been very transparent: the budget structure is unnecessarily complicated and fragmented; and weaknesses in budget formulation and implementation make the budget a poor indicator of the overall fiscal stance and reduce its efficiency as a tool of macroeconomic policy.

2.   In recent years the government has introduced a medium-term plan for fiscal consolidation and initiated reform measures to improve fiscal transparency. A special law on fiscal soundness was submitted to the National Assembly in 2001 that aims to achieve a balanced budget and ensure prudent debt management. There is a political consensus in Korea on the need to reduce public debt, which, although low by OECD standards, is at historically high levels as a result of the financial crisis in the late 1990s. There are also plans to revise the Budget and Account Law to adopt performance-based budget preparation and implementation and to ensure better provision of information on fiscal operations to the public. These reform measures notwithstanding, more consideration needs to be given to the role of fiscal policy in macroeconomic management. In particular, there is a need to formulate fiscal policy in a medium-term framework so that the fiscal stance is appropriate to developments in the business cycle.

3.   Fiscal policy as a tool of macroeconomic management is hampered by two factors. First, the automatic fiscal stabilizers are relatively weak in Korea. The weakness of the automatic stabilizers reflects the small size of government and the small social welfare system, which means that expenditures are relatively insensitive to fluctuations in economic activity. Second, there is a relatively high degree of uncertainty about fiscal outcomes in Korea, with actual budget outturns often deviating from the budget plans by a large margin. Thus, the impact of fiscal policy in any given year is often different from what was initially intended or considered desirable, with the risk that it becomes destabilizing. In particular, large systematic expenditure shortfalls and overshooting of revenues tend to make the fiscal stance pro-cyclical during an economic downturn.

4.   This chapter describes the main features of the Korean fiscal system from a macroeconomic perspective. It discusses why fiscal outturns tend to differ from the budget and makes suggestions to improve budget formulation and implementation. It also discusses how medium-term fiscal objectives such as maintaining a balanced budget and reducing public debt can be reconciled with the short-term objective of avoiding procyclical fiscal impulses in a downturn.

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[1] This paper was prepared by Dong He (APD).

5.   The following section describes the main characteristics of the revenue and expenditure structures and analyzes how such characteristics affect the size of automatic fiscal stabilizers in Korea. Section C describes patterns of deviations of budget outturns from budget plans and analyzes the causes for such deviations. Section D discusses the impact of the budget on aggregate demand. Section E presents recommendations about the role of a medium-term fiscal framework in strengthening the budget as a tool of macroeconomic management. Section F concludes.

B.   Main Features of Government Expenditure and Revenue

6.   Since the mid-1980s, the Korean government implemented conservative fiscal policies that contributed to low gross public debt on the eve of the 1997–98 financial crisis.[2] The principle of "expenditure within revenue," which was adopted in the mid-1980s, limited spending commitments to anticipated revenues, even though no formal fiscal rules were imposed by the constitution or by legislation. The breakout of the financial crisis in late 1997 marked a major shift in the stance of fiscal policy. Instead of balanced budgets during a period of high growth, the government ran large deficits during the crisis, reflecting the sharp contraction of tax receipts in the economic downturn as well as discretionary fiscal support to demand. In addition, the government incurred large contingent liabilities by guaranteeing bonds issued by the Deposit Insurance Fund and the Nonperforming Assets Management Fund in the context of financial sector restructuring.

Consolidated Central Government Balance

Sources: Ministry of Finance and Economy; and Fund staff estimates.

Central Government Gross Debt

Government-guaranteed bonds for financial sector restructuring

Sources: Ministry of Finance and Economy; and Fund staff estimates.

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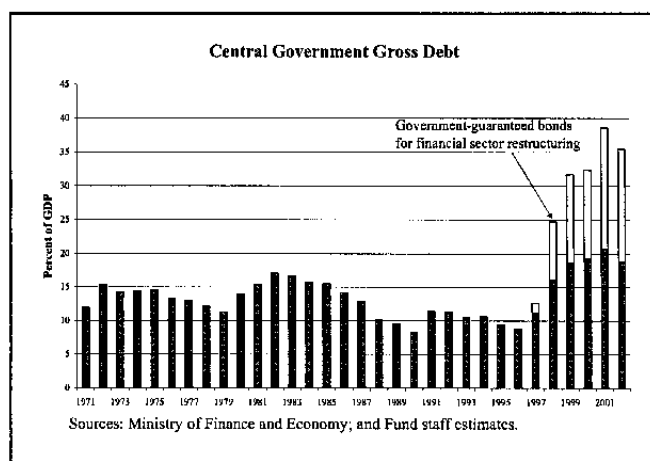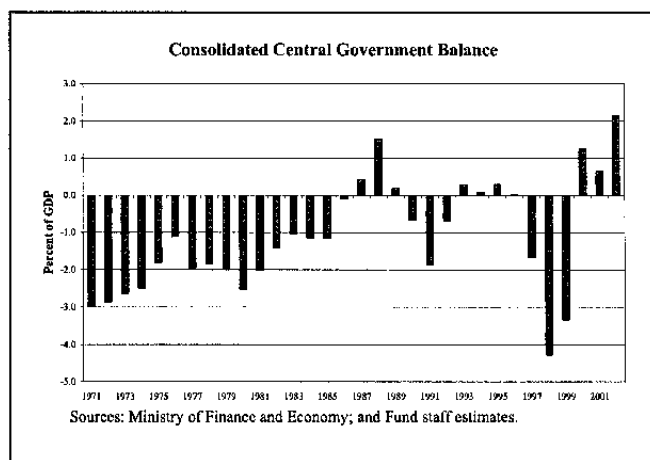
[2] Korea was one of the few OECD countries where net public debt was negative; that is, the central government was a net creditor to the other sectors in the economy. There are doubts, however, about the quality of government assets, which are mostly loans to local governments and private entities (Koh, 2000).

7.   Another defining characteristic of Korean fiscal conservatism is the relatively small size of government. On a general government basis, total public expenditure in 2000 amounted to 23 percent of GDP, the lowest except for Mexico among OECD countries (OECD, forthcoming). While this was partly due to Korea's level of economic development, Greece, Portugal, and several central European countries with comparable or lower income levels have far higher spending levels.

| General Government Spending by Economic Category					
(in percent of GDP in 2001)					
	Income Transfers	Subsidies	Interest Payments	Consumption	Net Capital Outlays	Total Outlays
Korea (2000)	3.6	0.3	0.7	10.1	8.3	23.0
Australia	8.9	1.1	2.0	18.5	2.2	32.7
Germany	18.9	1.6	3.3	19.0	3.0	45.7
Greece (2000)	16.3	0.2	7.1	15.5	4.9	44.0
Japan	10.0	0.9	3.3	16.7	5.9	36.8
Mexico (2000)	1.7	0.3	3.6	11.1	5.3	21.8
Portugal	12.5	1.4	3.1	20.7	4.4	42.1
Sweden	18.1	1.5	3.4	26.7	2.5	52.2
United States	11.4	0.5	3.4	15.1	0.9	31.2
OECD total	12.8	0.9	3.5	17.3	2.8	37.3

Source: OECD (forthcoming).

8.   Moreover, the composition of government expenditures by economic classification differs substantially from most OECD countries. Three major factors underlie the comparatively low public spending level in Korea. First, income transfers are limited by the relatively small size of the social safety net. At 3.6 percent of GDP, such spending is a quarter of the OECD average, although it is higher than in Mexico. Second, government consumption, at around 10 percent of

Primary Government Spending by Function							
(in percent of GDP in 2000)							
	Defence	General Public Services	Public Order and Safety	Education	Health	Social Protection	Economic Affairs
Korea							
1990	3.9	2.5	1.2	3.4	1.7	2.5	3.8
1998	3.1	3.2	1.5	4.1	2.4	3.9	5.6
Germany	1.2	3.9	1.6	4.3	6.3	21.9	4.2
Greece	3.3	10.0	1.1	4.2	3.9	19.6	0.2
Japan	1.0	2.9	1.5	4.2	6.2	10.7	4.7
Portugal	1.7	6.4	2.0	6.9	6.4	13.0	5.8
Sweden	2.2	10.2	1.3	6.9	6.3	24.5	4.0
United States	3.3	4.2	1.9	4.8	5.0	6.5	1.9
Average	2.3	5.8	1.6	5.1	5.2	14.3	3.8

Source: OECD (forthcoming).

GDP, is well below the OECD average of 17 percent. Third, relatively low public debt translates into modest interest payments as a share of GDP. In contrast, public investment is exceptionally high, with net capital outlays exceeding 8 percent of GDP. The structure of public expenditure classified by function also shows large differences with other OECD countries. Publicly provided social protection is significantly lower in Korea. On the other hand, defense spending, at around 3 percent of GDP, is double the OECD average, reflecting continued security concerns in the Korean peninsula.

9.   The Korean tax system is characterized by a low overall tax burden and limited labor market distortions (OECD, 2000). Total government revenue, at 23 percent of GDP, were among the lowest in the OECD. The low tax burden in Korea reflects a combination of narrow tax bases and relatively low marginal effective tax rates. The tax mix in Korea relies

more heavily on consumption and property taxes than many other OECD countries. The 38 percent share of consumption taxes in total revenues is substantially higher than in countries such as Japan and the United States, despite a sharp fall in recent years.[3] In addition, taxation of labor (as measured by average effective tax rates) is much lower in Korea than elsewhere in the OECD, while average taxation of consumption and capital appear to be close to the OECD average.

Tax Structure in Selected OECD Countries in 2000

Source: Revenue Statistics, 1965-2001, OECD.
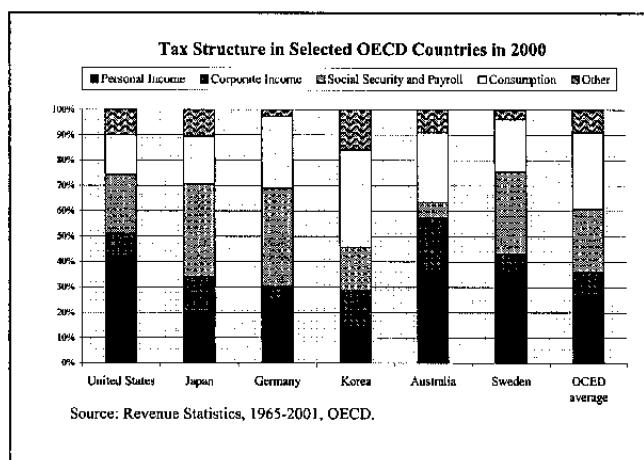
10.   These characteristics of government expenditure and revenue render the automatic fiscal stabilizers weak in Korea. As indicated by van den Noord (2000), the most important factor determining the cyclical sensitivity of the fiscal position is the size of the general government sector: the larger the share of government expenditure in domestic output, the greater is the sensitivity of the fiscal position to fluctuations in economic activity. The progressivity of taxes, the generosity of unemployment benefits and the cyclical sensitivity of various tax bases are also significant factors in determining the cyclical sensitivity of the fiscal position. In future, the automatic stabilizers in Korea may be strengthened as a result of expected changes in the size and structure of government spending and tax reforms discussed below.

11.   The size and structure of government expenditure and revenue in Korea are likely to experience significant changes over the medium term. Social welfare spending increased as the social safety net was expanded after the 1997–98 financial crisis. Subsequently, the government launched the "productive welfare" system in October 2000 to ensure minimum subsistence standards, which made social benefits under the Basic Livelihood Protection Program a right

Government Spending on the Social Safety Net

	1997	1998	1999	2000	2001	2002
Total (in billion won)	10,148	14,921	20,526	17,509	22,993	23,980
(in percent of GDP)	2.2	3.4	4.3	3.4	4.2	4.0
Of which:			(In percent of total)			
Unemployment insurance	1.7	8.0	8.3	6.5	7.5	8.8
Support for minimum living cost	9.4	7.6	8.7	13.7	14.5	14.5
Occupational accident insurance	1.5	9.7	6.2	8.3	7.8	7.9
National Health Insurance [1]	57.3	46.1	38.6	51.6	57.6	55.6
National Pension [2]	14.8	16.3	19.0	9.1	6.8	9.4

Source: OECD (forthcoming).
[1] Payment for medical treatment.
[2] Pension payment.

for those who qualify. The newly elected government of President Roh, Moo-hyun may

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[3] The share of taxes on goods and services in total tax revenue was 60 percent in 1985 and 43 percent in 1995. A lower share of indirect taxes will tend to increase the progressivity of the tax system.

further expand the safety net. Over the longer term, spending pressure are likely to accelerate as a result of population ageing and the consequent demands on social spending, notably on pensions and health care. In addition, Korea faces the uncertain cost of potential unification with North Korea.

12.   The overall tax burden is also likely to rise to finance the higher spending pressures noted above and because tax revenue will probably grow faster than income, reflecting a progressive income tax system in an environment of fast economic growth. The government has initiated reform measures to address the weaknesses of the tax system, which include generous allowances and loopholes for individuals, large-scale and wide-ranging tax preferences for enterprises, and an inappropriate taxation of property (OECD, 2000). The aim is to create an attractive business environment and improve equity and efficiency by broadening the tax base, lowering tax rates, and making the system more transparent and easier to understand. These reform measures will likely change the tax mix significantly, raising the share of direct taxes relative to indirect taxes, and the share of individual income taxes relative to corporation taxes.

C. Budget Structure, Formulation, and Implementation

13.   Even though fiscal discipline has been maintained at the aggregate level, fiscal management in Korea suffers from important weaknesses. Insufficient transparency of the budget reflects its highly complicated and fragmented structure (Box II.1). The extensive use of special accounts and public funds, with earmarking of revenue resources, weakens fiscal planning because the budget authorities have little control over a significant share of public spending. The fragmented structure prevents a holistic view in determining priorities for the use of government

Government Spending by Type of Account
(in percent of central government expenditure)

Legend:
— General account
- - - Special accounts
······ Public Funds 1/

Source: Ministry of Finance and Economy, reproduced from OECD (forthcoming).
1/ Ten new funds were added to the category of public funds in 2000.

resources, or even risks overlapping expenditures from different accounts or funds to serve the same policy objective.
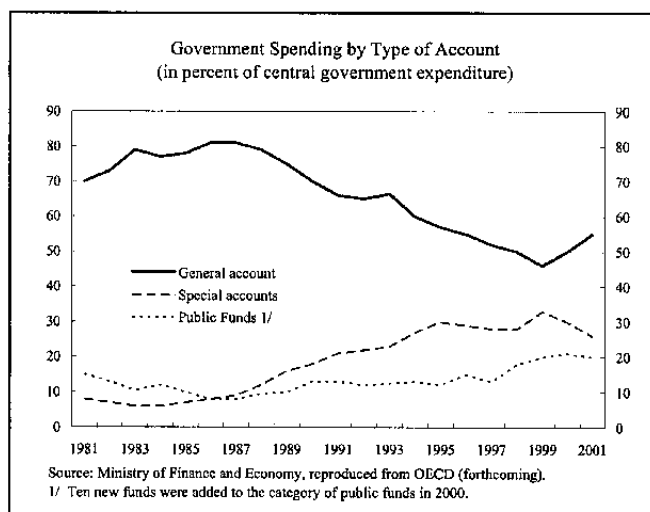
14.   From a macroeconomic perspective, the fragmented budget structure makes it difficult to form a meaningful view of the budget in economic terms. The use of a number of different budget concepts risks misunderstanding or confusion about both the policy stance and policy intentions. Given uncertainty about spending out of the public funds, the total level of expenditure on a consolidated basis is unknown when a new budget is prepared and approved by the parliament. Such uncertainty reduces the usefulness of the budget as a tool of macroeconomic policy since the impact of government expenditure on private sector demand also becomes uncertain.

Box II.1. The Budget Structure and Budget Concepts

There are four different types of accounts or funds in the Korean budgetary system: one General Account (GA), 22 special accounts, 47 public funds, and more than ten "other" funds. The GA comprises about half of central government spending on a consolidated basis. The proliferation of special accounts and public funds reflects the legacy of the economic policies of the 1960s and 1970s when a range of earmarked taxes and so-called quasi-taxes were created to finance public investments and loans to achieve specific policy objectives. While these accounts and funds have separate budgets and are managed independently, there are very complicated financial transfers among them, thus reducing transparency and masking accountability.

- The GA includes all transactions not classified by law as being undertaken by special accounts or funds. It is used to carry out the general purposes of government and its constituent ministries rather than being restricted by law to a specific program.
- Special accounts were introduced for certain government activities. These accounts can be divided into four categories: (i) business-like activities such as railway, telecommunications, and grain management, which would typically be nonfinancial public enterprises in other countries; (ii) special funds using earmarked sources of revenue, such as taxes, fees, and charges for particular government activities (e.g., toll roads, energy and resources, rural tax, and agriculture and fisheries structural adjustment); (iii) financing funds, such as those for fiscal lending and shared taxes to local governments; and (iv) miscellaneous smaller funds, such as that for prison operations. Special accounts are usually managed by the relevant line ministry, although responsibility for some special funds is shared by several ministries.
- Public funds were introduced for major government activities involving the receipt and disbursement of funds. They can be divided into six categories: (i) the largest are the pension, unemployment, and health insurance funds, which are typically trust funds in many countries; (ii) the public money management fund collects the proceeds from government borrowing and channels it to the GA, the Fiscal Lending Special Account, and other public funds; (iii) classic revolving funds such as for the aid budget; (iv) earmarked funds; (v) various industry funds, lending from which is below market rates; and (vi) a large national housing fund that supports low-income households.
- "Other" funds are established under laws pertaining to the non-government sector and are not managed by line ministries. However, ministry officials are often appointed as board members, allowing them to exert indirect control. Some "other" funds have been established to deal with financial sector restructuring (the Nonperforming Assets Management Fund, and the Deposit Insurance Fund); and there are also some guarantee funds and earmarked funds.

The annual provisions in the budget for the GA and the special accounts need to be approved by the National Assembly (NA). The budgets and accounts of public funds are presented to the NA for information, but the decision on the financial balances to be achieved by the funds is determined by the relevant ministries, in consultation with the Ministry of Planning and Budget. However, revisions to the Fund Management Act in December 2001 require that the public funds be subject to parliamentary approval beginning with the 2003 budget. This reform also increased the coverage of public funds by transforming a number of "other" funds into public funds. The balances of "other" funds are not subject to approval by the NA; nor is information on their balances required by the NA.

The authorities use four different budget concepts for the central government in budget documents:

- The narrowest budget concept covers only the GA. The detailed information by the functional, economic, and organizational classifications is only provided for this budget concept.
- A second budget concept covers the GA and the Fiscal Lending Special Account, netting out internal transfers. This is the total amount of "the budget," and it is the rate of increase in this aggregate that is announced by the government in its public presentation of the budget.
- A third and broader budget concept covers the GA and all 22 special accounts. It is the official budget, as defined in the Budget and Accounts Act, that is proposed by the government and approved by the NA. Detained information on sector amounts and their main programs are published together for this budget concept.
- The broadest budget concept is the consolidated budget, which covers the GA, all 22 special accounts, and all public funds. It is compiled and calculated according to the GFS rules (but excluding the "other" funds), specifying the financing and netting out internal transfers. When the authorities refer to the fiscal balance, this is the budget concept used.

The consolidated government budget suffers from weaknesses in its coverage and methodology. First, the GFS accounts do not include local governments, which hampers budget planning and monitoring at the general government level. Second, the budget is recorded on a cash-basis, which fails to deliver a fair and accurate picture of the impact of government activities on its overall financial position. In addition, fiscal data are typically published in highly aggregated form; and including privatization receipts above the line obscures underlying developments. Some of these problems are being addressed. The authorities currently plan to include local governments in the consolidated budget starting in 2003 and to move by 2005 at the latest from the present cash-based accounting to accrual accounting standards, a change that is in line with the new GFS standards.

15.   Budget formulation also suffers from incentives that adversely affect the behavior of government officials. Whether for historical or cultural reasons, "overperformance"—in the sense of conservative revenue estimates and under-spending by ministries resulting in better-than-expected budget balance outturns—was encouraged. There appears to be a view among government officials that "the larger the surplus the better."[4] This approach fostered a tradition of deliberately conservative revenue forecasting, leading to a tendency for

Overshooting in Revenue and Expenditure
Out-turn less budget as a percent of budget /1

Source: Board of Audit and Inspection, reproduced from OECD (forthcoming).
1/ Data refer to the general account.

overshooting in revenues; and of implicit encouragement to line ministries to plan for a cushion so that spending did not exceed the budgeted amount, leading to systematic expenditure shortfalls.[5] (Table II.1)
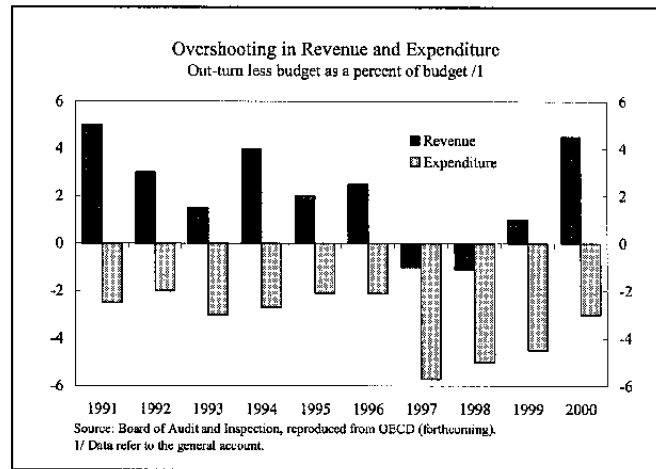
16.   Weaknesses in budget implementation also contribute to large deviations between budget plans and outturns. Arrangements for regular in-year monitoring and reporting on expenditure and revenue developments, with an analysis of causes of deviations from plans, are not well developed. Monitoring spending from the public funds is the responsibility of the line ministries concerned, rather than the MPB or the MOFE. This mitigates against clear analysis of the development of the overall fiscal balance during the year, or of the most economical cash management techniques to balance shortfalls and surpluses in individual accounts. Most fundamentally, there is no provision for a comprehensive mid-year review of the budget, using updated forecasts of the economy and expected fiscal outturns, which would provide a clear basis for decisions about needed fiscal measures such as supplementary expenditure provisions or other in-year measures, and give a firm framework for the following year's budget proposals.

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[4] For example, officials of the Ministry of Finance and Economy have described fiscal performance in 1999–2001 as follows: "Fiscal policy and public debt management have been exemplary, with the fiscal balance showing better results than budgeted figures for three consecutive years."

[5] Non-interest expenditure was 1.3 percentage points of GDP lower than budgeted in 2000, 0.9 percentage points lower in 2001, and estimated 0.6 percentage points lower in 2002. The shortfall in 2002 would have been larger were it not for the supplementary budget of W 4.1 trillion (0.7 percent of GDP) approved in September 2002 to finance typhoon-related reconstruction.

Table II.1. Consolidated Central Government Operations, 2000–02

	2000		2001		2002	
	Budget	Actual	Budget 1/	Actual	Budget	Est.
	(in trillions of won)					
Revenue	**120.8**	**135.8**	**142.7**	**144.0**	**154.4**	**156.5**
Tax revenue	79.7	92.9	95.9	95.8	103.6	104.1
Social security contributions	17.5	14.8	16.0	17.5	18.2	19.1
Nontax and capital revenue	23.6	28.1	30.8	30.7	32.6	33.4
Expenditure and net lending	**136.2**	**129.3**	**150.2**	**140.5**	**153.8**	**144.0**
Current expenditure	101.1	92.8	107.0	107.8	118.9	113.5
Interest	14.1	12.5	7.6	13.3	15.5	13.4
Non-interest	87.0	80.3	99.4	94.5	103.4	100.2
Capital expenditure	23.1	22.3	25.7	24.9	26.4	25.6
Net lending	12.0	14.2	17.5	7.7	8.5	4.9
Balance	**-15.4**	**6.5**	**-7.6**	**3.6**	**0.6**	**12.5**
Financing	**15.4**	**-6.5**	**7.6**	**-3.6**	**-0.6**	**-12.5**
Domestic financing	15.6	-6.1	7.9	-3.2	-0.1	-12.0
of which: Privatization	3.5	0.0	3.0	3.7	5.4	6.7
External Financing	-0.2	-0.4	-0.3	-0.4	-0.5	-0.5
	(in percent of GDP)					
Revenue	**23.1**	**26.0**	**26.2**	**26.4**	**26.6**	**26.9**
Tax revenue	15.3	17.8	17.6	17.6	17.8	17.9
Social security contributions	3.4	2.8	2.9	3.2	3.1	3.3
Nontax and capital revenue	4.5	5.4	5.6	5.6	5.6	5.7
Expenditure and net lending	**26.1**	**24.8**	**27.6**	**25.8**	**26.5**	**24.8**
Current expenditure	19.4	17.8	19.6	19.8	20.5	19.5
Interest	2.7	2.4	1.4	2.4	2.7	2.3
Non-interest	16.7	15.4	18.2	17.3	17.8	17.2
Capital expenditure	4.4	4.3	4.7	4.6	4.5	4.4
Net lending	2.3	2.7	3.2	1.4	1.5	0.8
Balance	**-2.9**	**1.3**	**-1.4**	**0.7**	**0.1**	**2.2**
Primary balance	**-0.2**	**3.6**	**0.0**	**3.1**	**2.8**	**4.5**
Memorandum items						
Overall balance (incl. privatization)	-18.9	6.5	-4.6	7.3	6.0	19.2
(as percent of GDP)	-3.6	1.3	-0.8	1.3	1.0	3.3
Nominal GDP (trillion won)	522.0	522.0	545.0	545.0	581.2	581.2

Sources: Ministry of Planning and Budget; and Fund staff estimates.

1/ Including supplementary budgets.

D. The Budget as a Tool of Macroeconomic Policy

17.   The tendency for systematically larger-than-budgeted surpluses (or smaller deficits) implies a systematic contractionary bias in fiscal policy that reduces its effectiveness as a tool of macroeconomic management. This bias is particularly damaging during an economic downturn because it means that fiscal policy tends to be inappropriately procyclical. As shown in Figure II.1, since 1971, fiscal policy was contractionary in 12 of the 18 years when the output gap was negative, i.e., when actual output was below potential output.[6] In other words, fiscal policy was supportive of growth only in six out of those 18 years. Two of the six years of supportive fiscal policies were during the 1997–98 financial crisis. In strong economic upturns, the contractionary bias in fiscal policies may result in a welcome stronger-than-budgeted counter cyclical fiscal stance, as in 2000.

Figure II.1 Output Gap and Fiscal Impulse

Source: Fund staff estimates.

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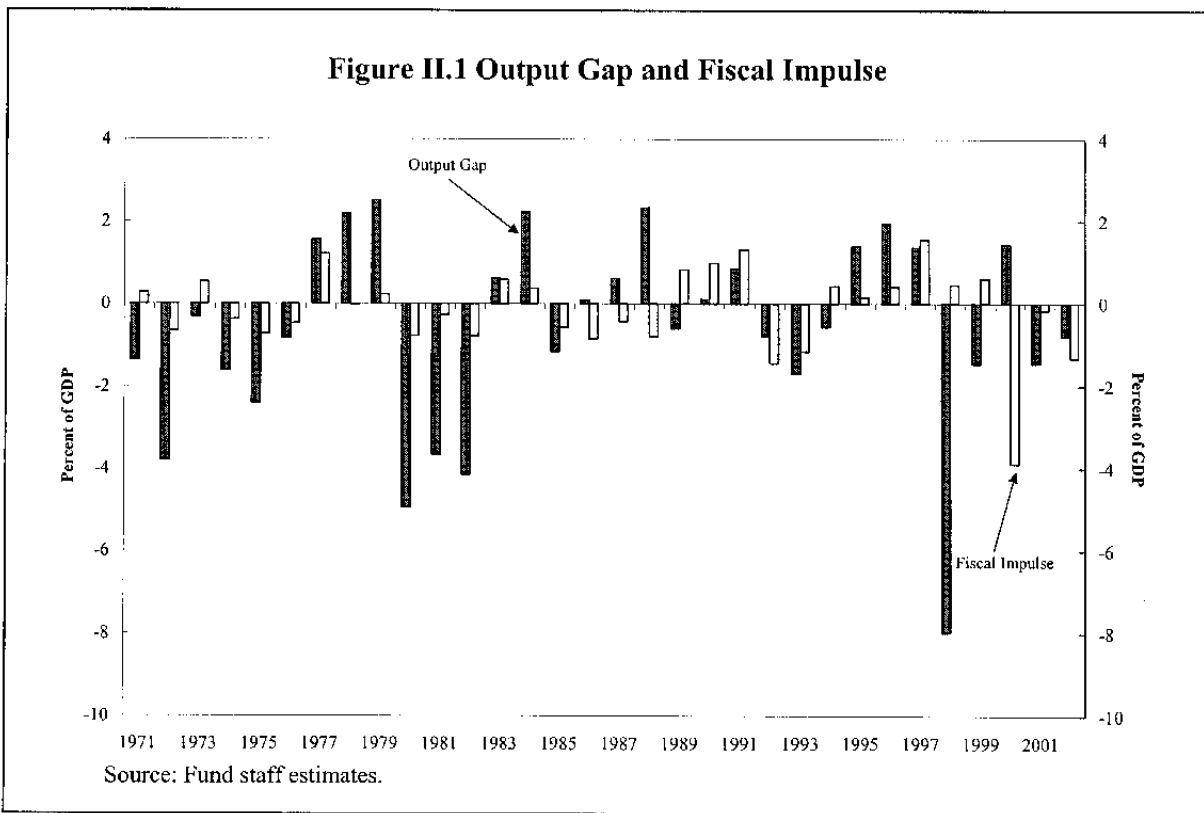
[6] The fiscal impulse is defined as the change in the cyclically adjusted fiscal balance. A positive fiscal impulse implies that the fiscal stance is "looser" or more expansionary than the previous year, a negative impulse implies a "tighter" or a more contractionary fiscal stance, and a zero impulse implies a "neutral" fiscal stance.

18.   The effectiveness of the budget as a tool of macroeconomic policy is also blunted by the way the macroeconomic effects of fiscal policy are described and presented to the public. The Korean authorities traditionally focus on the contribution of government expenditure to real GDP growth when describing the stance of fiscal policy, which, not surprisingly, is almost always "expansionary." This is misleading since it omits the negative impact on aggregate demand from taxes that reduces the disposable income of the private sector. In a world of imperfect competition, the fiscal stimulus to aggregate demand, expressed as a percentage of GDP, is given by (Chalk, 2002):

$$\Delta Y_t / Y_t = \beta^* \Delta G_t / Y_t - \mu^* \Delta R_t / Y_t$$

where $\Delta Y_t = Y_t - Y_{t-1}$, β is the expenditure multiplier, and μ is the revenue multiplier. Thus, the stimulus provided by the fiscal position to aggregate demand is given by the change in real expenditure and real tax revenues weighted by their respective multipliers. Accordingly, the positive contribution to GDP of higher real government expenditure alone is not a proper measure of the demand effect of the government budget, since it ignores the negative contribution to GDP of higher real government revenue.

19.   Figure II.2 shows the evolution of the demand impact measure in Korea for both the budget and the outturn in 2000–02, as well as the contribution of real government expenditure to GDP, calculated as the change in real government expenditure from year t-1 to year t as a proportion of real GDP in year t. The multipliers for current expenditure, capital expenditure, and revenue, which are derived from simulations using the BOK macroeconomic model, are 1.5, 1.2, and -0.9, respectively. The multiplier for net lending is assumed to be 0.7, considering that private sector investment is unlikely to change by the same magnitude as the change in government net lending. The contribution of real government expenditure was always positive and typically overstated the impact of the fiscal position on domestic demand. This was most obvious in 2000, when fiscal policy was significantly contractionary and had a fairly large negative impact on domestic demand.

20.   An important debate in Korea is whether surpluses from social security funds should be excluded from the overall balance when assessing the fiscal policy stance. Some argue on Ricardian grounds that social security contributions should not reduce private sector demand because such contributions are regarded as perfect substitutes for private savings. However, even if full Ricardian equivalence is assumed for social security contributions, these are a relatively small part of total government revenue (12 percent in 2001), and the negative demand impact of other government revenue needs to be taken into account in assessing the stance of fiscal policy.

Figure II.2. Demand Impact of Fiscal Balance

Source: Fund staff estimates.
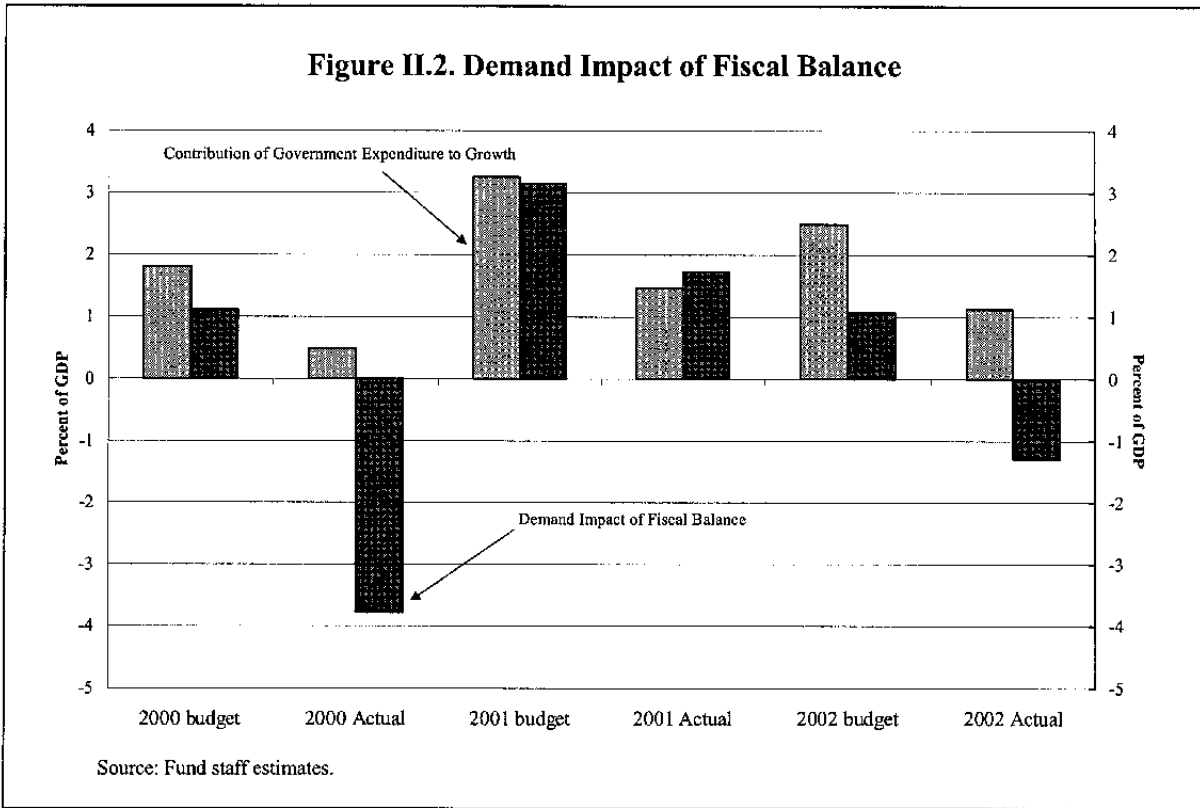
E. The Role of a Medium-Term Fiscal Framework

21.   A special law on fiscal soundness was submitted to the National Assembly in 2001 that aims to achieve a balanced budget in the medium term and ensure prudent debt management. It would require that a medium-term fiscal plan be presented to the National Assembly along with the annual budget bill. Since the consolidated central government balance has been in surplus since 2000, the objective of achieving a balanced budget presumably means a balanced budget excluding surpluses of the social security funds (SSF), an objective estimated to have been achieved in 2002.[7]

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[7] Yet another interpretation of the balanced budget target is to treat the additional outlays of absorbing part of the cost of financial sector restructuring as spending. In the four year period of 2003–06, the government plans to convert W 49 trillion of maturing government-guaranteed bonds issued by the Deposit Insurance Fund and the Nonperforming Assets Management Fund into treasury bonds. The target can then be interpreted as achieving a balanced budget by 2007, by which time the bond conversion exercise will have been completed. However, such debt conversions are below-the-line transactions and should not be considered as sources of deficit.

22.   While the introduction of a medium-term goal of a balanced budget may be appropriate, the connection between the objective and the annual budgeting process is unclear. It is particularly important to clarify that the medium-term objective implies an annual balanced budget on a cyclically-adjusted basis. Although the principle of "expenditure within revenue" has the merit of fiscal prudence when applied over the business cycle, it is unnecessarily restrictive as a guide to annual budgets in an advanced economy such as Korea. Most economic policymakers in advanced economies have long accepted the importance of focusing on the underlying structural budget balance rather than the actual balance, which reflects the stage of the business cycle. In a period of economic downturn, the government should accommodate the higher fiscal deficit and not seek to achieve annual balance budget targets that may risk being pro-cyclical. In other words, the objective of maintaining a balanced budget should be achieved over the course of a business cycle rather than in every year irrespective of the cycle.[8]

23.   Cyclical deviations from the balanced budget norm could come from both the effects of "letting automatic stabilizers work" and the use of discretionary revenue and expenditure policies. While there are important arguments against active use of discretionary fiscal policy, particularly where automatic stabilizers are large, a judicious use of temporary and fast-acting policy measures to support aggregate demand is appropriate in the face of a significant negative output gap, particularly if the automatic stabilizers are weak, as in Korea.

24.   A medium-term fiscal framework can be used to reconcile short-term and longer-term fiscal objectives. Under such a framework, temporary deviations from the balanced budget objective would be allowed so long as the medium-term fiscal path is acceptable. In the meantime, transparency and accountability would ensure that any short-term build up of public debt will be unwound in the medium term. In this regard, the government could usefully prepare and submit to the parliament, together with the budget bill, an annual fiscal strategy statement that sets out the government's medium-term fiscal objectives (for example, to reduce debt levels to a stated level), and any temporary fiscal policy actions needed to moderate cyclical fluctuations in economic activity, as well as plans for their reversal.

25.   If and when the automatic fiscal stabilizers are strengthened, a useful approach to the adoption of a medium-term fiscal framework that is consistent with fiscal prudence is to set aggregate expenditure policy according to medium-term targets, while allowing revenues to fluctuate with the level of economic activity. Such an approach would avoid expenditures that are significantly higher in a downturn or substantially lower in a boom, and would also address the concern that higher expenditures may be more difficult to trim once an economy slows (Heller, 2002).

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[8] Cyclically adjusting the budget balance is not a straightforward exercise since it is an inherently judgmental exercise to estimate the output gap. However, such difficulties do not obviate the need to form a view of the cyclical positions of the economy.

F. Concluding Remarks

26.   To improve the effectiveness of the budget as a tool of macroeconomic management, the Korean authorities should strengthen their macroeconomic and revenue forecasting capabilities. They should also improve their analysis of the demand impact of the budget, pay greater attention to the cyclical effects of the budget, and reduce the uncertainty in budgetary outturns. A more transparent and accountable budgetary system will be essential to the success of such efforts. One of the reform priorities should be to streamline the budget structure by consolidating special accounts and public funds so as to reduce drastically their number as well as their share of expenditure.

27.   Budget implementation should be improved by enhancing fiscal monitoring and reporting. Formal arrangements should be put in place for regular in-year monitoring and reporting on budget implementation centered on a mid-year review. Such a review should enable the authorities to revisit the economic assumptions underlying the budget on the basis of the latest macroeconomic forecasts; to examine the actual course of revenue and expenditure in relation to budget plans, and examine the reasons for any significant variations; to consider the need for any in-year adjustments and to ensure that such adjustments will be implemented in good time; and to provide a firm basis for decisions on the budget for the following year and for rolling forward the medium-term expenditure plans.

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III. LONG-RUN ECONOMIC GROWTH IN KOREA[1]

A. Introduction

1.   **Whether a miracle or a case of "plain vanilla" factor accumulation, Korea's economic growth performance has been impressive.** Average annual GDP growth in Korea was 7.1 percent in the last three decades, well above the OECD average of about 3 percent and that of many developing countries. As a result, Korea's GDP per capita (in PPP terms) is now nearly half that of the United States, compared to about one-seventh in 1970. Korea's per capita GDP has surpassed that of Argentina, Brazil, and Turkey and now ranks between Chile and Portugal. This impressive growth record together with that of the other Asian "tiger" economies has attracted much attention from researchers and policy makers. Many papers have investigated the factors driving GDP growth in these economies.[2] The general conclusion from this literature is that growth in the Asian tiger economies has largely reflected rapid capital accumulation and increases in labor—both a reflection of their low starting point in the 1960s—with only moderate increases in total factor productivity (TFP). This suggests that the high historical growth rates of the tiger economies cannot be sustained unless productivity growth increases substantially. If this does not happen, economic growth is bound to descend to more mundane levels as capital-labor ratios approach those of the more advanced economies.

2.   **This chapter goes one step beyond the traditional growth accounting exercise in that it tries to unravel the long-run relations between the factors of production.** Although growth accounting is useful as a mechanical decomposition of GDP growth into various inputs, it does not uncover the fundamental sources of growth. For example, is rapid capital accumulation the result of a big gap between the current capital-labor ratio and the long-run equilibrium ratio, or is it driven by increases in educational attainment of the labor force or technological progress? To answer this question it is necessary to determine the long-run equilibrium relation between the factors of production, both tangible (capital and labor) and intangible (technological progress). In doing so, this chapter seeks to contribute to a better understanding of the growth process in Korea's economy and to provide policy suggestions for sustaining high growth in the future.

3.   **The main policy implication is that for Korea to achieve annual GDP growth of about 5–6 percent over the medium term it needs a higher rate of technological progress.** Some of the factors that have contributed to rapid GDP growth in the past, in

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[1] This paper, which was prepared by Harm Zebregs (APD), reports preliminary results for a forthcoming IMF working paper.

[2] Bosworth and Collins (1996), Iwata, Khan, and Murao (2002), Ma (2001), and Young (1995) are some of the more recent papers that include Korea.

particular the increase in educational attainment of the work force, will be exhausted over the medium term. To ensure continuous high GDP growth alternative sources of growth need to be more fully exploited. In particular, growth in human capital will have to become more intensive in knowledge accumulation rather than in further increases in the number of years of schooling of the average worker. This could be achieved through greater openness to foreign trade and investment and through devoting more resources to research and development. Structural reforms can play an important role in this context by raising efficiency, so that alternative sources of economic growth can be better exploited.

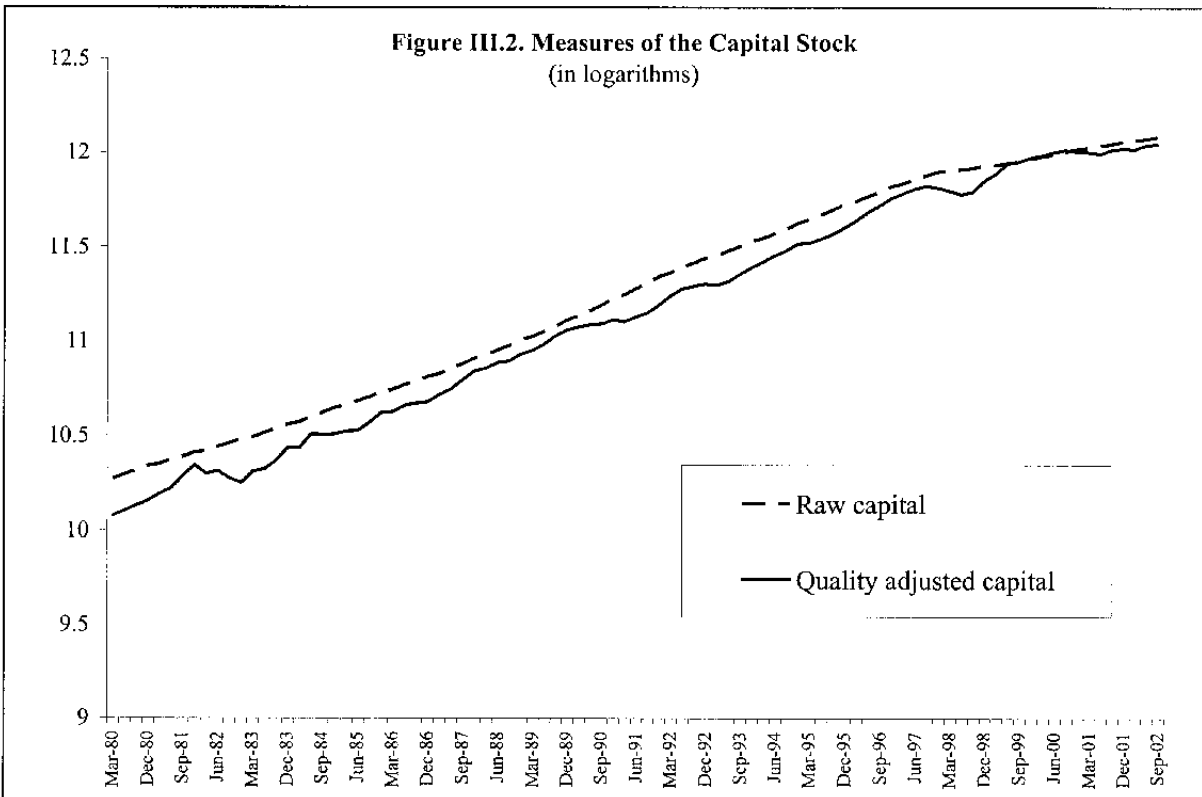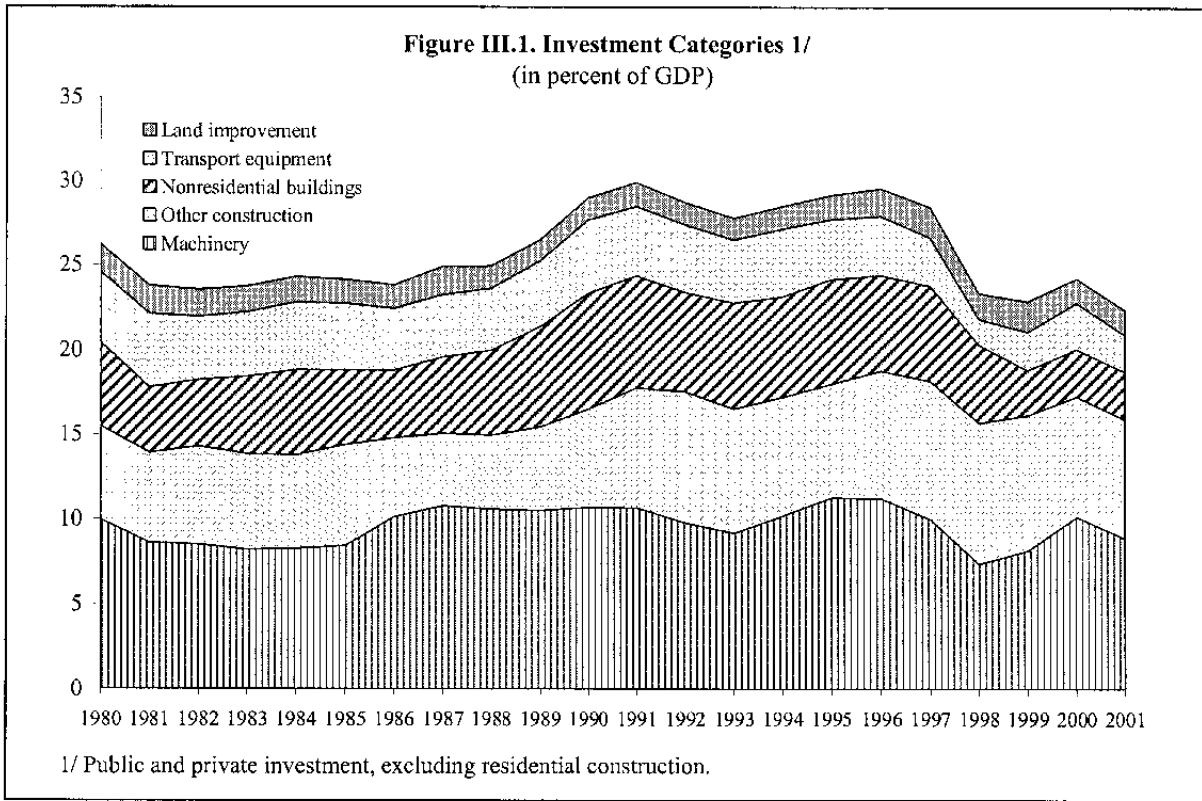## B. A Dissection of Korea's GDP Growth: 1980–2002

4.   **Investment in Korea was high by international standards during 1980–2002.** Gross fixed capital formation increased from 30 percent of GDP in the 1980s to 37 percent in the 1990s prior to the Asian financial crisis. After the crisis, the investment ratio fell to just below the level of the early 1980s, but remained high compared to the OECD average of about 22 percent. Machinery and construction (excluding residential buildings) have been the main components of gross fixed capital

Investment Ratios (in percent of GDP)				
	1980-89	1990-97	1998-99	1999-2002
Korea	29.7	36.8	28.8	27.4
Japan	29.3	29.5	26.5	25.5
United States	20.1	18.0	20.1	19.6
OECD 1/	23.4	21.9	22.5	21.9

Source: OECD.
1/ Unweighted average.

formation (Figure III.1). Capital stocks have been estimated for non-residential buildings, other construction, land improvements, machinery, and transport equipment using the perpetual-inventory method. An aggregate capital stock that allows for quality changes was then constructed by weighting each of the five capital stocks by their relative rental rates.[3] The capital stock that allows for quality changes increases at a slightly faster rate than the unadjusted capital stock, because machinery and transportation equipment—the two fastest growing investment categories—receive more than proportional weights (Figure III.2).
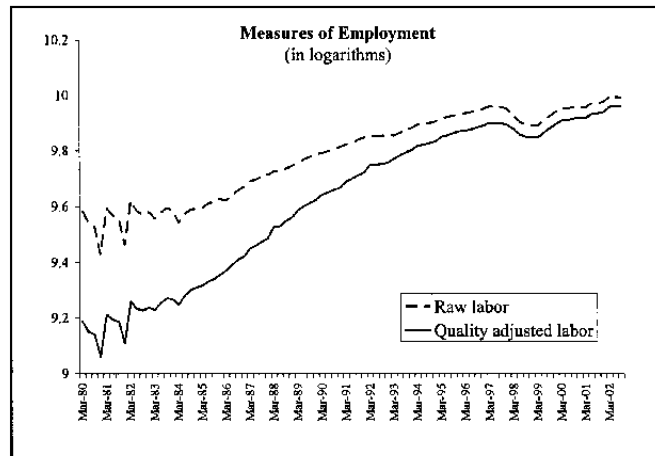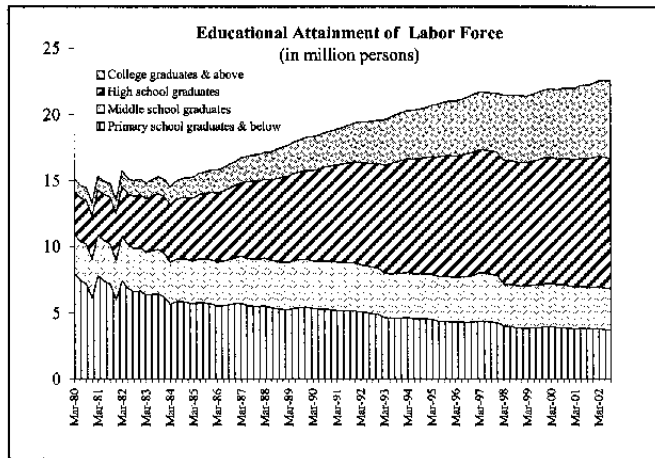
5.   **Labor force growth during 1980–2002 was largely driven by increases in the working age population of about 1.9 percent a year on average.** The labor force participation rate increased only slightly from 59.0 percent in 1980 to 62.2 percent in 1997, after which it fell to 61.3 percent in 2002. Korea's participation rate is low compared with other OECD economies, which averaged 71 percent in 2002. This is largely the result of the

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[3] See Appendix I for details.

Figure III.1. Investment Categories 1/
(in percent of GDP)

Legend:
- Land improvement
- Transport equipment
- Nonresidential buildings
- Other construction
- Machinery

1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001

1/ Public and private investment, excluding residential construction.

Figure III.2. Measures of the Capital Stock
(in logarithms)

- - Raw capital

—— Quality adjusted capital

traditionally low participation rate of women, which in 2002 was 49.1 percent compared with 74.1 percent among men. Employment, rather than the labor force, is needed to calculate the contribution of labor input to GDP growth, and, as with the capital stock, it is important to allow for quality changes.[4] This has been done by disaggregating employed persons by their level of educational attainment—middle school and below, high school, and college and above—and then weighting them by their relative wage levels. Employment allowing for quality changes increased faster than raw employment, because of increases in the educational attainment of the average Korean worker during 1980–2002.

6. **TFP growth is defined as the growth rate of GDP minus the weighted sum of the growth rates of quality adjusted capital and labor.** Under the assumption of perfect competition the weights are the income shares of capital and labor in GDP. The labor share was derived from the national accounts and, assuming constant returns to scale, the capital share was calculated as one minus the labor share.
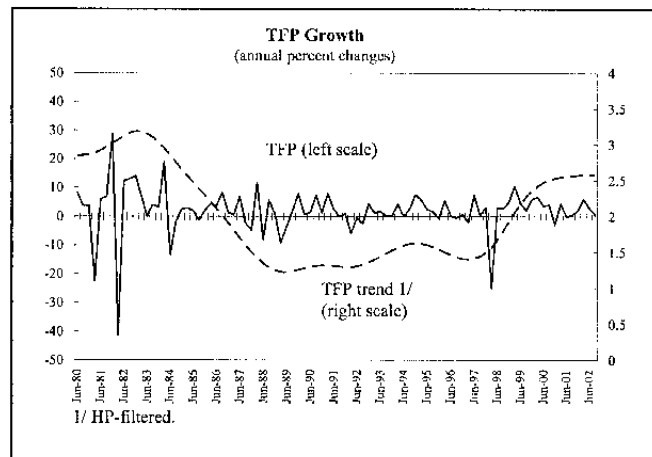

Educational Attainment of Labor Force
(in million persons)
□ College graduates & above
☑ High school graduates
□ Middle school graduates
◫ Primary school graduates & below

Measures of Employment
(in logarithms)

- - Raw labor
—— Quality adjusted labor

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[4] The measure of labor input could be refined further by taking into account actual hours worked. These data are available on a quarterly basis from 1980 onward, but they appear to suffer from measurement errors in the early 1980s.

7.   **Korean TFP growth estimated in this way was 1.9 percent a year during 1980–2002.** This is not very different from the TFP growth rates typical of other OECD countries. Although the time period and coverage differ, the estimated TFP growth rate for Korea is within the range of estimates in other studies (Iwata, Khan, and Murao, 2002; Ma, 2001; Pyo and others, 1993; Young, 1995). Young (1995), for example, estimates average annual TFP growth for the economy excluding agriculture to be 1.7 percent in 1966–90. For 1980–90, Young estimates TFP growth of 2.5 percent a year whereas this study, which includes the agricultural sector, suggests average annual TFP growth of 2 percent. The contribution of TFP to Korea's GDP growth has not been constant over time. The trend in TFP fell from about 3 percent a year in the early 1980s to 1.3 percent in the early 1990s and then picked up after the Asian financial crisis (note the different scales in the figure).

Contributions to GDP Growth
(average annual percent changes)

	1980-2002	1980-90	1990-2002	1990-96	1996-2002
GDP	6.8	8.2	5.7	7.1	4.4
Capital accumulation	2.0	2.0	2.1	2.4	1.5
Employment	2.8	4.1	1.9	2.9	1.0
TFP	1.9	2.0	1.9	1.8	1.8

Source: Staff calculations.

TFP Growth
(annual percent changes)

1/ HP-filtered.

8.   **Growth in employment and the capital stock accounted for most of Korea's GDP growth during 1980–2002.** The largest contribution came from growth in quality adjusted employment. In particular, increases in educational attainment were an important source of growth in labor input throughout 1980–2002, although its contribution diminished in the 1990s. This declining contribution is likely to continue given the limits on further increases in educational attainment. The contribution of capital accumulation to GDP growth rose in 1990–96 and then fell sharply after the Asian financial crisis. The pick up in TFP growth after the crisis suggests that structural reforms may have improved the allocation of resources and thus the efficiency of the Korean economy.

C. Sources of Output Growth

9.   **The growth accounting exercise indicates that increases in capital and labor accounted for most of Korea's GDP growth.** As in other studies, the analysis uncovered a relatively modest contribution from TFP growth. However, this does not mean that TFP growth is a less significant source of growth than capital accumulation and employment growth. In the long run, TFP growth may be the only source of growth. For example, in the neoclassical growth model developed by Solow (1956), per capita GDP growth in the steady state is entirely driven by exogenous technological progress. Without this technological progress GDP growth and capital accumulation only take place as the economy converges to its long-run steady state. Once the economy arrives at the steady state, growth comes to a halt. The speed at which the economy moves to its steady state is a function of the structural parameters of the model. In the neoclassical growth model these are the rate of intertemporal substitution of households, the parameters of the production function, the depreciation rate, the growth rate of the labor force, and the rate of exogenous technological progress.

10.   **To obtain a better understanding of the sources of GDP growth, rather than the contributions from different factors of production, it is necessary to analyze the growth process that generates the time series data for GDP, capital, labor, and TFP.** This process was analyzed using cointegration techniques to study the long-run relationship between real GDP, quality adjusted fixed capital, quality adjusted employment, TFP, and a measure of trade, the latter included to capture the potential impact of trade on TFP as suggested by the literature on endogenous growth (Grossman and Helpman, 1991).[5]

11.   **The long-run relationship between GDP, capital, labor, and TFP in Korea can be interpreted in terms of a two-sector growth model with physical and human capital.** Cointegration analysis was carried out for two sets of variables. The results for the first set, including GDP, quality adjusted capital K, quality adjusted labor L, and trade XM (defined as exports plus imports) are reported in the table. All variables are expressed in logarithms, so the estimated coefficients represent elasticities. The number of cointegrating vectors was determined with a Johansen cointegration test.

12.   The first vector in the table shows that **in the long-run steady state, quality adjusted capital is positively related to quality adjusted employment and trade**. This is consistent with the prediction of the growth model with human and physical capital that is described in Appendix II. A one percent increase in L and XM would raise the steady-state level of K by 1.3 percent, absent any feed back effects from K to L and XM. The second

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[5] This literature suggests that productivity rises with increases in specialization in the production process. Specialization is proxied by the number of intermediate inputs incorporated in a unit of final output. Trade raises productivity because it gives producers access to a larger variety of intermediate inputs.

vector can be interpreted as a production function with constant returns to scale, which was imposed by restricting the sum of the coefficients on K and L to be equal to one. The coefficients on capital and labor are close to the average income shares from the national accounts, which are respectively 0.24 and 0.76. TFP calculated in the previous section cannot be included as a right-hand variable in the production function. Instead, XM was included as a potential explanatory variable of TFP. By construction, the elasticity of GDP with respect to TFP is equal to one. Hence, the coefficient on XM in the second cointegrating vector is also the elasticity of TFP with respect to XM. It is possible, though, that this elasticity

Cointegrating Relations with GDP (standard errors in parentheses)		
	Vector 1	Vector 2
K	1	-0.2833
		(0.0526)
L	-0.8269	-0.7167
	(0.1864)	(0.0526)
GDP	0	1
XM	-0.4700	-0.1308
	(0.0705)	(0.0240)
Constant	1.3804	0.2299
LR test for binding restrictions (rank =2)		
Chi-square(5)	2.3309	
Probability	0.8017	
Source: Staff calculations.		

is biased because the elasticities of GDP with respect to capital and labor are assumed to be fixed over time. TFP can be interpreted as A^α, where A is a measure of labor augmenting technological progress and α is the elasticity of GDP with respect to labor. In that case, the elasticity of A with respect to XM is $0.1308/0.7167 = 0.1925$.

13.   **To test the validity of the above results, cointegration analysis of a second set of variables, including quality adjusted capital, quality adjusted employment, TFP, and trade, was carried out.** Because of how TFP is calculated, both cointegration analyses would yield similar results if the income shares in the national accounts, which were used to derive TFP, had been constant over time. Hence, the cointegration analysis with the second set of variables is similar to the analysis of the first set with the addition of time varying coefficients for capital and labor in the production function. Ln(TFP(t)) is divided by $\alpha(t)$ so that it reflects the logarithm of labor augmenting technological progress $\ln(A(t))$. The results of both analyses are

Cointegrating Relations with TFP (standard errors in parentheses)		
	Vector 1	Vector 2
K	1	0
L	-0.9564	0
	(0.0896)	
TFP	-0.9564	1
	(0.0896)	
XM	-0.2271	-0.1531
	(0.0623)	(0.0462)
Constant	1.7754	-0.0967
LR test for binding restrictions (rank =2)		
Chi-square(5)	2.0697	
Probability	0.8394	
Source: Staff calculations.		

broadly similar. To start with the second vector, in the long run A is only a function of XM. Specifications that included either K or L in the second cointegrating vector were insignificant. The elasticity of A with respect to XM is about the same order of magnitude as in the specification with constant factor shares. In the first cointegrating vector, the coefficients on L and A are restricted to be equal, so that $\ln(L)$ plus $\ln(A)$ can be interpreted as a measure of human capital that has a counter part in the growth model in Appendix II. These
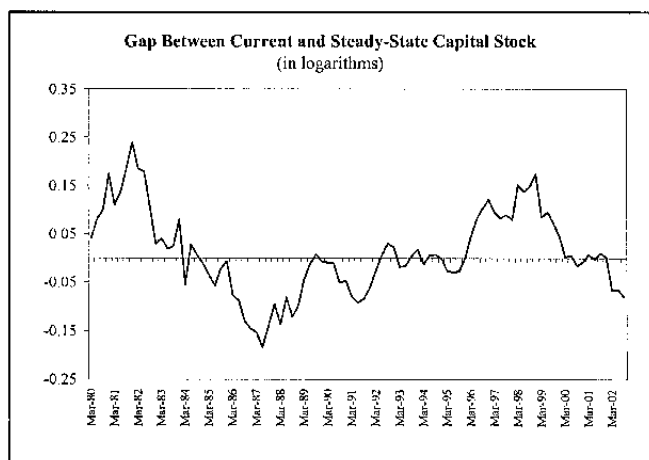
results further indicate that trade has a positive effect on capital accumulation in the long run over and above its indirect effect through A, which could be interpreted as efficiency gains from greater access to a wider variety of intermediate goods.

14. **Changes in the physical capital stock can be attributed to two factors**: convergence toward its steady state, and changes in the variables that determined the steady-state level of physical capital. As the analysis above showed, these variables are human capital and the efficiency gains resulting from international trade. To illustrate how this decomposition works, suppose that $K_0 = 10$ and that $K_0 - a_1 H_0 - a_2 XM_0 = -2$, where $H = L + A$ and a_1 and a_2 are the estimated coefficients in the previous table (all variables are in logarithms). Further, suppose that in the next period $K_1 = 11$ and that $K_1 - a_1 H_1 - a_2 XM_1 = -1.5$. If the growth rate of K would have been equal to the weighted growth rates of H and XM, the gap between K and its long-run equilibrium level would have remained the same, -2 in this example. This is defined to be the change in K accounted for by changes in H and XM. However, in this example K grows faster than the weighted average of H and XM, as the gap declines by 0.5—this is convergence. If, on the other hand, the gap widens to say -2.5, this would be considered a negative shock as K moved away from its long-run equilibrium. This decomposition only holds over suitably long time horizons as K cannot immediately catch up with increases in H and XM.

15. **Increases in human capital and efficiency were key factors in sustaining rapid capital accumulation in Korea in 1980–2001.** Convergence towards the long-run steady state can only explain a small portion of Korea's high rate of capital accumulation in 1980–2001. Instead, human capital accumulation and increases in efficiency kept the rate of return to investment from falling to its steady-state level, thereby sustaining economic growth. Convergence in 1980–90 was negative, because K was above its long-run equilibrium level in the early 1980s, as shown in the table. However, the negative impact of convergence was more than offset by increases in human capital and efficiency gains from international trade. The slowdown in physical capital accumulation in the second half of the 1990s is in part explained by a deceleration of human capital accumulation. Human capital has been defined as the product of the level

Gap Between Current and Steady-State Capital Stock
(in logarithms)

Sources of Long-Run Capital Accumulation
(average annual percent changes)

	1980-90	1985-95	1990-2001	1995-2001
Captital accumulation	9.7	10.0	8.3	7.5
Human capital accumulation	8.6	6.8	5.5	5.0
Efficiency increases	2.4	3.1	2.6	2.2
Convergence	-1.3	0.1	0.3	0.4

Source: Staff calculations.

of labor augmenting technological progress and quality adjusted employment. Growth of the latter slowed and is bound to slow further as population growth and increases in the educational attainment of the work force slow. Ultimately labor augmenting technological progress will be the main source of human capital growth.

D. Conclusion

16.   **GDP growth in Korea in 1980–2002 was impressive at 6.8 percent a year.** Growth accounting showed that increases in capital and labor, both adjusted for quality improvements, were the main contributors to Korea's growth. TFP growth was only modest and similar to that in other OECD countries.

17.   **Analysis of Korea's growth process revealed that human capital accumulation was an important source of economic growth.** It contributed to GDP growth directly as a factor input and indirectly by boosting physical capital accumulation. In the absence of rapid human capital accumulation the rate of return to investment would have declined much faster and growth would have slowed. Indeed, the deceleration in physical capital accumulation in the second half of the 1990s is in part explained by slower growth of human capital. Looking ahead, it is likely that increases in the educational attainment of the labor force, one of the components of human capital, will become smaller as increases in the years of schooling of the average worker slow. Nevertheless, there is still scope for further increases in the educational attainment of the work force, as new entrants are on average better trained than retiring workers, but the contribution of these increases to growth of quality adjusted labor will also decline. It is also projected that labor force growth will slow along with population growth. A higher participation rate of women might mitigate this projected trend.

18.   **To achieve annual GDP growth of 5–6 percent over the medium term Korea has to increase its rate of technological progress.** This can be achieved by devoting more resources to scientific research and commercial R&D, as well as by importing more foreign knowledge through international trade and foreign direct investment. Structural reforms will be important in this respect, as they improve the efficient allocation of resources and thereby increase the scope for greater exploitation of alternative sources of economic growth.

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CONSTRUCTION OF RELATIVE RENTAL RATES OF CAPITAL

With geometric depreciation and perfect foresight the rental price of a capital good K_j in period t is given by:

$$w_{K,j}(t) = p_{I,j}(t-1)r(t) + \delta_j p_{I,j}(t) - [p_{I,j}(t) - p_{I,j}(t-1)],$$

where $p_{I,j}(t)$ denotes the investment price of capital good j in period t, $r(t)$ is the economy-wide nominal rate of return between periods t and $t-1$, and δ_j is the depreciation rate of capital good j. The above arbitrage equation says that the return on investing $p_{I,j}$ in capital good j, which is the rental rate plus any valuation changes minus depreciation, is equal to the opportunity cost of investing the same amount in an asset with known return r.

Investment series for each type of capital good in current and constant prices were used to obtain investment prices. The price series were smoothed by taking four period averages. Depreciation rates are taken from Young (1992).

Under constant returns to scale, the following equality holds:

$$(1-\alpha)Y = \sum_{j=1}^{5} w_{K,j} K_j,$$

where the left-hand side is the share of aggregate capital income in GDP and the right-hand side is the sum of the rental incomes of the five types of capital goods. This equality can be exploited to calculate the rental rates of the different capital goods. This is done by varying $r(t)$ until the sum of rental payments to individual capital goods is equal to the share of aggregate capital income in GDP.

A Two-sector Model with Physical and Human Capital

The model in this appendix closely follows those developed by Uzawa (1965) and Lucas (1988). It has two sectors and two factors of production, human capital H and physical capital K. Sector 1 uses both inputs to produce consumption goods and capital goods, which have the same relative price:

$$Y_1 = C + \dot{K} + \delta K = B_1 K^{1-\alpha} H_1^{\alpha}, \quad 0 < \alpha < 1, \tag{A2.1}$$

where Y_1 is output of sector 1, $\dot{K} + \delta K$ gross fixed capital formation, and B_1 is a constant. Sector 2 produces human capital with only human capital:

$$Y_2 = \dot{H} + \delta H = B_2 H_2^{\beta}, \quad \beta > 0, \tag{A2.2}$$

where Y_2 is output of sector 2 and B_2 is a constant. Human capital employed in both sectors cannot exceed the available stock: $H \geq H_1 + H_2$. GDP is the sum of output in sectors 1 and 2: GDP $= Y_1 + pY_2$, with p the relative price of H.

A crucial assumption in the Lucas' model is that H is produced with constant returns to scale ($\beta = 1$), which, as can be shown, yields a long-run equilibrium in which K, H, and GDP all grow at the same rate.[6] When the economy is in this equilibrium it is said to be on its balanced growth path (BGP). Along this path K/H is constant. In the case with $\beta < 1$, a BGP does not exist and the economy converges to a steady state in which growth comes to a halt in the absence of exogenous increases in H, just as in the neoclassical growth model (Solow, 1956). The case with $\beta > 1$ is not very interesting as it implies accelerating growth over the long-run, which is normally not observed over long time horizons.

The model has transitional dynamics. Because it takes time to accumulate K and H, an economy with an initial endowment K_0/H_0 that is different from the long-run ratio K^*/H^* cannot jump instantaneously to its BGP or steady state. For $K_0/H_0 < K^*/H^*$, K/H will gradually increase while the economy moves toward its long-run equilibrium, vice versa for $K_0/H_0 > K^*/H^*$.

Now let H be defined as the product of years of schooling s, raw labor L_R, and the state of knowledge in the economy A:

$$H = sL_R A. \tag{A2.3}$$

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[6] See Barro and Sala-i-Martin (1995) for a more detailed description of the Uzawa-Lucas model.

The above relation shows the sources of human capital accumulation. In the long-run, however, only L_R and A can be sources of growth in human capital, because educational attainment is bounded by the maximum number of years a person can spend in school. The state of knowledge increases through research and development, scientific research, learning-by-doing, and adoption and adaptation of foreign technologies. Learning-by-doing can be the by-product of investment, which can extend beyond the firm that makes the investment. Foreign technologies can be introduced into an economy through trade and foreign direct investment and possibly other channels.

Dividing equation (A2.2) by H it can be rewritten as:

$$\frac{\dot{H}}{H} + \delta = \frac{\dot{s}}{s} + \frac{\dot{L}_R}{L_R} + \frac{\dot{A}}{A} + \delta = B_2(1-u)(sL_R A)^{\beta-1}, \tag{A2.4}$$

where $(1 - u) = H_2/H$.

If TFP is interpreted as A^α, then the product of $\text{TFP}^{1/\alpha}$ and quality adjusted labor is a measure of human capital similar to that in equation (A2.3). The Uzawa-Lucas model then predicts that $K/(sL_R\text{TFP}^{1/\alpha})$ is constant in the long-run. In logarithms this is:

$$\ln(K) = \ln(L) + \alpha^{-1}\ln(\text{TFP}) + \theta_0, \tag{A2.4}$$

where $L = sL_R$ is quality adjusted labor and θ_0 is a constant. TFP is assumed to be a function of learning-by-doing through capital accumulation and foreign knowledge imported through trade XM:

$$\ln(\text{TFP}) = \varphi_1\ln(K) + \varphi_2\ln(XM) + \theta_1. \tag{A2.5}$$

Substituting equation (A2.5) into equation (A2.4) yields:

$$\ln(K) = \frac{1}{1-\alpha\varphi_1}\ln(L) + \frac{\alpha\varphi_2}{1-\alpha\varphi_1}\ln(XM) + \theta_0 + \alpha\theta_1. \tag{A2.6}$$

Equations (A2.4)-(A2.6) along with a logarithmic aggregate production function are tested in the cointegration analysis in the main text.

IV. HOUSEHOLD CREDIT IN KOREA—A MACROPRUDENTIAL ANALYSIS[1]

A. Introduction

1.   **The growth in household indebtedness in Korea has been high in recent years, accompanied by a rapid run-up in some housing prices.** The rise in household lending followed a restructuring of the financial sector after the 1997–98 crisis, as banks sought to raise profits and strengthen their balance sheets. These developments have supported domestic demand, contributing to the relative strength of Korean GDP growth in 2001–02. However, Korea, like a number of other countries, has previously experienced boom-bust cycles in property markets, which had often been associated with financial system distress and adverse effects on activity.[2] In view of these risks, the Korean authorities are monitoring developments in household credit closely, and a range of policy measures were adopted in 2002.

2.   **This chapter seeks to assess the potential for weakness in household balance sheets that could undermine the financial sector and macroeconomic prospects.** The next section reviews recent developments in household credit and related macroeconomic and housing market trends. Structural changes in the financial sector underpinning these developments and data on credit quality are discussed in Sections C and D. Macroprudential indicators for Korean households are compared with other OECD countries in Section E, and Section F presents a sensitivity analysis to possible interest rate shocks. Section G concludes.

B. Household Credit Developments

3.   **Household credit rose at an annual rate of 34 percent in the first three quarters of 2002, an acceleration from the strong growth in 2000–01** (Table IV.1).[3] This rapid growth lifted the ratio of credit to disposable income for the individual sector from 82 percent at end-1998 to an estimated 120 percent in September 2002.[4] The debt ratio is somewhat lower at 110 percent if non-interest bearing liabilities are excluded. Part of this

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[1] This paper was prepared by Craig Beaumont (APD), incorporating contributions from Paul F. Gruenwald and Sung Eup Yoon (Resident Representative Office in Korea).

[2] Hilbers, Lei, and Zacho (2001) analyze a number of country experiences.

[3] Household credit is broadly measured, including credit from banks, savings institutions, insurance companies, credit card companies, finance companies, merchandise companies, and the National Housing Fund.

[4] The individual sector covers the self employed and non-incorporated businesses in addition to households. Income data are available for the individual sector but not for households separately, so all ratios to disposable income are based on the financial liabilities of the individual sector from the BOK Flow of Funds survey.

rapid increase was a reversal of the exceptional reduction in credit outstanding to households in 1998 at the time of the crisis, as credit had already reached 97 percent of disposable income in 1997.[5]

Table IV.1. Household Credit Developments							
	1996	1997	1998	1999	2000	2001	2002Q3
	(trillion won)						
Individual sector liabilities	254	300	270	293	329	400	476
Of which: Interest bearing [1]	213	246	224	242	292	351	433
Household credit [2]	175	211	184	214	267	342	424
	(annualized growth rate from end of previous year)						
Individual sector liabilities	18.2	18.3	-10.1	8.5	12.4	21.4	26.2
Of which: Interest bearing [1]	17.3	15.3	-8.7	7.8	20.6	20.5	32.2
Household credit [2]	22.4	20.9	-13.0	16.5	24.7	28.0	33.5
	(in percent)						
Credit to disposable income [3]	88	97	82	88	93	108	120
Of which: Interest bearing [1][3]	74	79	68	73	82	95	110

Source: Bank of Korea.
[1] Loans from financial institutions and the government. Excludes trade credit and miscellaneous.
[2] Excludes self employed persons and non-incorporated businesses.
[3] Staff estimates for 2001-02—data on disposable income of the individual sector have not been released.

4.   **High credit growth has been associated with a fall in household saving rates and a recovery in residential construction**. After a sharp 14 percentage point increase in 1998, the saving rate returned to its average 1995–97 level of 22½ percent in 1999. Continued strong growth in private consumption expenditure in 2000–02, at a time of modest growth in disposable income, pushed the saving rate down to an estimated 9 percent in 2002.[6] Residential construction declined in 1998–2000, but there was a strong rebound in 2001–02,

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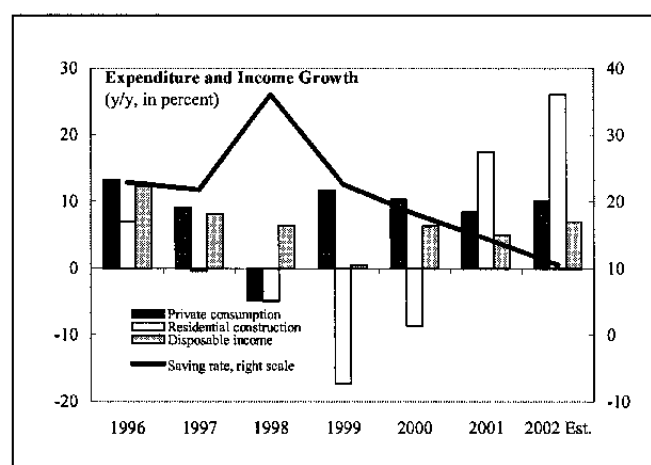
[5] Credit has also partly been used to replace informal private loans not captured in the official data, although this market was reportedly more important for SMEs than for households.

[6] Much of this fall in household savings may be lasting, as increased access to credit has reduced the need for households to accumulate wealth before purchasing or renting housing.
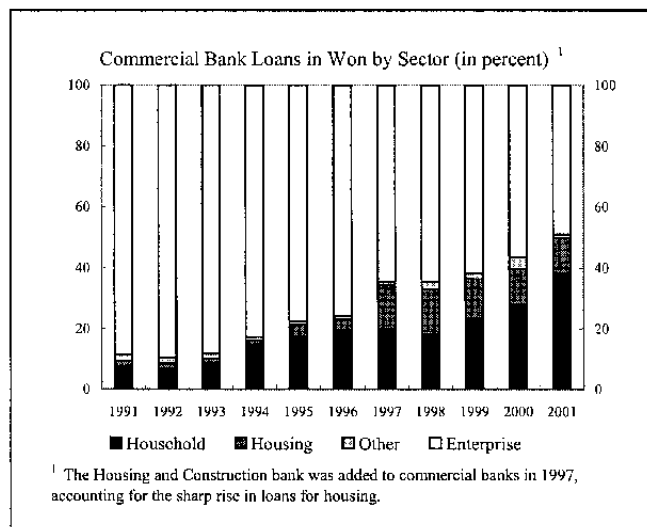
with construction returning to pre-crisis levels. The strength of consumption growth, together with the residential construction rebound, helped cushion Korean growth from the impact of the global slowdown in 2001.

5.   **Housing prices began to rise rapidly from mid-2001, but have slowed in recent months following the adoption of measures in the fall of 2002**. Overall house price inflation has been running at 16–18 percent (y/y) since March 2002, led by surging apartment prices in the southern Seoul area of Gangnam, which rose 43.4 percent (y/y) in September 2002. The factors behind the rise in housing prices, and measures taken to cool the market, are discussed in the annex. In the months following the adoption of housing market measures in September and prudential measures in October (Box IV.1), rises in the national house price index slowed, and small price falls were recorded in Seoul, especially in areas like Gangnam. From a longer-term perspective, the level of real housing prices is not historically high (Figure IV.1).

6.   **Most bank loans are to finance house or apartment purchases, as is apparent in recent macroeconomic and housing market developments**. In April 2002 the BOK surveyed those banks with the largest amounts of new lending to households, covering about 350 thousand loans from January 2001 to March 2002. Home purchases were the predominant use of bank loans to households, at 56 percent of loans in 2002Q1, up from 30 percent in 2001Q1. Repayment of other credit is the second largest use of bank loans, likely due to the lower interest rate on bank loans, but this has declined from 30 percent of loans in 2001Q1 to 9 percent in 2002Q1. Some 7½ percent of household loans are used for small business financing, while reported use for consumption seems implausibly low at 2–3 percent—a substantial share of borrowing (17–20 percent) is unallocated—although households may rely on credit card loans to finance consumption. Borrowing for investment purposes, including in equities, is relatively low at 7–8 percent.

C. Structural Change in the Market for Household Credit

7.   **Household credit expansion has primarily reflected entry by banks into this market after the financial sector restructuring stemming from the 1997–98 crisis.**[7] While the banking system was largely privately owned, lending activities in most banks were focused on the corporate sector until directed lending was abolished in 1998. A strategy of expanding household lending was adopted by a number of banks as a means to strengthen their balance sheets and profitability. With increased competition, interest margins

Commercial Bank Loans in Won by Sector (in percent) [1]

■ Household   ▦ Housing   ▣ Other   ▢ Enterprise

[1] The Housing and Construction bank was added to commercial banks in 1997, accounting for the sharp rise in loans for housing.

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[7] The restructuring of the banking system is discussed in Chopra *et al.* (2002).

Box IV.1. Prudential Measures in 2002 Regarding Household Loans

The authorities took a series of actions during 2002:
- February: the FSC/FSS indicated their intention to develop measures related to provisioning and reporting of loan delinquencies, and to establish a credit information bureau, early warning systems, and a consumer credit rehabilitation system.
- March: the BOK reduced the availability of credit from the subsidized aggregate credit ceiling facility (2.5 percent interest rate) to banks with increased exposure to household loans. This measure was effective in May, although in practice its impact was mainly as a signaling effect.
- Effective in May: the FSC/FSS increased minimum provisioning for household loans, and strengthened asset classification criteria by requiring that loans overdue by three months or longer be classified as substandard if they exceeded 60 percent of collateral value. The newly required provisioning was estimated at W 0.7 trillion, relative to existing provisions of W 2 trillion.
- June: the FSC/FSS required two banks to make comprehensive improvements in household credit risk management, while 14 other banks were required to make specific improvements.
- September: the FSC/FSS lowered the guideline for the ceiling on loan-to value (LTV) ratios for apartments in Seoul and parts of neighboring Kyonggi Province to 60 percent from 70–80 percent, as part of a package of measures to curb real estate speculation.

| Minimum Mandatory Loan Loss Provisioning Ratios (in percent)					
	Bank Household Loans			Credit Card Receivables		
	Original	May 2002	Jan. 2003	Original	May 2002	Jan. 2003
Normal	0.5	0.75	0.75	0.5	1.0	1.0
Precautionary	2.0	5.0	8.0	2.0	7.0	12.0
Substandard	20	20	20	20	20	20
Doubtful	50	55	55	50	60	60
Presumed loss	100	100	100	100	100	100

The pace of household lending slowed after May, but picked up strongly in August–September.
A major package of measures was announced in October:
(1) **Required provisioning** was further increased effective January 2003, with the increase also applied to insurance and finance companies.
(2) **Credit evaluation for real estate secured loans** was required to be conducted in a similar manner to unsecured loans, taking into account borrower income and ability to pay. Collateral appraisal was strengthened by requiring the use of the lower estimate from two to three appraisers.
(3) **BIS risk weighting increased for some real estate secured loans.** From a base of 50 percent, the risk weight on new loans is raised to 60 percent if the loan is overdue more that 30 days in one year, or if the borrowers' debt exceeds 250 percent of income, and to 70 percent if both conditions are met. The higher risk weight will be common on new loans as 60–70 percent of household borrowers are estimated to have debt exceeding 250 percent of income.
(4) **LTV guideline lowered to 60 percent throughout the country.** Seven banks were found to have average LTV above 70 percent, compared with the overall bank average of 67 percent. These banks were required to adjust their average LTV to less than 70 percent by June 2003.
(5) **Greater borrower education and protection.** The FSC/FSS will encourage financial institutions to participate more actively in the individual credit rehabilitation program.

This package of measures appears to have been effective, as both house prices and household lending slowed in November–December. The authorities continue to monitor developments closely.

Figure IV.1. Housing Price Developments, 1986–2002
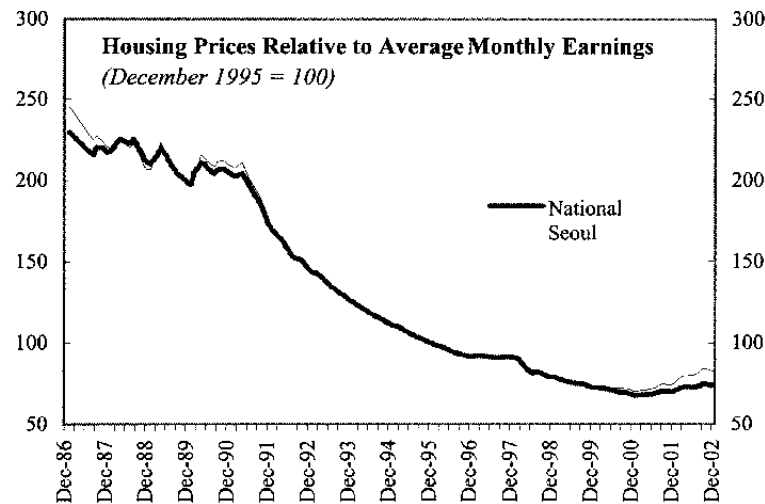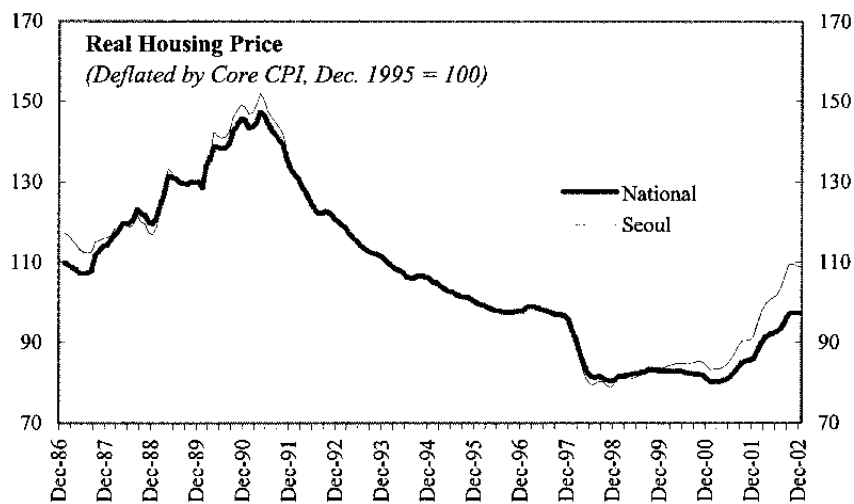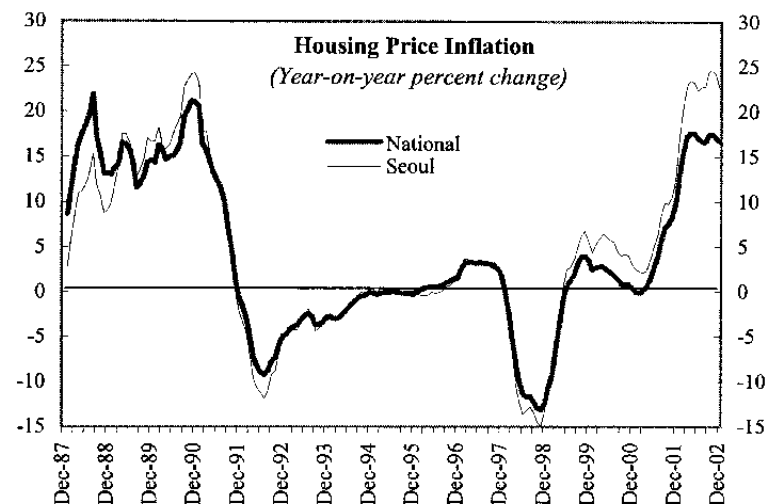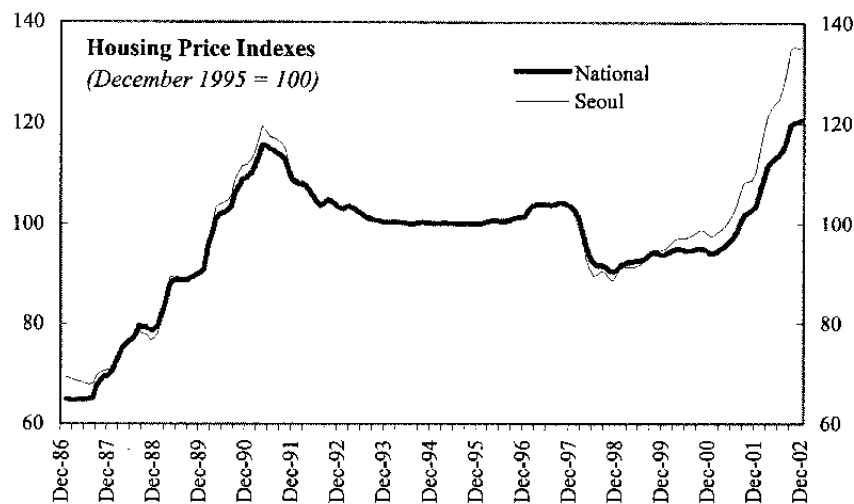
Sources: CEIC database and IMF staff calculations.

on household loans relative to the overnight call rate fell from 4.8 percent in 2000 to 3 percent in 2003. Household and housing loans rose from 35 percent of won denominated bank loans in 1997 to 50 percent in 2001, which is similar to the share typical in advanced economies.

8.   **Consequently, there have been major shifts in the market shares of banks and other sources of household credit.** Growth in bank loans to households exceeded 40 percent in 1999–2002, accounting for 60–80 percent of household credit expansion. As a result, the share of household credit provided by banks rose from 32 percent in 1998 to 52 percent by 2002Q3. A secondary contributor to the expansion in household credit was the boom in credit card use, which benefited from tax and other incentives (Box IV.2). Credit card debt outstanding doubled in 2000 and it rose to 16 percent of total household credit by 2002Q3, from 6 percent at end 1998. Traditionally, savings institutions were major sources of household credit, but credit from savings institutions fell during 1999–2001, and their market share collapsed from 34 percent to 13 percent.

Sources of Household Credit (in percent)
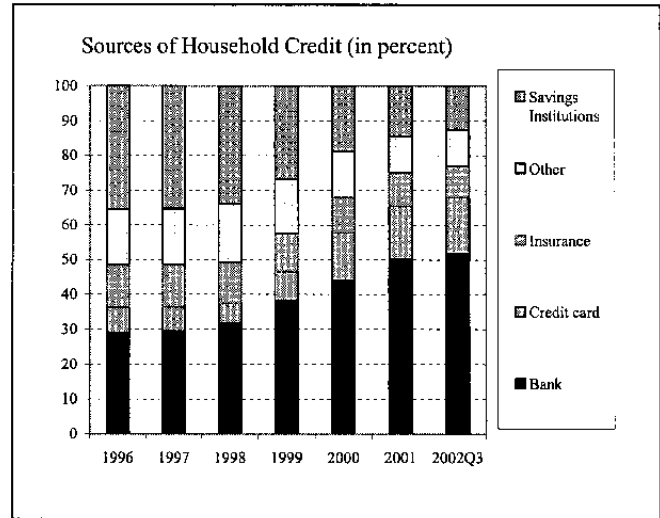
9.   **This rapid change in the structure of financing, along with the aggregate shift in the supply of funds to households, may have increased the risk of loan losses.** In a discussion of the causes of the Nordic banking crises in the early 1990s, Pesola (2001) notes that a surge in loan losses is more likely when rapid growth in lending reflects a supply shift, as commonly occurs after the financial sector is liberalized. In this case, banks tend to reduce interest rates and lower minimum credit standards, as happened in Korea in recent years. The post-crisis restructuring also has some aspects of a liberalization given the abolition of directed lending. In addition, shifts in the structure of financing sources imply the formation of many new lending relationships, which could impair credit risk analysis.

D. Developments in Household Credit Quality

10.   **Delinquency rates on bank loans are relatively low in Korea, although this may partly reflect the atypical structure of household loans.** Delinquency rates have remained stable at around 1½ percent on bank loans to households. This is well below the U.S. rate of 2.3 percent on residential mortgages on bank books, and just under 5 percent for securitized

Box IV.2. The Credit Card Boom and Regulatory Action

The credit card industry has grown rapidly in recent years. Credit card usage of W 307 trillion in the first half of 2002 was up 54 percent from the same period in 2001, and up six-fold from 1999. Credit card issuance has risen from 39 million in 1999 to 105 million in mid-2002, implying the average Korea adult has more than three credit cards. About two-thirds of credit card transactions are related to a loan in the form of a cash advance, with the remainder corresponding to purchases of merchandize; this the reverse of the pattern typical of other advanced countries.

Incentives and regulatory changes contributed to the boom in credit card usage:
- the government removed the ceiling on cash advances in May 1999, which had previously accounted for about half of total turnover.
- to reduce the number of cash transactions and bring merchants into the VAT net, the government initiated a lottery for credit card users in 2000. One lottery "ticket" is granted for each purchase.
- also with the aim of increasing the tax net, the authorities have introduced a deduction from taxable income, equal to 20 percent of credit card purchases in excess of 10 percent of gross income. The maximum deduction is W 5 million.

The credit card business has been highly profitable. The credit card industry consists of seven specialized credit card firms plus 19 bank affiliates, but three companies have over half of the market. The return on equity of the specialized card companies was 55 percent in the first half of 2001, and their net profits in 2001 were up 175 percent from 2000.

Delinquency rates on credit cards have risen by 5–6 percentage points during 2002 to 12 percent (Table IV.2). Along with a tightening of access to new credit, the lack of revolving credit contributed this rapid increase, as delinquencies on credit card debt cannot be postponed by paying the monthly minimum. Moreover, any late payments are included, partly accounting for the high level of delinquency—on the U.S. basis where delinquent payments must be at least 30 days overdue, the delinquency rate would be about 8 percent compared with 5 percent in the U.S. on average.

A wide range of measures were adopted by the FSC/FSS to address rising delinquency rates:
- a range of administrative steps were taken in May 2002, including: requirements to verify the identity and incomes of all new customers; a ban on aggressive marketing; a ban on unwarranted debt collection methods; and promotion of the use of debit cards.;
- credit card issuers were required to cut the portion of cash advances to 50 percent or less in July 2002, to be fully phased in by 2004, and enforcement was tightened in November 2002;
- capital adequacy requirements were tightened effective April 2003, with minimum capital raised to 6 percent of risk-weighted assets from 4 percent;
- the criteria for prompt corrective actions (PCA) for credit card companies were tightened in November 2002, such that that they could be banned from issuing new cards if their delinquency rates exceeded 15 percent for over one month, and they were also subjected to the same thresholds on capital adequacy as banks for PCA;
- minimum provisioning against unused credit limit was set at 1 percent for bank affiliated companies in June 2002, and for specialized companies in January 2003.

There are some preliminary signs of changing behavior in the credit card industry. Domestic banks had 28.1 million outstanding cards at end 2002, down 0.2 million from the previous month, the first decline in three years, as banks addressed delinquent accounts. Simultaneously, their delinquency ratio was reduced by 0.4 percentage points from the peak level of 12.2 percent in November.

mortgages (Federal Reserve, 2002). However, the lack of regular amortization on most bank loans to households may lower delinquency ratios and tend to delay their response to underlying financial distress (Box IV.3).

Table IV.2. Indicators of Household Credit Quality					
	2000 Dec.	2001 Dec.	2002 Sept.[1]	2002 Nov.	2002 Dec.
Delinquency ratio			(in percent)		
Bank household loans	2.5	1.3	1.6	1.6	1.5
Bank affiliated credit cards	7.5	7.3	11.1	12.2	11.8
Nonbank credit cards	5.2	5.8	9.2	11.7	...
			(in million)		
Borrowers in delinquency	2.08	2.45	2.46	2.57	2.63
Credit cards	0.80	1.04	1.30	1.44	1.51
Other	1.28	1.41	1.16	1.13	1.12

Sources: FSS and Korean Federation of Banks.

[1] The classification threshold for delinquency was increased from W 50,000 to W 300,000 in July 2002.

11.   **In contrast, the credit card delinquency rate has risen sharply in 2002, to some 12 percent.** Measured by U.S. criteria, the credit card delinquency rate is about 8 percent, compared with the U.S. average of 5 percent (see Box IV.2). There is a possibility that this rise in credit card delinquency could be an early indicator of a broader decline in household credit quality. However, credit cards are more widely used, including by younger and lower income persons with limited savings who do not have access to bank loans, so it is unclear whether the deterioration in the quality of credit card receivables has significant implications for the quality of bank loans.

E.   International Comparison of Household Financial Ratios

12.   **Korean household credit indicators are comparable to other advanced economies** (Figure IV.2).[8] The most commonly used indicator of household debt burdens is the stock of debt relative to household disposable income.[9] The sharp recent rise in the

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[8] Data for Korean household financial indicators are staff estimates based on the individual sector of the Flow of Funds statistics produced by the Bank of Korea. The individual sector is used as a proxy for the household sector for these financial ratios. This Flow of Funds data also covers the self employed and non-incorporated businesses so differences in the level or trends of the financial ratios for these groups relative to households may distort the cross-country comparison. For the purposes of the international comparison, loans from the financial sector and government are included, but trade credit and miscellaneous financial liabilities are excluded. Nonfinancial assets are estimated on the assumption that financial assets are 41 percent of total assets, as was found in the 1997 National Wealth Survey— which is made only every 10 years—similar to the share in Australia (45 percent) and Germany (40 percent).

[9] Macroprudential analysis of the household sector is discussed in Sundararajan *et al,* (2002).

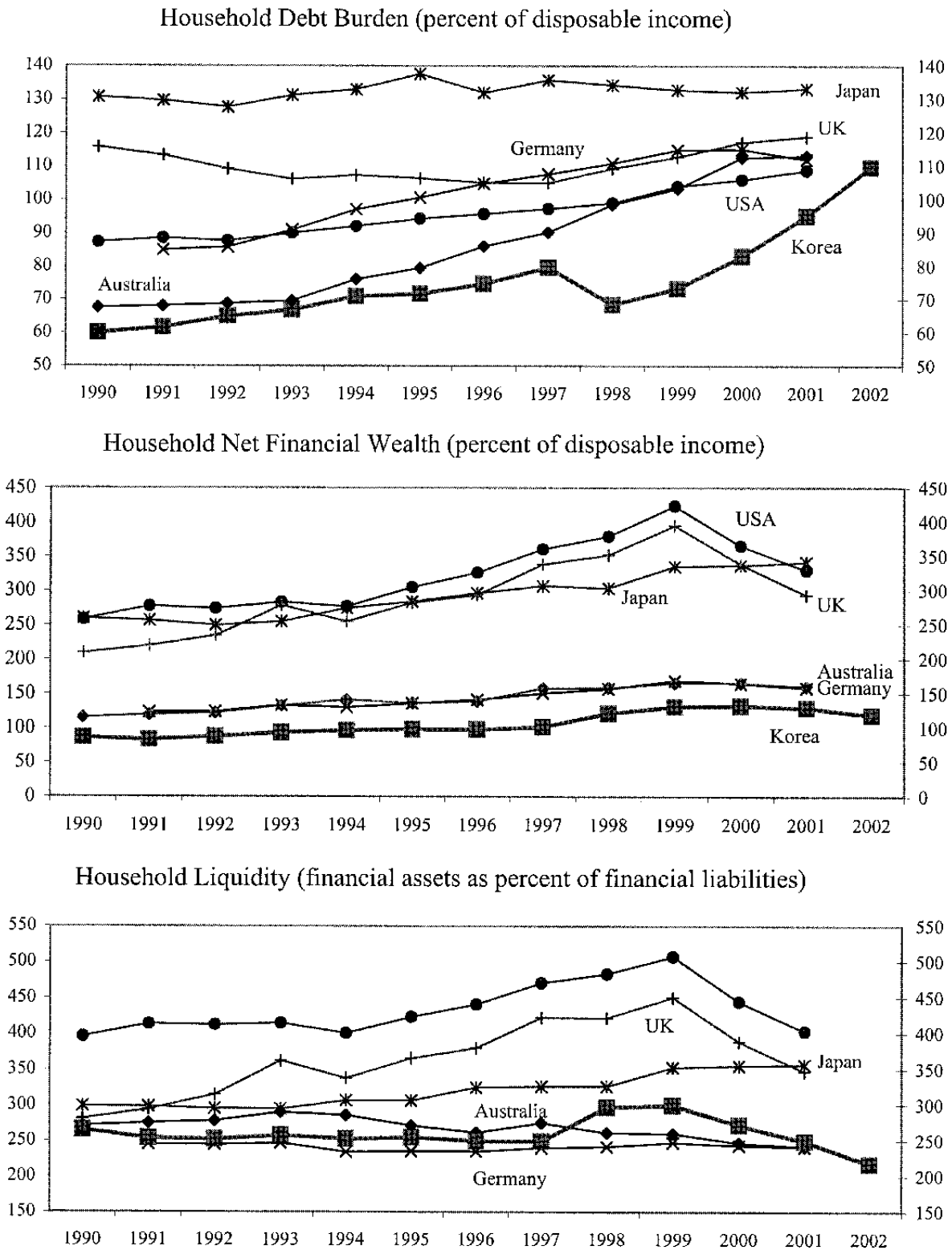## Box IV.3. Evolving Household Lending Practices

Typical household loans have short maturities and do not require amortization, and are based mainly on collateral rather than credit risk evaluation:

- **Household credit is relatively short-term and usually does not require amortization.** Bank loans to households for housing and other purposes usually have only a one- to three-year maturity. "Bullet" loans, with the full principal is due at maturity are most common, and the usual practice is to rollover or extend the loan at maturity. Interest rates are mostly floating, with more than one-half of loans linked to the three month CD rate. Long-term mortgages are rare in Korea, whereas they account for about two-thirds of household debt in the U.S., Canada, and Germany.
- **Bank lending practices have relied on collateral.** In the first three quarters of 2002, 71 percent of household loans were secured by real estate, and another 8 percent had guarantees.
- **Credit risk analysis has not been standard practice for loans with collateral.** For loans against collateral, borrowers often did not need to provide evidence of income. About 60–70 percent of household borrowers are estimated to have debt exceeding 250 percent of income.
- **Loan-to-value ratios are modest.** Average loan-to-value ratios were 67 percent across commercial banks in the third quarter of 2002, although the FSS found problems in collateral valuation. A low LTV may be necessary to compensate for the lack of amortization payments, and high leverage of borrowers relative to income, which imply a smaller cushion against a decline in collateral values.
- **Credit information sharing has been weak.** For example, the Korea Federation of Savings Banks found only 23 percent of borrowers have debt to only one savings bank, most having liabilities to a number of different savings banks.

Practices are reportedly evolving, partly due to regulatory pressure:

- **The use of loan amortization is beginning.** In early 2003, some major banks have begun to require that individuals redeem a percentage of their original debts to apply for debt extensions, e.g., Kookmin Bank requires a 10 percent repayment by borrowers with any recent overdue payments on credit cards or loans, and Woori Bank requires borrowers with poor credit records to redeem amounts exceeding 70 percent of collateral value when extending the maturity of debts— as usually happens at maturity.
- **Interest rate schedules have been adjusted to reflect the size of loans.** A number of banks have introduced a higher rate on mortgage loans to borrowers with debt more than two and a half times their annual income. This reflects the introduction of higher risk weights on such loans.
- **Credit information sharing has been strengthened.** Starting in September 2002, all financial firms, banks, insurers, and credit cards firms can share information on debtors.
- **Banks have tightened their credit screening systems.** A number of banks are refusing or limiting noncollateralized loans to persons with three or more credit cards, substantial credit card debt, or records of delinquency. This may account for the timing of the rise in credit delinquency, as borrowers are less able to take out new loans to clear their debts.
- **Settlement fees are being reintroduced by some banks.** Fees of ½–1 percent of the loan were dropped by banks in 2001 due to competitive pressures.
- **Banks' business plans for 2003 include slower growth rates in household lending.** The plans for 2003 are for expansion of 10–15 percent, compared with the business plans for 2002 that called for growth of about 30 percent.

Figure IV.2. Household Financial Ratios in Selected Advanced Economies

Household Debt Burden (percent of disposable income)

Household Net Financial Wealth (percent of disposable income)

Household Liquidity (financial assets as percent of financial liabilities)

Sources: BOK, Flows of Funds, and OECD.

debt burden of Korean households contrasts with the broad stability of debt ratios in Japan and the U.K., and the steady upward trends in the U.S. and Germany. These ratios cluster in the 110–120 percent range in recent years—with Japan being the notable exception—and Korea entered this range in 2002.

13.   **The rise in Korean household debt burdens over the medium term has been comparable to Australia**. The household debt burden in Korea is estimated to have risen 34 percentage points in the six years ended 2002. This compares with six year rises of 37 percentage points in Australia (1994–2000) and 41 percentage points in New Zealand (1992–99). Neither of these countries has experienced notable financial sector or macroeconomic problems as a consequence. There is clearly a need to examine other indicators before reaching the judgment that the sharp rise in household debt burdens in Korea is a potential source of macroeconomic or financial sector risk.

14.   **Other macroprudential indicators for Korean households are consistent with those in advanced economies**, and they have been relatively stable over time, aside from the effects of the 1997–98 crisis:

*   **The rise in Korean household debt has only modestly reduced household financial net worth**. The difference between households' financial assets and liabilities rose from 102 percent of disposable income in 1997 to 133 percent in 2000, before easing to an estimated 121 percent in 2002.[10] This fall may largely be a correction of the rapid rise induced by the crisis. In addition, there has been a significant rise in housing values, so overall net wealth would have been more stable.[11] While Korean household net financial wealth is well below the G-7 average of 270 percent in 2001, it is not far below Germany and Australia, which also hold a smaller share of financial assets in total assets.

*   **Household liquidity has eased more significantly, but remains comparable to Australia and Germany**. The coverage of financial liabilities by financial assets— sometimes interpreted as in indicator of "redemption ability"—is low compared with the U.S., U.K., and Japan, but is similar to Australia and Germany. Again, part of the decline in this ratio is a reversal of the post-crisis increase, and some reduction in liquidity is to be expected when access to credit improves.

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[10] Unlike the U.S. and U.K., equity valuation gains have not been an important contributor to rising household net worth in Korea.

[11] The aggregate market value of Seoul apartments was W 258 trillion in August 2002, a 55 percent rise from end-2000, according real estate analysts. This increase is equivalent to an increase in household net worth to disposable income of roughly 19 percentage points.

- **The interest payment burden on Korean households has been stable even as debt has risen** (Figure IV.3). Interest payments as a share of disposable income settled at 10 percent in 1995–97, but rose to 11.6 percent in 1998 due to the sharp rise in interest rates. In 2001–02 the interest ratio is estimated to have returned to 10 percent. Effective interest rates for households have fallen as policy interest rates fell after the crisis, with lending rates falling even further as competition for household lending reduced margins, and as households used bank loans to repay credit from more expensive sources. The interest payment burden is at the top of the range for the OECD countries for which data are available, but it is well below the levels in Sweden and Norway when they experienced banking crises.

15.   **Overall, the international comparison does not give any clear warning signs.** Nonetheless, it should be recognized that macroprudential analysis of households has only developed in recent years, and that international experience of deregulated financial markets may not be long enough to gauge what constitutes prudent debt levels (Woolford, 2001).

F. Sensitivity Analysis to Interest Rate Shocks

16.   **Macroeconomic shocks may undermine the financial position of households, adversely affecting the health of financial institutions.** The magnitude of financial sector losses due to shocks to the household sector will depend on the indebtedness of households, not only because this implies greater financial sector exposure to the household sector but also because of likely increases in the sensitivity of household financial soundness to shocks. This section presents some analysis of the potential magnitude of such impacts.

17.   **The impact of interest rate shocks on the household interest payment burden is the focus of the analysis.**[12] Stress testing in the context of Korea's participation in the Financial Sector Assessment Program indicated that the response of interest rates to macroeconomic shocks was the key determinant of their impact on household financial soundness, so the following sensitivity analysis focuses on interest rate shocks. While no single ratio can summarize the household financial position, this analysis uses the interest payment burden of households as the key indicator:

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[12] The simulations do not allow for a fall in house prices. The recent acceleration of house prices has been relatively brief, and while prices in some areas are historically high, house prices at the national level appear to be quite low in real terms (see Figure IV.1). Moreover, banks have generally modest loan-to-value ratios (see Box IV.3), so that even a substantial fall in house prices would leave collateral in excess of debt .

Figure IV.3. Household Interest Burdens
(Interest Payments in Percent of Household Disposable Income)
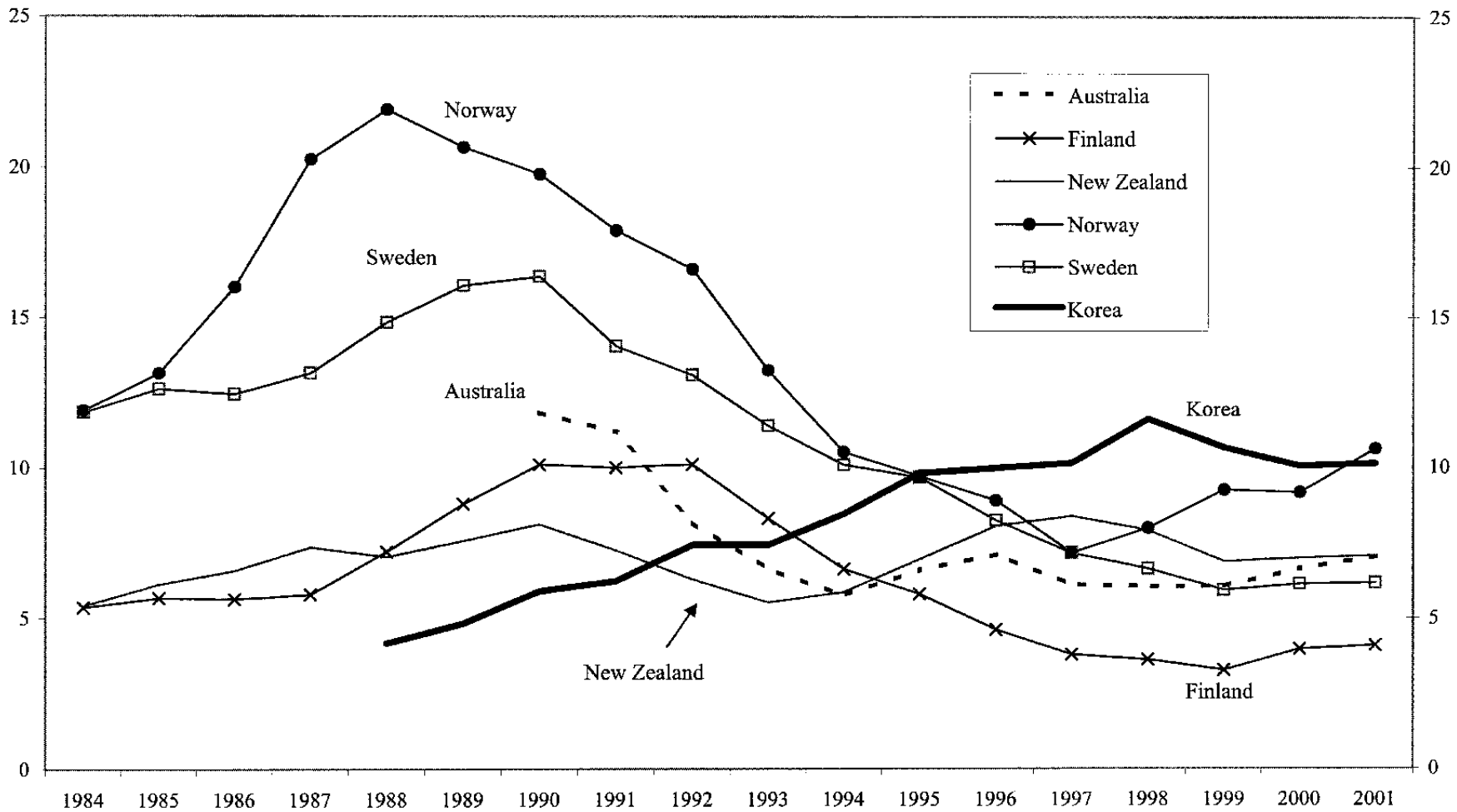
Source: OECD and BOK.

- As the debt service burden rises: (i) the likelihood of default rises as households have a smaller buffer against unforeseen expenses or income losses; and (ii) the incentives to declare bankruptcy also increase because the immediate consumption gains from bankruptcy are larger, as are the eventual benefits of personal debt restructuring (Davis, 1992).

- Benito *et al.* (2001) report that the interest burden (income gearing) is one of the main determinants of mortgage arrears in the U.K., with a 1 percentage point rise in income gearing estimated to increase the share of loans in arrears by 0.46 percentage points in the long run. Similarly, based on a panel estimation on four Nordic countries, Pesola (2001) finds that loan losses increase by 0.6 percentage points in the long run for a 1 percentage point rise in the ratio of household interest payments to GDP.

- The stability of household delinquency rates in Korea in the face of the rise in indebtedness is consistent with the stability of the interest payment burden.

18. **Interest rate shocks are simulated under two scenarios.**[13] A lasting increase in interest rates of 100–200 basis points over 2003–04 is possible if growth remains strong in Korea, e.g., 5 percent or higher. A 300 basis point hike is relatively high, and could be necessary if there was an exceptionally strong recovery. The sensitivity analysis is over a two-year period ending in 2004, to allow three-quarters of the shock to be passed through into the effective interest rate paid by households. The scenarios for the shocks are:

(i)   household credit growth slows in 2003–04, such that the credit to income ratio stabilizes at the level estimated for end-2002, of 113 percent;[14]

(ii)   household credit growth in 2003 continues at the same rate as in 2002, lifting the credit to income ratio to 136 percent, but credit grows in line with income thereafter.

19. **Continued high credit growth would significantly increase the impact of any interest rate hikes.** Under scenario (i), a 100–200 basis point rate hike would leave the interest burden at levels similar to the 11½ percent recorded in 1998. A 300 basis point hike would lift the ratio to 13 percent, somewhat outside historical experience. Based on the estimates reported above, this would increase aggregate household loan delinquency by about 1.2 percentage points, almost doubling current levels. Loan losses are estimated to rise by 1 percent of loans, which is substantial but within current provisioning levels. When the

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[13] It was not feasible to calibrate these shocks based on historical volatility given the extreme interest rate adjustments in the Asian crisis and interest rate controls earlier in the 1990s.

[14] The effective interest rate is estimated to have fallen 150 basis points from 2001, with the fall in bank lending rates of some 100 basis points, and further reductions due to shifting to cheaper sources of credit. There may be continued savings from loan restructuring in future, but their magnitude is unclear, and no further reduction is projected.

interest rate shock is combined with continued rapid credit growth, as in scenario (ii), the impacts are significantly larger, with large interest rate hikes then estimated to raise loan delinquency and loan losses by over 2 percentage points compared with the level in 2002.

Table IV.3. Estimated Impact of Interest Rate Shocks on Household Indicators in 2004				
	Base Line	Increase in Call Rate Target		
		100 bps	200 bps	300 bps
Scenario (i)[1]				
Credit to income, percent[2]	113	113	113	113
Effective interest rate, percent	9.1	9.9	10.6	11.4
Interest payments to income, percent	10.3	11.1	12.0	12.8
Change from 2002 (in percent of household loans)				
Delinquency rate[3]		0.4	0.8	1.2
Loan losses[4]		0.3	0.7	1.0
Scenario (ii) [5]				
Credit to income, percent[2]	136	136	136	136
Effective interest rate, percent	9.1	9.9	10.6	11.4
Interest payments to income, percent	12.4	13.4	14.4	15.4
Change from 2002 (in percent of household loans)				
Delinquency rate[3]		1.4	1.9	2.4
Loan losses[4]		1.3	1.7	2.1

[1] Household credit is assumed to grow in line with disposable income in 2003–04, so the ratio of credit to income is stable at the estimated level at end 2002 or 113 percent.
[2] Interest bearing financial liabilities, excludes trade credit and miscellaneous.
[3] Based on parameters estimated by Benito *et al.* (2001)
[4] Based on parameters estimated by Pesola (2001).
[5] Household credit is assumed to grow 20 percent faster than disposable income in 2003, as in 2002, raising the credit to income ratio to 136 percent, but credit grows in line with income thereafter.

20.   **This sensitivity analysis is preliminary in a number of respects.** The monitoring of macroprudential indicators has only begun recently as countries like the U.K. and Norway publish regular financial stability reviews, so research in this area is relatively limited. This analysis relied on parameters estimated for countries with different lending practices than in Korea, including different approaches to personal bankruptcy, which will likely alter the sensitivity of credit quality to shocks. In addition, the second scenario, with continued high credit growth, does not allow for the possibility of an associated boom-bust cycle in house prices, which may significantly increase the likely loan losses. Such an analysis would require more disaggregated data on loan-to-value ratios and loan-to-income ratios.

G. Conclusion

21.   **While some decline in household credit quality may occur in coming years, this deterioration seems likely to be within manageable limits**:

- the level of household indebtedness is comparable to other advanced economies, and the rate of increase since before the crisis is not outside the experience of other advanced economies, being similar to the increases in Australia and New Zealand;

- other macroprudential indicators of household liquidity, net worth, and debt service burdens do not indicate a lack of financial soundness;

- indicators of credit quality have remained stable except for credit card receivables, which account for only one-sixth of household credit;

- loan-to-value ratios on housing loans are conservative, and as of end-2002 there does not appear to be a significant risk of substantial generalized declines in house prices;

- from the estimated financial position of households at end-2002, the sensitivity analysis suggests that a relatively large rise in interest rates would be required to substantially raise delinquency rates and loan losses relative to current provisioning levels.

22.   **The risks of significant loan losses would rise if high household credit growth were to continue, but at this stage, the recently adopted prudential measures appear to have averted this risk.** The sensitivity analysis also found that further rapid growth in household indebtedness could significantly increase the impact of interest rate hikes on loan delinquency and losses. Prudential and other measures adopted during 2002, culminating in the package adopted in October, appear to have been effective in slowing credit growth in recent months. If this more sustainable pace of credit growth continues, the macroprudential indicators for households would tend to stabilize.

23.   **Further progress in household credit risk assessment and longer-term household lending are desirable to increase the robustness of the household credit market.** With the aid of regulatory pressure, banks are beginning to strengthen their credit risk management systems. Supervisors will need to monitor loan performance to assess the results of these efforts and to reassess the adequacy of provisioning over time. The current reliance on "bullet" loans (see Box IV.3), without regular amortization, tends to obscure possible debt service problems. Moreover, the short maturities mean that a significant fraction of loans needs to be rolled over in any period. This creates the potential for rollover risk, e.g., if housing values fell, exacerbating housing price declines when this collateral is realized. Amortized loans, with longer durations, would not suffer from these difficulties, and the authorities should continue to encourage the use of such loans, especially for housing finance purposes.

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Developments in the Housing Market

Housing prices have risen strongly since mid-2001, especially in parts of Seoul (see Figure IV.1). After being flat for some years after a crisis-related decline, housing prices began to rise in mid-2001. Overall house price inflation has been running at 16–18 percent (y/y) since March 2002. The most rapid increases were in apartment prices in the southern Seoul area of Gangnam, which rose 43.4 percent (y/y) in September 2002.

Recent developments in house prices reflected both supply and demand factors:

- The supply of new housing collapsed after the crisis, partly reflecting the bankruptcy of many construction companies. From almost 600 thousand units in 1997, construction fell by almost half in 1998, and remained depressed in 1999–2000. A strong recovery began in 2001 with 530 thousand units built, and 667 thousand units were constructed in 2002.
- On the demand side, interest rate cuts in 2001 and stock market weakness made housing an attractive investment.[15] This investment was facilitated by easy credit conditions as banks competed for household loans and as the BOK cut interest rates, such that the household loan rate fell from 9½ percent at end 2000 to 7¼ percent a year later. The rise in housing prices began in mid-2001, after an almost 50 percent collapse in the Korean stock market index during 2000.
- Trading in contracts *(bunyankwan)* for the right to purchase apartments prior to their construction was liberalized in 2000 to stimulate the real estate market.
- From a longer-term perspective, the level of real housing prices was relatively low in 2001. The Korea Research Institute for Human Settlements found that house affordability had increased, with average housing costs equal to five years of earnings, compared with nine to ten years earnings in 1991.

The housing market in Korea includes some unique features that make the market more prone to speculation:

- Rather than making regular rent payments, renters under the *jonse* system pay a deposit equal to about 60 percent of the property's value up front, which is returned in full at the end of the lease. This is an interest-free loan to the property owner. The *jonse* system possibly developed because of the limited availability of mortgage financing in the past. With the fall in interest rates in recent years, a more standard system of regular rental payments is becoming more prevalent.

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[15] Research by the KDI finds that changes in apartment prices generally are reflected in developments in household loans, and that apartment prices are significantly influenced by overall interest rates rather than the amount of household loans.

- When purchasing a new dwelling, the future owners buy a right—a *bunyankwan*—to occupy the property when completed. In effect the future owners of the property help finance construction costs. The holder of the *bunyankwan* makes four or five payments to the developer over the construction period which typically lasts two years.

- Korea experienced an asset price bubble in late 1980s and early 1990s, but this affected all types of real estate nationwide. Market observers suggest speculators hoarded *bunyankwan* to drive up prices. A speculator can also obtain higher leverage by using *jonse* funds to increase the number of apartments they own.

The authorities took various steps to cool off the housing market in 2002:

- In early 2002, capital gains on *bunyankwan* were made taxable, and two installments were required to be paid on *bunyankwan* before it could be traded. Tax audits on speculators were imposed.

A wide range of steps were taken in April, including:
- the National Tax Service increased the standard value—used for tax purposes—of 5 million apartment units by an average of 10 percent, with increases of 50 percent in parts of Seoul. This advanced the usual increase by three months, aiming to dampen real estate speculation by making buyers pay higher acquisition and registration taxes;
- the major construction companies agreed to refrain from price increases and the tax office launched a probe of construction companies; and
- the Housing Finance Credit Guarantee Fund replaced 100 percent guarantees on housing loans with 90 percent guarantees. This step was designed to encourage banks to be more cautious in extending housing loans and reduce losses on guarantees. It affected only a fraction of the market, as outstanding guarantees were W 16 trillion in 2001.

A second round of targeted measures was introduced in September:
- limits on resale of *bunyankwan* contracts were introduced in designated speculative regions, primarily Seoul and Kyonggi province. Resale of contracts was prohibited until one year after signing the contract, or after paying a fee, unless the owner needed to move, and apartment subscribers were prohibited from signing for additional apartments for five years;
- capital gains tax exemptions were made more restrictive in Seoul and Kyonggi province, as owners must reside in the house at least one year and possess it for at least three years to qualify for an exemption; and
- market prices are to be used for capital gains taxation if the value of an apartment exceeds W 600 million.

These measures appear to have been effective in recent months. In October 2002–January 2003, the national house price index slowed more than would have been expected due to seasonal factors, and small price falls were recorded in Seoul, especially in areas like Gangnam.