



REPUBLIC OF KOREA

FINANCIAL SYSTEM STABILITY ASSESSMENT

May 2014

This Financial System Stability Assessment on the Republic of Korea was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on December 24, 2013.

The Report on the Observance of Standards and Codes has been released separately.

The publication policy for staff reports and other documents allows for the deletion of market-sensitive information.

Copies of this report are available to the public from

International Monetary Fund • Publication Services
PO Box 92780 • Washington, D.C. 20090
Telephone: (202) 623-7430 • Fax: (202) 623-7201
E-mail: publications@imf.org Web: <http://www.imf.org>
Price: \$18.00 per printed copy

International Monetary Fund
Washington, D.C.



REPUBLIC OF KOREA

FINANCIAL SYSTEM STABILITY ASSESSMENT

December 24, 2013

Approved By

Christopher Towe, MCM
Markus H. Rodlauer, APD

Prepared By

Ghiath Shabsigh

This report is based on the work of the Financial Sector Assessment Program (FSAP) mission that visited Seoul on April 3–19, 2013 and July 1–17, 2013. The preliminary FSAP findings were discussed with the authorities during the Article IV Consultation mission, October 29–November 13, 2013.

- An International Monetary Fund (IMF) led mission with World Bank participation visited Seoul on April 3–19, 2013 and July 1–17, 2013 to update the Financial Sector Assessment Program (FSAP) for the Republic of Korea (Korea) conducted in 2003. In the case of each of the sector assessments, new methodologies adopted since the global financial crisis were employed.
- The mission met with Chairman Shin Je-Yoon of the Financial Services Commission (FSC), Governor Choi Soohyun of the Financial Supervisory Service (FSS), and Governor Kim Choongsoo of the Bank of Korea (BOK). Extensive discussions were held with senior management and staff in those institutions, as well as at the Ministry of Strategy and Finance (MOSF), the Korea Exchange (KRX), the Korea Securities Depository (KSD), and the Korea Deposit Insurance Corporation (KDIC). The mission also met representatives of academia and the private sector. Findings and recommendations were discussed with the heads and senior staff of the FSC, the FSS, the BOK, the KRX, and the MOSF. The team would like to express its gratitude to the Korean authorities for the excellent working relationship and their cooperation with the FSAP team, as well as for the generous hospitality.
- The team comprised of Ghiath Shabsigh (Mission Chief), Bernard J. Laurens (IMF Deputy Mission Chief), Kelly Eckhold, Eija Holttinen, Silvia Iorgova, Sonali Jain-Chandra, Phakawa Jeasakul, Erlend Nier, Hong Wang, Froukelien Wendt, and Christopher Wilson, (all IMF); Krishnamurti Damodaran (World Bank Deputy Mission Chief), Yejin Carol Lee, Valeria Salomao Garcia, Gynedi Srinivas, Craig Thorburn, and Sal Ngan Wong, (all World Bank), Ernesto Aguirre, and Andrea Corcoran (both External Experts).

- FSAPs are designed to assess the stability of the financial system as a whole and not that of individual institutions. They have been developed to help countries identify and remedy weaknesses in their financial sector structure, thereby, enhancing their resilience to macroeconomic shocks and cross-border contagion. FSAPs do not cover risks that are specific to individual institutions such as asset quality, operational or legal risks, or fraud.
- Korea is deemed by the Fund to have a systemically important financial sector according to SM/10/235 (9/16/2010), and the stability assessment under this FSAP is part of bilateral surveillance under Article IV of the Fund's Articles of Agreement.
- This report was prepared by Ghiath Shabsigh and members of the FSAP mission.

CONTENTS

GLOSSARY	5
EXECUTIVE SUMMARY	7
A. Macroeconomic Outlook and Micro-Financial Linkages	10
B. Financial Crisis and Policy Response	10
SOUNDNESS OF THE FINANCIAL SECTOR AND POTENTIAL RISKS	12
A. Overview of the Financial Sector	12
B. Financial Sector Vulnerabilities	12
C. Stress Tests of Banks and Nonbank Depository Institutions	17
MACROPRUDENTIAL FRAMEWORK	20
A. Macroprudential Measures and their Effectiveness	20
B. Institutional Arrangement and Recommendations	22
FINANCIAL SECTOR SUPERVISION: LEGAL UNDER-PINNING AND STRUCTURE	23
SECTORAL REGULATION AND SUPERVISION	24
A. Banking	25
B. Insurance	27
C. Securities	28
D. Financial Markets Infrastructures	29
E. Anti-Money Laundering and Combating the Financing of Terrorism	31
F. Conclusions and Recommendations	31
SYSTEMIC LIQUIDITY	32
CRISIS MANAGEMENT AND RESOLUTION FRAMEWORK	33
BOXES	
1. Korea: Global Financial Crisis: Korea Stabilization Policy Measures	11
2. Korea: Household Debt-Related Risks	15
3. Korea: Banking Sector: Stress Test Scenarios and Shocks	18
5. Korea: Supervisory Intensity	26
FIGURE	
1. Korea: Household Sector Debt at Risk not Covered by Assets	16

TABLES

1. Korea: Financial Stability Assessment Program Update: High Priority _____	9
2. Korea: Stress Tests of Nonbank Depository Institutions _____	20
3. Korea: Interconnectedness of Financial Sector Oversight Decision-making Bodies _____	24

APPENDIXES

I. Korea: Main Recommendations of the 2003 Financial Sector Assessment Program _____	35
II. Korea: Supervisory Intensity _____	37
III. Korea: Risk Assessment Matrix _____	40
IV. Korea: Stress Test Matrix (STeM) for the Banking Sector (Solvency) _____	41
V. Korea: Stress Test Matrix (STeM) for the Banking Sector (Liquidity Risk) _____	43

APPENDIX FIGURES

1. Korea: Banking Sector Soundness _____	44
2. Korea: Corporate Sector Risks _____	45
3. Korea: Household Sector Risks _____	46
4. Korea: Top-Down Solvency Stress Test: Basel III Capital Ratios, Aggregate, and Distribution _	47
5. Korea: Top-down Solvency Stress Tests: Drivers of Cumulative Impact on Basel III Capital Adequacy Ratios _____	48
6. Korea: Solvency Stress Tests: Impact of Market Risk in the Severe Scenario_____	48
7. Korea: Basel III Capital Ratios after Sensitivity Shocks _____	49
8. Korea: Liquidity Stress Tests: Breakdown of 30-Day Dash Flows_____	49
9. Korea: Systemic Liquidity Indicators _____	50

APPENDIX TABLES

1. Korea: Selected Economic Indicators, 2008–2014 _____	51
2. Korea: Financial System Structure, 2002–12 _____	52
3. Korea: Core Set of Financial Soundness Indicators, 2008–12 _____	53

Glossary

AMC	Asset Management Companies
AML/CFT	Anti-Money Laundering/Combating the Financing of Terrorism
APA	Administrative Procedure Act
BCP	Basel Core Principles for Effective Banking Supervision
BOK	Bank of Korea
BU	Bottom-up (Stress Test)
CAR	Capital Adequacy Ratio
CCP	Central Counterparty
CIS	Collective Investment Scheme
CL	Contingent Liabilities
CPSS	Committee on Payment and Settlement Systems
CSD	Central Securities Depositories
DM	Derivatives Market
DSR	Debt Service Ratio
DTI	Debt-to-income
ELA	Emergency Liquidity Assistance
FAAR	Administrative Regulations
FATF	Financial Action Task Force
FHCs	Financial Holding Companies
FMI	Financial Markets Infrastructures
FSAP	Financial Sector Assessment Program
FSB	Financial Stability Board
FSC	Financial Services Commission
FISCPMA	Financial Investment Services and Capital Markets Act
FSIs	Financial Soundness Indicators
FSS	Financial Supervisory Service
FSSA	Financial System Stability Assessment
FX	Foreign Exchange
GDP	Gross Domestic Product
GFC	Global Financial Crisis
IAIS	International Association of Insurance Supervisors
ICAAP	Internal Capital Adequacy Assessment Process
ICP	Insurance Core Principle
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
KDIC	Korea Deposit Insurance Corporation
KICPA	Korean Institute of Certified Public Accountants
KIF	Korean Institute of Finance
K-IFRS	Korean International Financial Reporting Standards
KOFIA	Korea Financial Investment Association

KoFIU	Korea Financial Intelligence Unit
KOSDAQ	Korean Securities Dealers Automated Quotations
KOSPI	Korea Composite Stock Index
KRW	Korean Won
KRX	Korea Exchange
KSD	Korea Securities Depository
LCR	Liquidity Coverage Ratio
LTV	Loan-to-Value
MCM	Monetary and Capital Market Department
MEFM	Macroeconomic and Finance Meeting
ML	Money Laundering
MMoU	Multilateral Memorandum of Understanding
MoFE	Ministry of Finance and Economy
MOSF	Ministry of Strategy and Finance
MOU	Memorandum of Understanding
MPC	Monetary Policy Committee
MSB	Mutual Savings Banks
MTM	Mark to Market
NBDIs	Nonbank Depository Institutions
NBFIs	Nonbank Financial Institutions
NIM	Net Interest Margin
NPL	Nonperforming Loan
OTC	Over-the-Counter
PFMI	CPSS-IOSCO Principles for Financial Market Infrastructures
RAAS	Risk Assessment Application System
ROA	Return on Assets (Average Assets)
RRC	Regulatory Reform Committee
RWA	Risk-weighted Assets
SFC	Securities and Futures Commission
SIFIs	Systemically Important Financial Institutions
SAMP	Systemic Risk Assessment Model for Macroprudential Policy
TD	Top-down (Stress Test)
TDs	Trade Repositories
U.S.	United States of America
USD/US\$	United States Dollar
UMP	Unconventional Monetary Policy
WEO	World Economic Outlook

EXECUTIVE SUMMARY

The Korean economy is experiencing a modest recovery, helped by supportive monetary and fiscal policies and buoyant exports. GDP growth is expected to rebound to 2.8 percent in 2013 (from 2 percent in 2012), and strengthen further to 3.7 percent in 2014, in view of the projected global recovery and a gradual pickup in domestic demand. Inflation has fallen to 0.7 percent in October 2013 from 4.2 percent in 2011, well below the target band of 2½–3½ percent. With stronger exports and muted domestic demand, the current account surplus has widened and is expected to reach around 5.5 percent of GDP in 2013, putting an upward pressure on the exchange rate. However, risks are on the downside. The main near-term risks are external: sharply slower growth in Korea's main trading partners or severe global financial market stress.

While the vulnerability of the Korean financial system has diminished considerably since the 2008 crisis, risks remain. The capitalization of the banking sector has improved, foreign currency liquidity profiles have strengthened markedly, and the active disposal of bad assets has resulted in low levels of nonperforming loans. However, profitability has remained weak, and while banks' vulnerabilities to corporate and household exposures appear contained in the near term, further economic weakness could impair the soundness of both sectors. Although macroprudential policies slowed the growth of banks' lending to households, this has spurred household exposures to less regulated nonbank financial institutions (NBFIs).

The banking system appears resilient to extreme growth shocks or protracted sluggish movement of the economy, but nonbank depository institutions (NBDIs) are more vulnerable. Banking capital adequacy ratios remain at about or above 10 percent even under the most severe stress test scenario. Banks' foreign currency liquidity positions are robust; only under a very severe scenario the system would face a small but manageable liquidity shortage. However, stress tests reveal that some NBDIs have thin buffers against credit risk. A regulatory framework consistent with that for banks should be applied to all NBDIs, with larger entities also subjected to stricter supervision.

Korea has been effective in articulating and applying macroprudential policies, but would benefit from the establishment of a macroprudential council. A high degree of capital account openness and an increasing degree of financial integration, coupled with greater sophistication of the financial sector and the potential for regulatory arbitrage will require an enhanced ability to detect emerging systemic risks and to initiate timely responses. This argues for establishing more formal and dedicated arrangements for macroprudential policy. Such arrangements can provide for enhanced transparency and accountability, a greater degree of independence from the political process, a clarification and strengthening of the role of the BOK in financial stability, and a separation of the macroprudential policy function from crisis management.

There would be merit also in establishing a dedicated apex committee for leading and coordinating crisis preparedness and crisis management. The authorities should undertake periodic crisis simulation exercises; strengthen the ability of the deposit insurance and resolution

authority to play a more effective role, and bring the financial institutions resolution framework in line with international best practice, in particular regarding financial conglomerates and systemically important financial institutions (SIFIs).

Building upon the 2003 FSAP recommendations, the authorities have taken resolute steps to strengthen the regulation and supervision of the financial sector. The assessments of standards and codes identified gaps that need to be addressed, with issues related to governance, mandate, and risk-sensitive approaches being overarching concerns that could undermine supervisory effectiveness. Additional efforts are needed to update the regulations including with respect to financial conglomerates and NBFIs. The legal framework provides solid foundation for financial sector oversight but gaps need to be addressed, in particular, the narrow range and level of pecuniary administrative sanctions in comparison to a prosecution-centric focus at present.

The regulatory architecture raises a number of concerns. These pertain, in particular, to its independence from political influence or the perception of it, multiple objectives that dilute the focus on the core supervisory mandate, and overlapping responsibilities and complex processes requiring intense inter-agency communication. Therefore, there is a need to further strengthen the independence of the FSC and FSS from the political process to facilitate greater focus on promoting the safety and soundness of the financial sector and sound supervisory and enforcement decisions.

The Korean authorities have undertaken various initiatives with respect to AML/CFT. The key shortcomings to date are: (i) lack of a sound and effective risk-based approach to AML/CFT supervision; (ii) slow progress in amending the legal framework; and (iii) absence of supervision for a subset of deposit-taking institutions.

The BOK has significant capacity to respond to foreign and domestic currency liquidity pressures although tensions may arise in times of heightened stress. High levels of Korean won (KRW) liquidity provide participants confidence in financing longer term assets from short-term funding markets. However, thin secondary markets for fixed-income securities is a weakness at times of stress, implying a prominent BOK role to backstop markets. The systemic liquidity framework will benefit from measures to support secondary markets development, and the BOK should ensure its emergency liquidity assistance (ELA) framework is robust and understood by stakeholders.

Korea has a well-developed payment, clearing, and settlement infrastructure, but there's room to increase compliance with international standards. Enhanced cooperation between the BOK and the FSC regarding the regulation, supervision, and oversight of the financial markets infrastructures (FMIs) is desirable. The authorities should also develop a memorandum of understanding (MOU) to ensure effective coordination between the BOK and FSC covering both the appropriate technical and management levels within the authorities. They should also develop and test a crisis management plan. To further improve the FMIs regulatory structure, the powers of the BOK and the resources of the FSC should be increased.

High priority recommendations are shown in Table 1.

Table 1. Korea: Financial Stability Assessment Program Update—High Priority Recommendations

Recommendations	Timing
Overall Financial Sector Oversight and Coordination	
Establish a dedicated and formal macroprudential council, with a stronger role for the BOK, the power to recommend regulatory action from other bodies, and transparency over policy deliberations.	Medium-term
Strengthen the independence of the FSC and FSS and increase transparency of the allocation of decision-making responsibilities among the two authorities.	Short to Medium-term
Enhance enforcement effectiveness by broadening the range of administrative and civil penalties and increasing the amount of administrative fines and civil penalties.	Medium-term
Financial Stability Analysis, Stress Tests, and Financial Supervision	
Enhance coordination among agencies involved in stress testing (FSS and BOK).	Short-term
FSS should carry out a comprehensive validation of banks' stress testing exercise.	Short-term
Disclose to the public the results of the stress tests conducted by the authorities.	Short-Term
Empower supervisors to set capital ratios above the Basel II minimum, implement all principles of Pillar-2 of Basel II, and extend calculation of Basel II capital to group holding companies.	Short-term
Apply regulatory framework consistent with that for banks to all NBDIs, with larger entities also subjected to stricter supervision.	Short-term
Implement a risk-based approach to AML/CFT supervision, and expand supervisory activities to all deposit-taking institutions, and the designated non-financial businesses and professions.	Short-term
Ensure sufficiently comprehensive audit oversight and introduce minimum standards for appointing external auditors of banks over and above existing requirements, reflecting expectations of experience and expertise.	Medium-term
Enhance risk-sensitivity of supervision via more flexible and frequent examinations that also provide sufficient coverage of the smaller supervised entities and enhancement to the judgmental component of the assessments.	Medium-term
Crisis Preparedness and Crisis Management Framework	
Establish a dedicated apex committee for leading and coordinating crisis preparedness and management work; undertake periodic crisis simulation exercises.	Short-term
Replenish the deficit in deposit insurance fund; assure KDIC back-up funding.	Short-term
Address potential moral hazard risks by enhancing banks' risk management; and ensuring that government support is not assured or open-ended.	Medium-term
Systemic Liquidity Management and Financial Market Infrastructures (FMIs)	
BOK to ensure that its crisis management contingency plan adequately covers ELA-related decisions. Put in place a Memorandum of Understanding to ensure effective coordination between BOK and FSC in FMI matters, and provide BOK with more enforcement tools.	Short-term Short-term
Reform the credit risk and management framework for the securities market, and increase the number of KRX staff managing companywide and CCP-related matters.	Short-term

INTRODUCTION AND BACKGROUND

A. Macroeconomic Outlook and Micro-Financial Linkages

1. After significant slowdown in 2012, Korea's growth strengthened over the course of 2013 (Appendix Table 1), with exports rebounding strongly and private consumption and construction strengthening, due in part to a pickup in wage growth and policies to reinvigorate the housing market. Growth is projected to rise to 2.8 percent in 2013 and to further strengthen to 3.7 percent in 2014. Inflation has been subdued, due to the absence of demand pressures and moderating commodity and food prices, falling from 4.2 percent in 2011 to 0.7 percent in October 2013 (end of period), well below the target band of 2½–3½ percent.

2. Against this background, the Korean authorities' response has been timely and measured. The government issued a supplementary budget in April 2013 (of 1¼ percent of GDP) to make up for a potential revenue shortfall and provide modest stimulus. The fiscal deficit (excluding social security funds) is projected to widen to around 2.1 percent of GDP in 2013. The previously committed fiscal consolidation path has also been delayed in view of the prevailing negative output gap. The BOK cut the policy rate by 25 bps in May 2013 to 2.5 percent, after pausing since October 2012. In addition, in April 2013, the government launched a comprehensive policy package to stimulate the property market. The key short-term risks to the outlook are an abrupt and premature exit from quantitative easing in the United States, a re-intensification of the euro area crisis, and a deeper-than-expected slowdown in emerging markets, particularly China.

3. Korea was affected only mildly by the recent global market turmoil, and has been even viewed as a safe haven. After a short-lived fall in the won, Korea proved resilient to the large capital outflows and sharp currency depreciations that affected the rest of the region following the announcement of the eventual tapering of U.S. unconventional monetary policy (UMP) in May. Despite tighter global conditions, Korean bond yields have risen only modestly and the Korean won and stock market have actually been appreciating. Korea's resilience to capital outflows relative to other economies reflects strong fundamentals, particularly reduced short-term external debt, low inflation and public debt, and rebounding growth. Notwithstanding this resilience, Korea's susceptibility to capital flow volatility remains a key concern for policymakers, and measures have been taken to mitigate this volatility (see below).

B. Financial Crisis and Policy Response

4. Prompt policy actions by the Korean authorities supported a relatively rapid recovery of the financial sector and the broader economy after the 2008 crisis (Box 1). With the seizure of international money markets following the Lehman Brothers collapse, Korean banks faced a sharp reduction in their credit lines and found it difficult to roll over their short-term external borrowings.¹

¹ Net capital outflows amounted to 4½ percent of annualized GDP in the fourth quarter of 2008, compared to about 3¾ percent of annualized GDP in the fourth quarter of 1997 during the Asian financial crisis.

The shortage of dollar funding spilled over into domestic money markets, and the perceived default risk of Korean banks, due to their significant reliance on wholesale funding, increased by more than anywhere else in the region. However, despite a severe and sudden reversal of capital flows, prompt policy measures supported the stability of the financial sector and ensured that the flow of credit to the economy was not disrupted.

Box 1. Global Financial Crisis: Korea's Stabilization Policy Measures

The authorities implemented a broad set of measures to counteract financial stability pressures, in particular to address concerns about the dry-out of FX and won liquidity, and preempt capitalization pressures on banks and ensure the flow of credit to the economy. Most of them, except for SME support, have now been phased out:

- Providing generous liquidity support in both won and U.S. dollar. The BOK broadened the list of eligible counterparties and collateral in its won repo operations and supplied liquidity of KRW16.8 trillion through long-term repos. It also set aside KRW 5 trillion (KRW 2.1 trillion were used) to purchase corporate bonds and CPs under the Bond Market Stabilization Fund. Regarding dollar liquidity, the BOK used foreign reserves and entered into currency swap deals with major central banks to provide up to US\$56 billion to banks and trade-related businesses.
- Guaranteeing banks' external debt. The government guaranteed banks' foreign debt in 2009, even though the scale of use was limited. By end-2009, several banks were able to access international capital markets without recourse to the government's guarantee.
- Establishing recapitalization and restructuring funds. In December 2008 a Bank Recapitalization Fund of up to KRW 20 trillion was set up to strengthen banks' capital base; a one-time injection of KRW 4 trillion into eight banks was carried out in March 2009. The Fund was used on a temporary, countercyclical basis during the crisis to avert potential moral hazard. The Korea Asset Management Corporation (KAMCO) stood ready to issue up to KRW 40 trillion government-backed bonds to purchase corporate nonperforming loans (NPLs) from financial institutions (only a fraction was used).
- Ensuring SMEs' access to credit. The amount of SME credit guarantees was raised and its coverage increased up to 100 percent; banks were guided to roll over SME loans falling due in 2009. Subsidized lending facilities for SMEs were also expanded, with the BOK raising the Aggregate Credit Ceiling by KRW 3.5 trillion to KRW 10 trillion.
- Actively using macroprudential tools to contain systemic liquidity risks in the banking sector. This was a response to Korean banks' significant reliance on wholesale funding and short-term external debt.

5. The comprehensive policy responses supported the stability in the financial sector, and positive credit growth to the real economy. The interbank market was stabilized quickly after a roughly 150 basis point spike in interbank market spreads in December 2008. With banks able to fund themselves, private domestic credit continued to grow healthily in Korea.

SOUNDNESS OF THE FINANCIAL SECTOR AND POTENTIAL RISKS

A. Overview of the Financial Sector

6. Korea's financial sector is large and diversified (Appendix Table 2). The total assets of the sector amounted to 312 percent of GDP at end-2012. The banking sector, comprising commercial and specialized banks, and two foreign banks, accounted for 48 percent of aggregate financial sector assets at end-2012, with lending constituting 73 percent of commercial banks' total assets (above the average for the advanced Asian countries). The nonbank sector has experienced strong growth in recent years, with its share in total financial sector assets rising to 52 percent at end-2012 from 41 percent at end-2000. The nonbanking sector comprises a wide range of deposit- and non deposit-taking institutions. The former includes credit cooperatives, accounting for about 11 percent of aggregate financial sector assets at end-2012. Non-deposit-taking institutions mainly comprise insurance companies, asset management companies, and securities companies, respectively accounting for 19 percent, 8 percent, and 7 percent of aggregate financial sector assets, respectively.

7. The authorities have been fostering the development of financial holding companies (FHCs). FHCs are seen to hold potential benefits as they permit local financial institutions to pursue economies of scale and scope. Regulations stance seek to minimize potential FHC-related vulnerabilities, such as by prohibiting FHCs to control nonfinancial subsidiaries. As of end-2012, there were 12 FHCs in Korea: 10 bank and 2 nonbank holding companies.

8. Korea has a sizeable local capital markets. The bond market is among the largest in Asia, with outstanding securities accounting for 123 percent of GDP at end-2012. Growth in the market is driven by the corporate bond segment, one of the largest in the world.² The derivatives market is also large, with trading activity concentrated in exchange-traded derivatives. Daily turnover of equity-linked derivatives at the Korea Exchange was the second highest globally, only behind the CME. There is also active trading of foreign exchange (FX) and interest rate derivatives.

B. Financial Sector Vulnerabilities

9. Financial sector vulnerabilities have diminished considerably since the 2008 crisis as a result of policy actions to strengthen banks' solvency and liquidity in the aftermath of the crisis. Banks' liquidity profiles have improved markedly, reflecting lower FX liquidity mismatches and less reliance on wholesale funding (Appendix Figure 1). Banks' capitalization has been bolstered via

² In Korea, outstanding domestic debt securities amounted to 43 percent of GDP for corporate issuers and 32 percent of GDP for financial institutions at end-2012, placing Korea among the largest corporate bond market in percent of GDP. Consequently, intermediation by the domestic banking system in Korea is relatively less important compared to other Asian countries.

post-crisis measures (Box 1), and by supervisory guidance to limit dividend payouts. As a result the capital adequacy ratio (CAR) of the banking system at end-2012 reached 14.3 percent from 12.3 percent at end-2008.

10. The exposure of the Korean financial system to intensification of risks in global financial markets has been muted, but remains largely untested. In the aftermath of the 2008 crisis, banks decreased considerably their dependence on short-term wholesale funding in global markets. However, they are still exposed to the potential for some funding pressures if global financial risks increase sharply, for example via a re-intensification of stress in the euro area, where most foreign funding originates. Moreover, so far Korea has been largely unaffected by the capital outflows related to a potential UMP exit, but its status of safe haven is still untested. A disorderly UMP exit, and a sudden reversal of capital flows could impair the already weak business sentiment and investment. Finally, tighter financial conditions could put a brunt on domestic growth as funding costs of banks and corporates rise.

11. Banks' profitability has been subject to downward pressures. Since the onset of the crisis, the profitability has been impacted negatively by the low interest rate environment (compressing the net interest margins), increased credit risk due to deteriorating macroeconomic conditions, and conservative regulatory provisioning standards (up to about 150 percent of expected losses).³ The return on assets (ROA) of the commercial banks in 2012, at about 0.5 percent, is low relative to other countries (Appendix Figure 1). Importantly, the share of non-interest income has remained low (Appendix Figure 1).

12. Vulnerabilities in the nonfinancial corporate sector have picked up over the past two years. Korean firms entered the 2008 crisis with relatively solid balance sheets, following a decade-long corporate restructuring. Despite the sizeable decline of output during the crisis, the corporate sector remained profitable, and its aggregate balance sheet strengthened. However, corporate financial conditions deteriorated in 2011 due to the global slowdown, and have remained weak due to lower profitability (Appendix Figure 2). The aggregate debt-at-risk ratio is at a level comparable to that prevailing in the midst of the 2008 crisis. Corporate leverage has continued to decline after 2008, but Korean firms remain more leveraged than OECD peers, and their profitability tends to lag behind peers in major advanced and emerging economies. The team's analysis suggests that a shock comparable to that faced by an average firm during the 2008 crisis would induce aggregate expected losses comparable to late 2008 levels.

13. Vulnerabilities are more acute in sectors most affected by the post 2008 crisis economic slowdown, as well as across SMEs. Balance sheet pressures and weak earnings are concentrated in sectors facing structural challenges (construction and real estate development) or those exposed to the global downturn (shipbuilding and transportation). Overall, SMEs are more leveraged and less profitable compared to large corporations. At 2 percent, SMEs' return on assets

³ The credit quality has remained stable due to the sales and write-offs of NPLs.

in 2011 was about 0.5 percentage points below that of large corporations. SMEs' leverage ratio at end-2011 was also 35 percentage points higher than the 145 percent for large corporations. To some extent, the issue may be structural as extensive government support is likely provides a lifeline to a potentially unproductive and financially weak SMEs.

14. Korean financial institutions are highly exposed to the household sector, but in the absence of macroeconomic shocks near-term risks should be manageable (Box 2).⁴ Household leverage is high by international standards, with household debt accounting for 136 percent of disposable income at end-2012, and has been rising, albeit at a slower pace. In the near term, the banking sector vulnerabilities related to household lending are relatively limited due to conservative macroprudential limits (see below), a robust process for collateral collection, and high household net wealth. However, the macroprudential requirements on bank household exposures appear to have increased credit risk at some NBFIs. In recent years, lower-income and lower-rated households have been increasingly securing credit via NBDIs, and the share of delinquent loans at some NBDIs is now relatively high.⁵ The rising importance of NBDIs calls for a better alignment of the regulatory and supervisory rules applied to NBDIs with those applied to banks.⁶

15. Further deterioration in the housing market could lead to an upsurge in household credit risks. Sensitivity analysis (Figure 1)⁷ suggests that household debt-related vulnerabilities are tightly linked to housing prices, given the high share of real estate in households' wealth. Under the baseline scenario, the aggregate level of debt at risk not covered by all assets stands at only 0.7 percent against 21.9 percent if the absorptive capacity of financial assets only is taken into account, suggesting that housing debt soundness is sensitive to a decline in housing-related wealth.

⁴ The share of household debt owed by borrowers with high DSR (>40 percent) and high LTI (>400 percent) was 35 percent in July 2010, up from 30 percent in July 2009. At end-2012, the share of debt owed by borrowers with high DSR (>40 percent) alone is estimated to be 33 percent.

⁵ Related vulnerabilities are difficult to quantify given the lack of detailed data on NBDIs' household lending patterns.

⁶ NDFIs accounted for 20 percent of household credit at end-2012, while all NBFIs accounted for 45 percent.

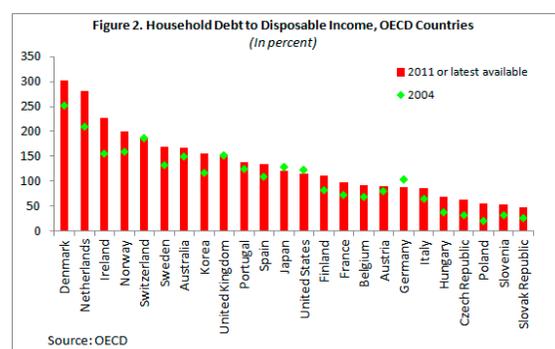
⁷ Sensitivity analysis carried out by the Korean Institute of Finance (KIF) was based on a framework provided by the FSAP team and jointly agreed parameters. The magnitude of the shocks is comparable to those in banking sector stress tests. However, only shocks with direct impact on household debt service were considered, with no feedback effects on house price, for example, given lack of adequate historical data on household debt distributions.

Box 2. Household Debt-Related Risks

In the past decade, Korean households have become highly leveraged as the growth of household credit has outstripped income growth. Household debt, as a share of disposable income has increased by more than 40 percentage points, from 116 percent in 2004 to 156 percent at end-2011.* In absolute terms, household leverage is also high by OECD standards. The median household debt to disposable income across OECD countries in 2011 was 128 percent.

The ability of households to meet the high debt burden is partly supported by high level of wealth concentrated in real estate.

Household wealth in Korea is high by international standards and, in the aggregate, exceeds by a large margin the level of outstanding debt. At end-2012, households' net assets accounted for 115 percent of household debt. Most of these assets were relatively liquid, including a large share of currency and deposits, which accounted for more than 45 percent of financial assets (far above levels in the U.S. and Germany). However, the preponderance of household assets takes the form of real estate (75 percent of total assets) subject to potentially adverse housing price movements. Other mitigating factors include low loan-to-value (LTV) values, currently at around 50 percent. In addition, banks' collateral collection is robust with recovery of up to 120 percent of loan values.



Despite the relatively benign aggregate picture, there are pockets of vulnerabilities due to various factors:

The structure of household debt. A substantial share of household loans are structured as bullet loans, exposing households to refinancing risks since principals need to be refinanced periodically. The share of such loans has declined from 41.3 percent at end-2010 to 33.6 percent in March 2013, but remains high. Moreover, household debt is dominated by variable rate loans, exposing households to a sharp rise of financing costs in case of a rise in interest rates. The share of fixed rate loans has increased from 5.1 percent at end-2010 to 39.5 percent in May 2013.

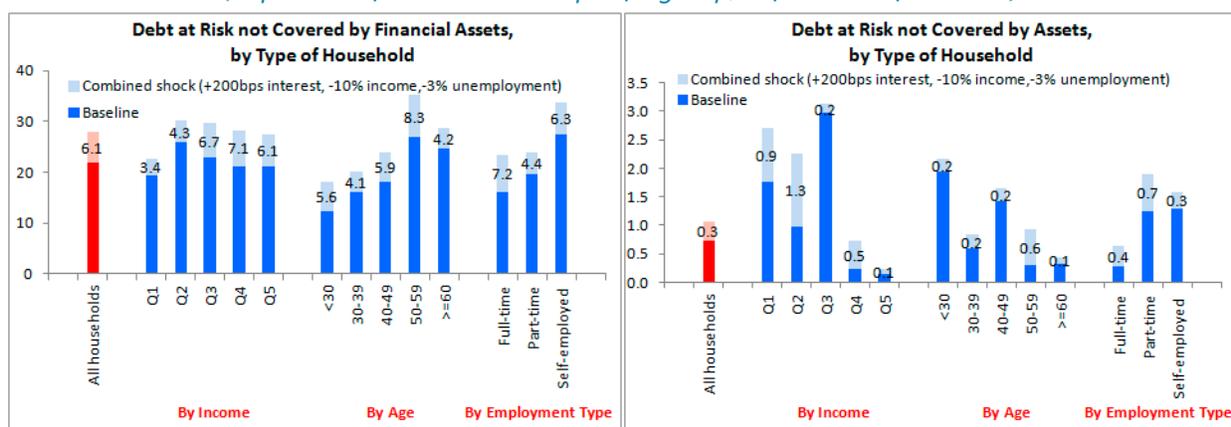
The uneven distribution of debt and assets across households. Recently household debt has increased more at lower ends of the income distribution. A shock to these households' repayment capacity (i.e., due to a further decline in their disposable incomes) could lead to financial sector losses and should, thus, be monitored carefully.

The sizable increase in lending by NBFIs. While the pace of household loan growth by banks has decelerated, lending by nonbanks has risen sharply. As of end-2012, NBFIs accounted for 45 percent of household lending. The financial stability challenges of nonbank lending are related to the less regulated nature of these institutions, and their tendency to tap less creditworthy borrowers unable to access bank funding due to banks' tighter lending standards.

The increase in the debt of multiple loan borrowers. The debt of borrowers taking out multiple loans rose considerably from KRW 262 trillion in June 2010 to KRW 306 trillion at end-2012, as did the number of multiple loan borrowers. There are some indications that the quality of these loans may be worsening, as the delinquencies of multiple loan borrowers are higher than for others and are rising.

* The OECD-wide data used here covers both households and non-profit institutions serving households, a broader definition of households than the one used in the rest of the report.

Figure 1. Household Sector Debt at Risk not Covered by Assets
(In percent of total debt in a specific group; before and after shock)



Source: KIF based on data from the Household Survey of the Korea National Statistical Office, and a framework provided by the IMF FSAP team.

Note: Debt at risk refers to the share of debt owed by borrowers with debt service ratio (DSR) over 40 percent.

16. The authorities need to support continual gradual household deleveraging to ensure adequate growth momentum without fueling financial stability concerns. Apart from strong macroeconomic policies and structural policies to bolster the real economy and household disposable incomes, this process should include: (i) tighter regulation of NBFIs to curb further credit expansion via regulatory arbitrage; (ii) further transformation of the structure of household debt towards fixed rate amortizing loans, while ensuring that such loans are priced to fully reflect risks; and (iii) expanded availability of debt counseling services, providing budget and legal advice to households.

17. Overall, banks' NPL levels are low, reflecting a practice of active disposal of bad assets, mostly via market mechanisms. The NPLs of commercial banks accounted for 1.2 percent of total loans at end-2012, with an average of about 1 percent per year written off or sold to Asset Management Companies (AMCs). Most distressed assets are purchased by private entities, which fund purchases via the issuance of corporate bonds. The effectiveness of this process is supported by a robust collateral recovery process. Recovery rates are reportedly high, with lenders legally having senior claims on up to 120 percent of the value of a loan. The robustness of these mechanisms in a context of a sharp decline in housing prices has not been tested.

18. However, the financial sector is subject to distortions that need to be addressed. It is important to ensure that banks have full operational autonomy to undertake risk-based allocation of credit, including developing risk pricing skills to provide non-guaranteed funding to a broader range of viable SMEs, supported by enhanced risk management. Curbing pressures on banks to cut interest rates and fees would be beneficial to avoid depressing bank profits and limit the availability of credit for higher risk borrowers.

C. Stress Tests of Banks and Nonbank Depository Institutions

Banking sector

19. The team's analysis suggests that the commercial banking system would remain sound even under extreme shocks to macroeconomic growth or protracted sluggish movement of the economy (Box 3). This reflects high initial capital buffers and conservative capital management. The system-wide capital ratios remain considerably above the Basel III requirement even under a very adverse macro scenario (Appendix Figures 4 and 5) and all banks meet the Basel III capital requirements, with CARs remaining at about or above 10 percent.

20. The impact of higher interest rates due to a potential disorderly exit from unconventional monetary policies (UMP) in the U.S. would also be limited. However, this should not lead to complacency given that the robustness of the results is subject to model limitations.⁸

21. Banks also remain solvent if potential second-round spillover effects are taken into consideration.⁹ The stress tests evaluated the potential amplification of the effect of macroeconomic shocks due to the propagation through interbank and macro-financial linkages. While the level of bank capital deteriorates further, as expected, the effects tend to be limited, and the aggregate CAR of the sector declines only marginally. By end-2017, when the accumulated effect is the largest, the aggregate CAR under the severe scenario would decline to 12 percent taking into account contagion effects, against 13.6 percent without such effects (Appendix Figure 4). The macro model used does not explicitly capture some of the linkages, particularly the link between higher interest rates and the DSR. To correct for this, an exogenous consumption shock was applied based on a model linking consumption to DSR. Here also, model limitations may have underestimated the potential impact (see footnote 8).

22. Banks' market risks are muted, in part due to limited securities' holdings. Banks' market risk exposures at end-2012 were about eight times smaller than credit risk exposures, and were mostly in the form of debt securities holdings. Even under the most adverse scenario of a sharp economic downturn, market risks would account for only up to 0.3 percent of risk-weighted assets in 2014 under the BU exercise, and 0.8 percent in 2013 under the TD exercise (Appendix Figure 6). Overall, TD estimates suggest that a market shock would reduce the capital adequacy ratio of the top seven banks by only about 1.3 percent.

⁸ The macro model used does not explicitly capture some of the linkages, particularly, the link between higher interest rates and the DSRs. To correct for this, an exogenous consumption shock was applied based on a model linking consumption to DSR. Such an approach (the only feasible alternative, given modeling constraints) may have underestimated the potential impact.

⁹ This builds upon the results of the previously discussed stress tests.

Box 3. Banking Sector: Stress Test Scenarios and Shocks

The FSAP conducted comprehensive solvency and liquidity stress tests of the banking system, as well as analysis of contagion effects across banks, and simple stress tests of nonbank depository institutions. Sensitivity tests on the exposure of the banking sector to movements in interest rates and housing prices were also carried out. Given the lack of sufficient public data, the assessments were performed by the authorities based on a stress testing framework agreed with the FSAP team, and validation of models and results by the FSAP team. The validation included extensive discussions with the BOK and the FSS and detailed reviews of the methodologies, computations, and results of the stress tests. The TD tests made use of the BOK's Systemic Risk Assessment Model for Macprudential Policy (SAMP). Bottom-up (BU) tests by the top seven domestic banks were also carried out. The key macro and financial variables for TD and BU tests were projected using BOK's macro models. All TD estimations were completed by the BOK and all BU estimations by the participating banks in coordination with the FSS. Liquidity tests were carried out at both the TD level by the FSS, and at the BU level by individual banks. The FSAP team did not carry out independent stress tests due to the lack of sufficient publicly available data.

Solvency tests assumed a five-year horizon and evaluated the impact of extreme macroeconomic shocks via four scenarios: (i) a mild and a severe global double-dips, with the latter potentially resulting in a slump of real GDP growth to -3.8 percent in 2013 and to -2.7 percent in 2014, and gradual recovery to its projected path by the 2017 (the last year of the stress testing horizon); (ii) a prolonged period of low economic growth, with real GDP growth 2.5 percentage points below projected baseline over the entire 5-year horizon; and (iii) a spike in interest rates from a potential disorderly exit from unconventional monetary policy in the U.S., with interest rates increasing by 250 basis points (mid-range of the shocks used in the sensitivity analysis below) over 2½ years, starting in the second half of 2014. The resilience of the banking system was evaluated via the expected impact of such deterioration in macroeconomic conditions on banks' credit and market risks, and consequently on banks' capital bases. The solvency tests were carried out both by the authorities and by the banks.

TD solvency tests also evaluated the additional impact of inter-bank spillovers. Contagion-related losses were estimated as second-round losses due to liquidity contagion, using the BOK SAMP model. The FSAP team could not estimate its own network model, given that the authorities were unable to share the necessary data. In principle, separate modeling frameworks with the BOK SAMP permit an evaluation of second-round effects due to both default and liquidity contagion. However, the high capitalization buffers of Korean banks and the lack of bank defaults after the first-round solvency shocks made the use of the default contagion model unfeasible. The assessment of liquidity contagion assumed that default contagion precedes liquidity contagion. Drops in banks' capital positions—but not necessarily outright defaults—were modeled to lead to higher funding costs, mark-to-market (MTM) losses due to fire sales, and credit crunch losses.

Liquidity tests evaluated the ability of banks to withstand unprecedented shocks to both their FX and local currency liquidity conditions. The TD and BU tests were designed as alternative liquidity measures, meant to capture aggregate and roll-over liquidity risks respectively, and were evaluated over a 30-day horizon. The shock magnitudes under both scenarios were extreme. Under the TD scenarios, banks were assumed to completely lose access to secured wholesale funding, and face higher deposit outflows than previously observed in Korea. The assumptions in the BU scenarios were identical, but were applied to banks' rollover rates, rather than to the entire funding base.

The exposure of banks to potential interest rate and housing price risks was also evaluated via sensitivity analyses. These evaluated the impact on the aggregate credit and/or market risks of an increase in interest rates, given the high share of variable rate loans (an extreme shock of 300 basis points and a moderate shock of 200 basis points); an exchange rate depreciation (an extreme shock of 50 percent, and a moderate shock of 30 percent); and a fall in real house prices (an extreme shock of 20 percent and a moderate shock of 15 percent).

23. FX liquidity stress tests suggest that even in the event of unprecedented liquidity outflows the system-wide liquidity position would remain manageable. Under a scenario involving a shutdown of global wholesale funding, the aggregate gap for all commercial banks amounts to around US\$3.8 billion without taking into account the committed credit lines from international banks (about 1.2 percent of Korea’s international reserves); it would turn into a small surplus of around US\$155 million after taking these credit lines into account. Similarly, Korean won liquidity stress tests suggest that individual banks have sufficient liquid assets to handle potential outflows under extreme shocks.¹⁰

24. The authorities carry out stress tests, but the process needs to be enhanced. The FSS requires banks to carry out stress tests twice a year for solvency and monthly for liquidity. The BOK conducts TD stress tests of the banking sector using supervisory information. However, there are issues related to the lack of cross-agency coordination to discuss relevant risk factors and reconcile the results. The FSS and the BOK do not share results with each other, and hence do not have a channel to validate their respective results. For example, the TD exercise (conducted by the BOK) and the BU exercise (conducted by banks and validated by the FSS) produce divergent results on market risks (Appendix Figure 6). Differences in the results can account for divergence of views on the nature and level of needed policy actions. Making public the stress tests conducted by different agencies would also encourage the authorities to coordinate more closely. Furthermore, there is a need for the FSS to maintain close interaction with banks to validate banks’ stress testing results. The FSS does not appear to validate fully the BU results received from banks, for example the ways in which banks estimate losses. In addition, while banks comply with regulatory requirements, they do not appear to run event-specific tests in line with their internal operational needs. Banks tend to follow scenarios provided by the FSS that mimic deterioration in macroeconomic and liquidity conditions in line with shocks experienced during previous crises.

Nonbank depository institutions

25. The soundness of NBDIs was assessed based on a reverse stress test (Table 4), which show that some NBDIs have thin buffers against potential credit risk.¹¹ The reverse stress test determined the size of NPL shocks that would account for a drop of capital adequacy below the minimum required levels. The lack of data (except for MSBs) justified using a simple balance sheet framework. The stress tests assumed: pre-loss profitability at lowest levels historically, and more conservative provisioning than rules enforced by Korean supervisors. The results indicate that some NBDIs—including mutual savings banks and credit unions—could only handle up to a 6–8 percentage point increase in nonperforming loans before their capital drops below the minimum

¹⁰ An estimate of the stress test by the authorities with data as of end-September 2013, using assumptions identical to those used by the FSAP team, shows a decline in the FX liquidity gap to US\$1.5 billion before accounting for credit lines from international banks, and a surplus of US\$3.1 billion after accounting for such credit lines.

¹¹ Carrying out stress tests for NDFIs was deemed essential, given the collective importance of these institutions for the domestic financial stability (they account for 20 percent of domestic household credit).

required threshold. However, even in the event of potential NBDIs difficulties, spillovers to other parts of the financial sector are likely to be minimal, given that their funding is mostly in deposits.

Table 2. Korea: Stress Tests of Nonbank Depository Institutions
(In percent)

Reverse Stress Test:

Size of NPL increase that brings NBDIs to minimum capital requirement

	Minimum Capital Requirement 1/	NPL ratio		
		Current Level	Maximum Level 2/	Buffer
Mutual savings banks	6.0	20.0	28.0	8.0
Credit unions	2.0	4.2	9.8	5.6
Agricultural cooperatives	5.0	2.1	14.7	12.6
Fishery cooperatives	0.0	2.7	12.1	9.4
Forestry cooperatives	2.0	2.8	45.3	42.5

1/ Based on regulatory capital to risk-weighted assets for mutual savings banks (MSBs), and net capital to adjusted total assets for credit unions and cooperatives. For MSBs, the current minimum capital requirement is 6 percent for entities with total assets of greater than KRW 2 trillion and 5 percent for others entities.

2/ The maximum level of nonperforming loans that would bring capital to the minimum requirement level.

Key Assumptions:

1. Pre-loss net income (relative to total assets) is at the lowest level since 2007. recognizable for the provisioning purpose.
3. Required provisioning is 20 percent for secured loans and 100 percent for unsecured loans.

MACROPRUDENTIAL FRAMEWORK

A. Macroprudential Measures and their Effectiveness

26. The Korean authorities have been actively using macroprudential policy tools with a view to contain the build-up of systemic vulnerabilities. LTV ratios were introduced in 2002, in response to sharp increases in house-price growth, and complemented by limits on debt-to-income (DTI) ratios in 2005. When the Lehman collapse exposed the volatile funding structure of the Korean banking system, the authorities introduced a range of measures in order to contain liquidity and FX vulnerabilities, including a ceiling on the loan-to-deposit ratio (2009), a regulation on the ratio of FX derivatives positions (2010) and a levy on short-term FX funding (2011). Macroprudential policies in Korea are at the discretion of the relevant agencies, but subject to informal interagency coordination, in particular the recently established MEFM.

27. The LTV and DTI policies have been adjusted actively to changing conditions and seems to have contributed to the resilience of the Korean financial system. The limits on LTV ratios apply nationwide, but are tighter in designated speculative zones, while the limits on DTI ratios apply only within the metropolitan area. Since their launch, both ratios were tightened and

loosened several times, with the cumulative effect amounting to a considerable tightening relative to the levels at which the measures were introduced. The limits were also extended to nonbank providers of mortgage credit, even if with some delay.¹² The average actual LTV ratio in Korea is around 50 percent, which is low when compared to that in other countries (e.g., 74 percent in Germany, 75 percent in the U.S. and 80 percent in the United Kingdom), which may have had a dampening effect on house price growth and household credit growth over the past decade (Kim, 2013), and helped keep mortgage default rates below 1 percent into 2012 despite softening housing prices since 2008.¹³

28. Introduction of a ceiling on the ratio of loans to deposits has led to greater resilience to liquidity shocks. The ratio of loans to won deposits stood at around 120 percent for domestic banks when the authorities announced a ceiling on this ratio of 100 percent. Banks responded by reducing their reliance on funding through bonds, short term certificates of deposits and interbank loans, and increased funding through core deposits. As a result of the measure, which was first enforced in June 2012, the loan-to-deposit ratio has come down substantially, to around 95 percent (as of April 2013) on average for commercial banks.¹⁴

29. The FX-related measures were designed to contain systemic risk from short-term FX borrowing by foreign branches and domestic banks. The regulation on the ratio of FX derivatives positions was first introduced in October 2010 at 250 percent for foreign branches and 50 percent for domestic banks and was since tightened twice, in July 2011 and January 2013, to present levels of 150 percent and 30 percent for foreign branches and domestic banks, respectively. This measure was designed to curb banks' building up of excessive FX derivatives positions which tended to be financed by short-term borrowing, and as a result, tended to increase maturity mismatches and financial vulnerability in the banking system.

30. A Macroprudential Stability Levy has complemented the regulation on the ratio of FX derivatives position since August 2011. The levy is 20 basis points of the dollar amount of short-term FX funding with a maturity of less than one year, with lower rates applying to longer maturities in a graduated manner, and applies uniformly to both foreign bank branches and domestic banks. The levy penalizes carry trades where banks borrow short term in FX, to swap this funding into Korean won and invest in local assets.

31. The FX-related measures appear to have had the desired effects. The average FX leverage ratio of foreign branches has fallen from over 260 percent at the time the ratio of FX derivatives position was first announced to around 90 percent on average in late 2013, although this

¹² At present, limits on the LTV ratio range between 50 and 60 percent for banks and between 60 and 70 percent for nonbanks, while the DTI ratio limit is between 50 percent and 65 percent.

¹³ See Kim Choongsoo, Governor of Bank of Korea, "Macroprudential Policies: Korea's Experiences," 2013. Since 2008, house prices have been falling in Seoul, but have continued to grow in other regions.

¹⁴ The loan-to-deposit ratio used here is based on a definition followed by the FSS and differs from that used in the Appendix Table 3.

may have been in part due to reduced demand from exporters for forward contracts. The measures appear to have contributed to a shift away from short-term FX funding, with its share in all FX funding falling from around 50 percent in 2008 to less than 20 percent in April 2013, mostly driven by shifts in the maturity structure of the external funding of foreign branches towards longer term funding. This shift may have caused interbank capital flows into Korea to become less sensitive to global financial conditions since June 2010, compared to other Asian countries (Bruno and Shin 2013).

B. Institutional Arrangement and Recommendations

32. Macprudential policy in Korea has long been coordinated at various levels and through a range of interagency meetings. Systemic risk assessments and policy measures were discussed in meetings of the informal “FX Market Stabilization Meeting” and the “Economic and Financial Market Monitoring Meeting,” and joint press conferences and press releases used to announce macroprudential measures. These arrangements were replaced on July 20, 2012 by MEFM which is convened at least quarterly at the deputy level and comprises the BOK, the FSC, the FSS, and the MOSF, which chairs and prepares the agenda. The scope of the meeting is broad and in principle covers all aspects of macroeconomic and financial policy. The authorities strive for consensus but the decisions taken at the meeting are not binding, and each agency remains ultimately responsible for policy decisions in its domain. Interagency coordination is not confined to the MEFM and is strong at working level especially between the MOSF, the FSC, and the FSS. To improve information exchange between the agencies, a revised Memorandum of Understanding was signed in 2009 and has led to improvements, especially in the sharing especially of supervisory data.

33. Korea has done well in applying macroprudential tools and should consider a further strengthening of the institutional framework for macroprudential policy. In particular, arrangements should be based on a formal and well-focused institutional framework for macroprudential policy. They would benefit from enhanced transparency and accountability, a greater degree of independence from the political process, and a clarification and strengthening of the role of the BOK in financial stability.

34. The arrangements for macroprudential policy should be separated from those for crisis management and preparedness. Macroprudential policy and crisis management are separate policy functions that can benefit from separate institutional frameworks, including from greater transparency as well as greater political independence. Separation would also facilitate the establishment of a stronger role for the BOK in macroprudential policy.

35. The objectives, functions, and powers of a dedicated macroprudential policy council should be articulated in primary legislation. The council should have broad power to make recommendations to the regulatory agencies, coupled with a ‘comply or explain’ mechanism, as is increasingly standard practice. The law should require the BOK to provide regular assessments of systemic risk to the council and to formulate draft policy responses for consideration by the council. A record of the council’s deliberations should be made public and further accountability to parliament and the public be ensured through periodic reports. The council could be chaired by the

BOK or the MOSF and should also comprise the financial regulatory and supervisory agencies. The council should meet at least quarterly with all participating agencies represented at the top level.

36. It will be important that the arrangements for macroprudential policy do not impinge on the continued independence of the BOK in conducting monetary policy. Monetary policy should therefore be explicitly excluded from the scope of discussion of the council. Alternatively, the arrangements could assign the BOK a veto power over policy decisions by the council.

FINANCIAL SECTOR SUPERVISION: LEGAL UNDERPINNING AND STRUCTURE

37. The legal framework for the financial sector has undergone improvement since the 2003 FSAP, but there are gaps. Financial sector related laws and subsidiary legislation have been continuously updated, and efforts made by the authorities to benchmark against international standards and to draw from legal traditions in multiple jurisdictions. Gaps in the legal framework relate in particular to the fact that the enforcement approach is predominantly prosecution-centric, and the range and level of administrative pecuniary sanctions are relatively small compared with other jurisdictions. The introduction of a regime for imposition of administrative penalties in Korea in respect to a broader range of offences would enable the financial regulators to implement a more effective enforcement system.

38. The institutional arrangements for financial sector supervision involve multiple agencies. These agencies include: (i) the MOSF: responsible for FX policies and financial and economic coordination; (ii) the FSC: responsible for financial sector policy, prudential policy, supervision, enforcement, sanctions, and financial institution resolution; (iii) the Securities and Futures Commission (SFC), established within the FSC: responsible for monitoring, supervising and investigating capital market activities; (iv) the FSS: responsible for conducting the inspection and supervision of financial institutions under the guidance and oversight of the FSC and SFC; (v) the KDIC: operating the deposit insurance function and performing the resolution functions under the guidance and oversight of the FSC; and (vi) the Korea Financial Intelligence Unit (KOFIU): established under the oversight of the FSC, performing the financial intelligence function.¹⁵

39. Inter-agency mechanisms have been established to facilitate policy coordination and conflict resolution, and cross representation at key decision-making levels and multiple interlocking government arrangements (Table 3). The inter-agency mechanisms are: (i) the FSC, FSS, BOK, MOSF, and KDIC have signed a joint MOU that provides for sharing periodic and non-scheduled financial information submitted by financial institutions to the BOK, FSS, and KDIC; and (ii) the BOK and KDIC can request the FSS to undertake joint examinations of regulated entities and share examination reports. Following joint BOK/FSS examinations, the BOK may request the FSS to take any necessary corrective measures in areas under its mandate. The BOK's Monetary Policy

¹⁵ Joint examinations between the BOK and FSS are also possible.

Committee (MPC) may also request that the FSC reconsider a decision it has taken if it has a direct bearing on monetary and credit policies.¹⁶

Table 3. Korea: Interconnectedness of Financial Sector Oversight Decision-making Bodies

Name	MOSF	BOK	FSC	FSS	FSC-SFC	KDIC	OTHERS
Macroeconomic Financial Meeting	CHAIR: Vice Minister	Senior Deputy Governor	Vice Chair	Senior Deputy Governor	-	Vice President	-
Bank of Korea (Monetary Policy Committee)	Vice Minister (non-voting member)	CHAIR: Governor; and Sr. Deputy Governor	Vice Chair (non-voting member)	-	-	-	Five other members (one member each recommended by BOK, MOSF, FSC, Korea Chamber of Commerce & Industry, and Korea Federation of Banks)
Financial Services Commission	Vice Minister	Senior Deputy Governor	CHAIR: FSC Chairman; and FSC Vice Chair	Governor	-	President	Three external members including one member recommended by Chamber of Commerce
FSC-SFC	-	-	-	-	Chair: FSC Vice Chairman	-	One Standing commissioner and three non standing commissioners
Deposit Insurance Committee	Vice Minister	Senior Deputy Governor	Vice Chair	-	-	CHAIR: President	Three external members
Financial Supervisory Services	-	-	-	CHAIR: Gov., Sr. Dep. Gov.	-	-	-

SECTORAL REGULATION AND SUPERVISION

40. Detailed assessments of observance of the most relevant financial sector standards and codes were undertaken.¹⁷ Information was also obtained to update the November 2008 assessment of compliance with the Financial Action Task Force (FATF) 40+9 Recommendations on the Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT).

¹⁶ Article 89(2) of the BOK Act notes that the FSC, if requested by the BOK to review a decision, needs a two thirds majority to retain its original decision.

¹⁷ See the Reports on the Observance of Standards and Codes for summary assessments of Korea's observance of financial standards and codes.

A. Banking

41. The FSC and FSS have made considerable progress in addressing issues raised during the 2003 FSAP and has achieved moderate compliance with the BCPs as revised in 2012.

Numerous structural changes and regulatory reforms have been implemented aimed at strengthening the supervisory framework. This effort, along with a coordinated response by the public sector, has gone a long way in helping to improve the robustness of the banking sector which performed well during the 2008 crisis. Conservative requirements in respect of capital, liquidity and loan loss provisioning have also been important in this regard.

42. Although banking supervision has been enhanced, further emphasis towards a more risk-sensitive approach would be beneficial. The FSC-FSS operates with a detailed off-site supervisory process, supported by a broad range of data collected on a periodical basis. The on-site examination process would benefit from more flexible and frequent examinations, tailored to ensure strong surveillance of the most relevant risks. Enhancements to the judgmental component of the assessments and the appointment of a point of contact in charge of all aspects related to a particular bank/banking group is key in achieving a comprehensive view of risk. Supervision practices could be developed further to be more intrusive in assessing corporate governance particularly in assessing the Board's oversight of risk management (Box 5).

43. The Internal Capital Adequacy Assessment Process (ICAAP) will be an important stepping stone in achieving an integrated approach to capital planning and higher standards of risk management. When fully implemented it will provide a framework for a comprehensive assessment of risk and capital and will help in assigning individual bank capital ratios. The average CAR for the banking sector, at about 13.8 percent, provides a healthy buffer over prudential minimums. Basel II applies to the commercial banks. FHCs are subject to Basel I; current plans to apply Basel II to FHCs by December 2013 will improve the consistency and comparability of the capital base for Korean banks. The FSS plans to implement Basel III in December 2013.

44. The FSC and FSS have taken the first step in developing a framework for group supervision of the large complex financial institutions by enacting the FHC Act. Nonetheless, further effort is needed to achieve an effective approach to group supervision. The FSS-FSC is yet to consistently apply minimum requirements for capital, liquidity and risk management on a group-wide basis. Effective supervision of group structures should be seen as a priority to achieve a consolidated view of risk that takes into account linkages in organizational structure and inter-group transactions.

45. Prudential regulations covering loan loss provisioning have been strengthened. In transitioning to International Financial Reporting Standards (IFRS), a reserve for Credit Loss was introduced to prevent a decrease of banks' capacity to absorb losses. The non-performing loan ratios for the domestic banks remain low by international standards. However there are areas to improve provisioning practices, especially where loans return from default to performing status, which should be tightly controlled. Since the 2008 crisis, government-sponsored AMC's have been introduced to acquire NPLs in several sectors of the economy (see above).

Box 5. Korea: Supervisory Intensity

To be effective, supervision must be intrusive, adaptive, proactive, comprehensive, and conclusive. Supervision intensity is characteristic of these key elements; it represents the ability to act, as well as the demonstrated willingness of the supervisor to follow up if issues are identified. Against this background, the main features of supervisory intensity in Korea are as follows (see also Appendix II):

- Onsite examination by the FSS is an intensive process, which compares well with best practice in terms of its comprehensiveness. For the larger, more complex, and systemically important banks, greater frequency of onsite examinations would enable supervisors to act more proactively in detecting emerging risks and adapting the supervisory stance accordingly. Fully leveraging the use of supervisory tools to differentiate banks' risk profile will help allocate scarce supervisory resources toward the riskiest banks.
- Regarding corporate governance, systematic meetings with the full banks' board in the context of onsite examination would allow the FSS to more accurately assess the Board's understanding of the banking group's operational structure and risks.
- The FSS increased the frequency of its onsite supervision of MSBs, enhanced corporate governance requirements, and strengthened offsite surveillance. More frequent and intrusive approach to assessing the effectiveness of the MSB's Board of directors should be implemented.
- FSS relies on highly skilled and commitment of staff, supported by a detailed off-site supervisory process and tools. More frequent assessments of risk management information would help produce a comprehensive view of risk. By applying an intrusive approach to the assessment of the Board, and challenging its oversight of risk management, the FSC-FSS will be able to encourage higher standards of corporate governance.

46. Banks operate with strong liquidity ratios, especially foreign currency liquidity requirements, which are more conservative in their calibration than domestic liquidity. Banks need to comply with a one-to-one loan-to-deposit ratio restricting leverage and while foreign currency denominated asset-liability regulatory requirements are tightly managed, there is scope to enhance liquidity risk management of won-denominated asset-liability. Transition to the Basel III Liquidity Coverage Ratio (LCR) framework will provide a useful step in this regard and banks are currently required to report LCR ratios on a quarterly basis.

47. Authorization processes are generally thorough but there is room to require formal approval for certain activities. Major acquisitions and transfer of ownership rely on a process of notification as opposed to an explicit approval by the supervisor. The requirement to obtain an approval involves a higher standard of due diligence and enables the supervisory authorities to take action early in the process if deemed necessary.

48. A regulatory and supervisory framework consistent with banks should be applied to the larger non-bank deposit taking institutions (i.e., mutual savings banks) strengthen their

resilience to shocks. The capital framework for non-bank deposit taking institutions is a net capital ratio of equity over the sum of total assets and loan loss provisions. For those non-bank deposit taking institutions that are of an equivalent size to banks, the capital framework should be strengthened and calculated using the Basel computations and definitions.

B. Insurance

49. The insurance supervisory system in Korea shows a high level of observance of the Insurance Core Principles (ICPs), and the supervisory and regulatory structure. Compared to the previous FSAP, reforms have been made that are now proactive to achieve best practices rather than remedial in response to the financial crisis of the late 1990s. The authorities have implemented IFRS accounting standards, updated the capital regime, and many other regulatory requirements in a proactive and timely manner. Limited weaknesses in the regulatory structure are well understood by the authorities and proposals for reform have been developed. The authorities have developed a sound Risk Assessment Application System (RAAS), and their attention to insurance fraud is impressive.

50. The insurance sector in Korea has long been one of the most significant in the world in terms of penetration. Total premium stood at KRW 149.9 trillion (USD 134 billion) in 2011 ranking it the eighth largest in the world. Insurance penetration stood at 11.6 percent and was ranked 5th in the world and insurance density stood at USD 2,660 per person ranked 23rd in the world. Insurance market concentration indicates an open and competitive market. All of the large insurers are substantially domestic with both assets and premiums attributable to their domestic business well above 90 percent. They do not currently meet the expected criteria for either IAIS Global Systemic Insurers or ConFrame IAIG supervision.

51. Negative interest rate spreads remain an issue but the challenges have been mitigated substantially by having recognized the issue well before many other jurisdictions. The late 1990s financial crisis brought the issue to attention and led to timely corrective actions. An active program of stress testing and other methods, along with actions by insurers has greatly reduced negative spread risk. However, the risk remains, albeit at reduced levels, and needs to be monitored on an ongoing basis. Insurer profitability and capital are sound for both life and non-life insurance.

52. Industry capacity for enhanced enterprise risk management will take time to mature. Continuing the development of risk management capacity can be supported by current initiatives to enhance requirements. Observance will be improved further as ongoing initiatives progress. Enhanced risk management, and group supervision will become more important and can be enhanced progressively using existing platforms for cooperation. G-SIFI and ComFrame could be relevant for Korea at least as a host supervisor in the short term. Becoming a signatory to the IAIS Multilateral Memorandum of Understanding (MMoU) is in progress.

C. Securities

53. Significant progress was made since the last FSAP in revising the securities regulatory framework, with the current framework achieving good overall compliance with the International Organization of Securities Commissions (IOSCO) Principles. Importantly, the earlier legal impediments to international cooperation and exchange of information have been removed. Since 2011, Korea also applies the Korean International Financial Reporting Standards (K-IFRS) that follow the IFRS.

54. Although the regulators' responsibilities are defined in legislation, the complexity of the structure obscures the transparency of the decision-making processes. The responsibility for deciding on a particular supervisory or enforcement action can lie either at the FSC, SFC, or FSS, depending on the nature and gravity of action, but it is not always clear which one of them is ultimately in charge. The process is further complicated by the use of pre-deliberation committees at various levels. Self-regulatory organizations - the KRX, the Korea Financial Investment Association (KOFIA) and the Korean Institute of Certified Public Accountants (KICPA)—also play a role in the regulatory and supervisory processes. Publication of additional information on the decision-making structure and processes would be beneficial.

55. The authorities have a broad set of powers, most of which are used effectively. The on-site examination program could be expanded to ensure sufficient coverage of smaller entities, in particular asset management companies and auditors. Improved oversight of small auditors is important to address challenges in enforcing compliance with the auditor independence and quality control requirements. The on-site inspections should also continue to focus on ensuring proper handling of customer securities and funds.

56. Despite recent improvements announced or taken by the authorities, challenges remain in enforcing compliance with the unfair trading/market abuse provisions of the Financial Investment Services and Capital Markets Act (FISCMA). This is primarily due to the lack of sufficiently dissuasive administrative sanctions and the length and less than optimal outcome of the criminal enforcement process. Jointly with the public prosecutor's office, the authorities should continue to seek ways to improve both the administrative and criminal enforcement powers and processes.

57. Comprehensive disclosure requirements apply to both issuers and collective investment schemes (CIS). Applicable rules prescribe the content of primary market, periodic and ongoing disclosures. While their prescriptive nature ensures compliance with the IOSCO Principles, the authorities are encouraged to monitor whether the current ongoing disclosure requirements for issuers continues to best serve the interests of investors and market evolution while maintaining a manageable compliance burden. Given the risks arising to investors from any shortcomings in CIS custody and valuation, it is important to focus on monitoring compliance and require the use of market or fair value for all CIS.

58. The current processes to monitor systemic risk do not appear to sufficiently acknowledge the potential for systemic risk arising from the securities sector. This combined with certain deficiencies in the regulators' arrangements to manage defaults could negatively impact their ability to deal with market disruptions and institutional failures.

D. Financial Markets Infrastructures

59. Korea has a well-developed payment, clearing, and settlement infrastructure. BOK-WIRE+ is the real-time interbank gross payment and settlement system, and the backbone of the infrastructure where the final payments of various markets are settled.¹⁸ The KRX is the main player in the securities and derivatives market, operating three exchanges and offering CCP settlement services for all securities and derivatives traded on the KRX.¹⁹ While the authorities have decided to establish a CCP for over-the-counter (OTC) derivatives at a future date, discussions are ongoing on the desirability of transforming the current trade reporting systems into full-fledged trade repositories (TRs). The planned CCP for OTC derivatives should ensure full compliance with the PFMI before being launched, taking into account lessons learned from the assessment of the CCP for exchange-traded products.

60. BOK-Wire+ is largely compliant with the international Principles for Financial Markets Infrastructures (PFMI). It is subject to comprehensive and transparent risk management frameworks comprising clear policies and guidelines, governance arrangements, and operational systems including regularly tested default and business continuity procedures. All transactions once settled in BOK-Wire+ are deemed final and irrevocable, as well as bankruptcy remote.

61. Improvements are needed in certain areas to enhance the level of compliance with the PFMI. It is recommended that the operator of BOK-Wire: (i) improves the collateral risk management framework, by adopting regular testing of haircuts, and putting in place an annual independent validation of the haircut procedures adopted; (ii) provides more clarity in the regulations on settlement finality and queue management, particularly with regard to revocation of queued transactions; (iii) fully implements the disclosure framework, including disclosure of relevant rules and regulations in English; and (iv) strengthens BOK's powers of oversight over linked payment FMIs and participants, particularly to obtain authentic information and enforce compliance by FMIs with its observations and findings.

¹⁸ The current BOK-Wire+ system in place since 2009 and has a hybrid settlement function using continuous bilateral and multilateral offsetting mechanisms enabling participants to save on intraday liquidity. It is used for settlement of all short-term financial transactions, cash leg of DVP securities settlement, KRW leg of FX Contingent Liabilities (CLs), and settlement and the net settlement of retail payment systems. BOK-Wire+ is also used for monetary policy operations and for the issuance and redemption of government and other public bonds.

¹⁹ The KRX operates three exchanges: the Korea Composite Stock Index (KOSPI), Korean Securities Dealers Automated Quotations (KOSDAQ), and derivatives market (DM). It also has a majority stake in the KSD, which is a securities settlement system, central securities depository (CSD), and maintains the register for all securities traded on the KRX. In 2012, the KRX was the world's number one in stock index options, with a total volume of 1.6 billion traded contracts. It was number 5 measured in value of bond trading and number 8 in value of share trading. At the end of 2012, market capitalization reached USD 1,179 billion (mostly on account of domestic companies).

62. The central counterparty (CCP) of Korea Exchange, which broadly complies with the PFMI, contributes to the safety and efficiency of the securities and derivatives market in Korea, but also concentrates systemic risk. Important steps to improve its risk management systems have been initiated in the recent period such as the introduction of intraday margin calls, back testing, and sensitivity analysis, which need to be further developed. The sizes of the joint compensation fund and settlement reserves have been increased to strengthen KRX's financial protection against a potential default of its clearing members. The introduction of the operational risk management system in January 2013 enables the KRX to manage its companywide risks in a consistent and comprehensive manner.

63. Additional steps to further compliance of the CCP with the PFMI related to the management of credit risks are warranted. KRX should reform the credit risk management framework for the securities market, by collecting risk-based collateral (margin) on a daily basis to cover KRX's exposures towards its clearing members between the transaction and settlement days. KRX may also reconsider the current design of its joint compensation funds, in particular by removing the fixed size requirement of the fund to better adapt to increased exposures. KRX's criteria for settlement banks and custodians should be increased. Finally, KRX's risk management framework, and in particular its margin model, should be reviewed and validated by an experienced and independent entity, such as an academic or a consultant.

64. The independence of the KRX risk management committee should be improved and the size of staff responsible for the management of credit and liquidity risk should be increased. The committee, although independent of the business departments, is chaired by an executive director who is also responsible for strategy and planning, and therefore not fully independent from business related matters. Staffing levels in the risk management team and the clearing and settlement department responsible for risk management is small compared to the scope of their responsibilities; it should be increased. More generally, the focus of KRX on the safety and efficiency of the CCP could be increased, for example by placing higher priority on the safety and efficiency of the CCP and on financial stability in the KRX's company objectives.

65. Regarding the regulation, supervision and oversight of FMIs, the cooperation between the BOK and the FSC should be formalized. That would involve: (i) developing an MOU having a sound legal basis to ensure effective coordination between the BOK and FSC where their roles as regulators overlap. Such a formal arrangement should help enhance cooperation at the appropriate technical and management levels and should improve the efficiency and effectiveness of the regulation, supervision and oversight, in particular in relation to the KRX-CCP and the KSD; (ii) "speaking with one voice," to avoid any potential inefficiencies in the BOK and FSC communication with the KRX and KSD; (iii) agreeing on specific arrangements regarding the frequency of exchanges of information, and holding joint meetings with the FSS, KRX and KSD; and (iv) developing and testing a crisis management plan to enable timely and effective cooperation in times of crisis.

66. To further improve the regulatory structure for FMIs the powers of the BOK and the resources of the FSC should be increased. Existing legislation should be amended to provide the

BOK with enforcement tools to effectively discharge its oversight responsibilities. In addition, an increase in human resources at the FSC is warranted to support a proactive policy approach and effective guidance by the FSC to the FSS.

E. Anti-Money Laundering and Combating the Financing of Terrorism²⁰

67. Korea has taken significant steps to enhance its AML/CFT framework. In November 2008, Korea's AML/CFT framework was assessed by the FATF, the standard setter of which Korea is a member. At the time, Korea's AML/CFT framework suffered from a number of significant deficiencies. Since then, the authorities have made regular and steady progress in addressing the main shortcomings identified, notably by amending existing legislation.²¹ Furthermore, additional resources have been allotted to both Financial Supervisory Service (FSS) and KoFIU to enhance the capacity of AML/CFT supervision and examination, and regular training has been provided to staff of law enforcement agencies to improve the effective implementation of sanctions for money laundering (ML).

68. Additional measures are required to address remaining deficiencies. Some of the main concerns relate to: (i) the supervisory sanction regime, whose primary targets are not financial institutions, but rather their staff, and which include mostly non-pecuniary sanctions; and (ii) the AML/CFT regulation and supervision of the designated nonfinancial businesses and professions which currently encompass only casinos. The shortcomings in the terrorist financing offence also remain a concern, although a draft bill amending the *Prohibition of Financing for Offences of Public Intimidation Act* is being drafted with a view to expanding the scope of the offence and is expected to be submitted to the National Assembly later this year. The FATF has tentatively scheduled Korea for an assessment against the revised AML/CFT standard in 2016.

F. Conclusions and Recommendations

69. The current supervisory structure seems to meet the operating needs but there are a number of concerns. In particular, the current governance structures, decision making systems and accountability arrangements promote consensus building and provide a practical framework for coordination between different agencies, but there are nonetheless concerns that they compromise the independence of the supervisors. The presence of industry nominees on the governance structures of the supervisory authorities could also give rise to "regulatory capture." Finally, current

²⁰ This section draws on Korea's 6th and 7th progress reports to the FATF.

²¹ A bill amending the Financial Transaction Reports Act has been submitted to the National Assembly for approval. The amendment would abolish the threshold for reporting of suspicious transactions and require banks to ensure that full originator information travel with wire transfers. The authorities are also expecting to ratify the Palermo Convention by the end of this year after all relevant legislations have been amended to criminalize transnational organized crime.

responsibilities of the supervisory authorities include financial policies and market development, which give room for conflicts of interest and dilution of supervision.²²

70. Going forward, consideration should be given to streamlining the institutional framework for financial sector supervision and further strengthening supervisory independence, in the light of the rapid evolution of the financial system in Korea, its expansion in the region, and the fast evolving global regulatory and supervisory environment. The reform efforts should in particular ensure that the new arrangement: (i) has well identified objectives and responsibilities that clearly and transparently define the responsibilities of the various authorities in prudential and conduct of business supervision and enforcement; (ii) is free of political influence and interference, or the perception of it; (iii) is able to set and enforce a set of prudential requirements at system level as well as for individual institutions in accordance with their risk profile and systemic importance; (iv) has explicit powers to take timely supervisory response measures, including a range of sanctions, enforcement actions, and revocation of license; (v) is familiar with the market and market practices, but independent of market influences; and (vi) has efficient internal systems that eliminate administrative layers.

SYSTEMIC LIQUIDITY

71. In normal times the markets work well underpinned by high domestic currency liquidity and a tighter control on FX funding risks. The Korean financial system's structural liquidity overhang of around KRW 230 trillion (about 20 percent of GDP) means that in normal times the markets are well supported. Steps to more closely manage the funding risks associated with exporters' and multinationals' structural needs for medium to long term foreign currency have led to declining FX liquidity exposures since the GFC period (Appendix Figure 9).

72. The money market has underlying vulnerabilities in stress situations. Much of the money market lacks active secondary markets, with the most actively traded being the unsecured cash and repo markets of maturities of up to one week. The markets for longer term instruments are relatively shallow and dominated by buy and hold investors and there are no market makers.

73. The absence of active secondary markets means the BOK plays a prominent role in backstopping the markets. While banks maintain liquidity standards in line with current prudential requirements, they hold few assets that could be used to raise liquidity from secondary markets in a stress situation leaving the BOK a prominent role. The BOK's significant capacity to respond to

²² The stated objectives of the FSC are as follows: (i) to promote the advancement of the financial industry; (ii) to promote the stability of the financial markets; (iii) to establish sound credit activity and fair financial transaction practices; and (iv) to protect depositors, investors and other financial consumers.

liquidity pressures, including significant foreign reserves and swap lines along with wide ranging ELA powers that were broadened after the GFC are mitigating factors.²³

74. Measures to boost secondary markets will help increase the degree of market self reliance; ensuring that ELA procedures are well honed will ensure that quick action is possible.

Boosting the liquidity of secondary markets would give market participants more self reliance in a liquidity stress period reducing the need for reliance on the BOK. The authorities' plans to implement the Basel III LCR will be helpful in this regard, as well as ongoing efforts to improve repo markets. The BOK should ensure that their ELA plans are well developed and practiced, as well as understood and accepted by key stakeholders so as to smooth decision making in what may be fast moving and uncertain conditions, as well as guide expectations and accountability.

CRISIS MANAGEMENT AND RESOLUTION FRAMEWORK

75. The financial safety net comprising a deposit insurance scheme and the central bank' ELA are well established, and supported by a well developed framework of financial sector supervision.

Several well established and efficient options that are available for managing a financial crisis include: the ability to influence systemic liquidity in money and securities markets; broad deposit insurance and investor protection (including full guarantee); public funds to support financial institutions and markets that may be under stress; and mechanisms to intervene and resolve troubled financial institutions.

76. Improving and formalizing the framework for crisis management would help preserve and build upon institutional memory and existing frameworks.

The authorities can consider formally setting up a dedicated apex forum for leading the inter-agency cooperation and coordination work on crisis preparedness and crisis management, distinct from the council proposed for macroprudential policies. The authorities can also formally designate crisis management team(s) in each supervisory authority; develop a crisis management handbook; establish multi-agency institution-specific crisis management groups; and periodically conduct crisis simulation exercises to test and enhance contingency plans and crisis management arrangements.

77. Recognizing the importance of the role of the KDIC, the authorities can make improvements to further promote its ability to intervene effectively during or leading up to a

²³ The BOK Act was revised in 2011 with a view to broaden the range of powers and tools to provide liquidity assistance to the financial system in stress situations, including through lending or purchasing of securities of banking institutions and for-profit entities. Decisions relating to lending operations are taken by the MPC with a required attendance of at least 5 members and a simple majority required for normal lending operations and a 4 person majority decision required for ELA. At end-March 2013, the BOK held US\$327.4 billion of reserves (28 percent of GDP), and had bilateral swap lines with the Peoples Bank of China (PBOC), the Chang Mai Initiative (CMI), and the Bank of Japan (BOJ), as well as a multilateral swap lines via the newly introduced Chang Mai Multilateral Initiative.

crisis without exposing itself to avoidable losses. These include: (i) replenishing the deposit insurance fund which is currently in deficit; (ii) establishing an explicitly assured and irrevocable line of credit from the Government to provide back-up funding to KDIC to improve its ability to make prompt depositor pay-outs and to provide financial assistance in times of crisis; (iii) discontinuing the current practice of allowing insolvent banks to continue to accept fresh deposits and repay existing deposits; and (iv) reviewing the processes involved to reduce the timelines allowed for making decisions on the repayment of depositors, providing financial assistance to and resolving troubled banks.

78. Korea established several funds in the wake of the GFC to provide financial assistance to financial institutions either directly or indirectly. Korea also established similar public fund during the crisis in the late 1990s. These funds can potentially distort the incentive framework for financial institutions, and their role should be reviewed carefully to fully address moral hazard issues.

79. The resolution framework for financial institutions in Korea provides a comprehensive range of resolution options but can be improved in light of FSB and BCBS recommendations. The legal framework establishes a special resolution regime for distressed financial institutions in Korea.²⁴ While the resolution authorities' powers are sufficiently comprehensive to address threats to financial stability, there is scope for improvement to assure certainty and avoid delays in resolution processes, particularly with reference to financial conglomerates and SIFIs, including cross-border operations.

²⁴ The Act on Structural Improvement of the Financial Industry (ASIFI) provides the special resolution regime for financial sector entities, including banks (except the specialized banks), the Industrial Bank of Korea, investment traders, brokers, collective investment business entities, investment advisory business entities, discretionary investment business entities, insurance companies, mutual savings banks, trust business entities, merchant banks, and financial holding companies.

**Appendix I. Korea: Main Recommendations of the
2003 Financial Sector Assessment Program**

Main Recommendations	Implementation Status
Overall Financial Sector Oversight	
Strengthen supervisory independence to improve the ability to provide authoritative guidance and interpretation.	Partly done. Several structural initiatives have been implemented to address independence. In practice more is to be done to preserve the FSC-FSS independence from outside influence.
Strengthen legal protection of supervisors.	Partly done. Progress has been made, but more work is required to fully protect supervisors.
Clarifying the division of responsibilities between the Ministry of Finance and Economy (MoFE), the FSC and FSS.	Done.
Tighten supervision of NBDIs which face soundness problems and seem inadequately supervised.	Partly done. Supervisory processes and regulations require continued attention.
Banking Supervision	
Increase supervisor's capacity to meet the challenges of new tasks (i.e., off-balance sheet activities and Basel II).	Done.
Pay greater attention to differing risk levels when setting minimum capital levels, and give more attention to qualitative criteria in supervision.	Partly done. Implementation of individual minimum capital ratios remains a work in progress and greater attention to qualitative criteria in offsite supervision needs attention.
Broaden the coverage of fit and proper criteria.	Done.
Enhance the ability of supervisors to stress test banks' balance sheets.	Partly done. Stress testing capabilities have improved. Further work is needed to integrate stress testing into the supervision cycle linked with assessing risk and capital management.
Insurance Supervision	
Strengthen the solvency framework for life insurance companies, with most of the companies remaining undercapitalized.	Done (new capital regime implemented, capital levels strengthened).

Securities Regulation	
Improve regulatory transparency, and strengthen enforcement of prudential rules.	Partly done.
Enhance the volatile market framework by requiring more frequent calculation and reporting of capital requirements.	Partly done.
Tighten regulations of securities firms to curb excessive risk-taking and mitigate derivatives activities related risks.	Partly done.
Payments System	
Establish the role of the Bank of Korea in overseeing the payments system in the legislation.	Done, but powers of BOK need to be strengthened.
Address existing obstacles related to settlement practices in debt securities trade, and mitigate risks associated the use of checks for large value payments.	Done.
Legal Framework	
Adopt a strong insolvency framework.	Done.
Anti-Money Laundering and Combating the Financing of Terrorism	
More resources should be provided to the KoFIU to make the AML/CFT framework operational.	Done, with a plan to increase resources to meet further needs.
Remove the limitation to access customer information to facilitate international cooperation on information sharing.	Done.
Abolish the threshold for suspicious transaction reports.	Amendment to enter into force in October 2013.
Market Development	
Develop a benchmark yield curve; reduce market segmentation arising from multiple types of government securities.	Partly done (duration extended to 30 years but different types of government bonds are still issued).
Remove some remaining impediments to foreign participation to foster market development.	Done.

Appendix II. Korea: Supervisory Intensity

1. **The quality of financial sector supervision has emerged as a key issue from the financial crisis and while significant progress has been made in reforming regulatory standards for internationally active banks through the work of the BCBS, strengthening quality supervision should be seen as an equally important priority.** To be effective in challenging institutions and ensuring adherence to regulations, supervision must include a number of key elements: it must be intrusive, adaptive, proactive, comprehensive, and conclusive.²⁵ 1/ Supervision intensity is characteristic of these key elements and represents not only the ability to act, but the demonstrated willingness of the supervisor to ask questions, dig deep and to act if issues are identified. The key purpose of this work-stream is to illustrate examples of best practice and identify potential areas of improvement if necessary.
2. **The FSS adopts a two tiered approach to bank supervision:** a focus on individual banks through a relationship manager model; and centralized teams of subject matter experts responsible for industry analysis of specific risk issues such as FX risk, concentration risk etc. The FSS maintains an integrated system to collect and manage data from the banks forming the basis of offsite surveillance. A comprehensive suite of Financial Soundness Indicators (FSIs) are collected on a quarterly basis and more regularly if required. For instance, in respect of liquidity, data are collected on a monthly basis. Results from offsite analysis are captured in the CAEL risk rating tool (Capital, Asset Soundness, Earnings and Liquidity). The offsite surveillance tools enable the FSS to identify risks and incorporate into its onsite supervision program that is adjusted if necessary.
3. **A dedicated team of specialists perform onsite examinations across the banking sector.** A full scope examination is normally performed every two years, encompassing a thorough evaluation of the entire spectrum of risk management and compliance programs. The onsite examination consists of a team of examiners and takes approximately one month and produces a risk assessment using the CAMEL-R framework (CAMEL-R is similar to CAEL with the addition of an assessment of Business Management and Risk Management). A partial onsite examination is normally performed every other year and is typically focused on a single thematic issue (e.g., corporate governance in 2012).
4. **Onsite examinations complement off-sight supervision by providing insight into risk management as a forward-looking tool.** Examples of best practice onsite examinations involve supervisors challenging the quality of risk management staff and being intrusive in evaluating the application of policies and processes, both of which are not evident in quantitative indicators. For example, the relationship between front and back office functions in the credit approval process, or the effectiveness of credit hind-sighting and risk culture. The onsite examination process conducted by the FSS is an intensive and in-depth examination involving meetings with senior management, Board representatives, file reviews, and analysis of key documentation and compares well with best

²⁵ IMF Staff Position Note, "The Making of Good Supervision: Learning to Say No," May 18, 2010. This document can be found at the following URL: <http://www.imf.org/external/pubs/cat/createx/Publications.aspx?page=sdn>.

practice in terms of its comprehensiveness. For the larger, more complex, and systemically important banks, greater frequency of onsite examinations would enable supervisors to act more proactively in detecting emerging risks and the capacity to adapt its supervisory stance accordingly.

5. Increasing the frequency of onsite examinations does, however, involve resource implications. An effective tool to differentiate the risk profile of banks will help allocate scarce supervisory resources against the riskiest banks and highest priority risks. Thematic examinations targeted at a specific portfolio or business line, conducted over a two-to-five day period, is one example of best practice to compare and contrast risk management practices to identify outliers across the industry. By making more use of deep-dive examinations that concentrate on a specific risk area, the FSS will be able to make more timely assessments of risk management and create a stronger linkage between onsite and offsite supervision.

6. In assessing corporate governance, the FSS onsite examination process includes the verification of documentation such as Board resolutions, Board minutes and meeting agendas, and an assessment of the adequacy of the management structure. In performing the full scope onsite examination, the FSS will meet with the Board to discuss risk management issues prior to, and at the conclusion of, the examination. The FSS will typically engage the executive directors during these meetings and only in exceptional circumstances will meet with the full board consisting of independent (outside) directors. A meeting with the full board of directors is seen as best practice as it will enable the supervisor the opportunity to effectively assess the board's oversight of the bank by challenging its understanding of risk management processes and to ensure risk settings are prudently managed. A meeting with the full board will allow the FSS to more accurately assess the Board's understand of the banking group's operational structure and its risks, including those arising from the use of structures that impede transparency (e.g., special-purpose or related structures). Furthermore, by extending meetings with the board of directors of subsidiaries supervised by the FSC-FSS, will help ensure corporate governance standards are consistent across the group to protect different sets of stakeholders.

7. The nonbank deposit taking segment of the financial sector consists of a large number of individual institutions (approximately 2,338 Credit Unions, Cooperatives and 93 Mutual Savings Banks). As of March 2013, Credit Unions and Cooperatives had combined total assets of KW352.1tr representing 9.9 percent of the financial systems and KWR 10.7 percent of lending by the financial system with average assets of KWR 150.6 billion and average lending of KWR 87.4 billion. The largest Credit Union by assets is KWR 600 billion and the largest Cooperative is KWR 2 trillion which is in the Agricultural sector. The market share for Agricultural Cooperatives is almost 80 percent at KWR 272.6 trillion. The FSC-FSS employs the same supervisory tools as used with banks (mainly CAEL and CAMEL), however for Credit Unions and Cooperatives, the FSS-FSC rely upon Federations representing their immediate membership to share the onsite and offsite supervision responsibilities. In the instance where nonbank deposit taking institutions are of a sufficiently significant size, there is scope to apply a consistent standard of minimum requirements across banks and nonbank deposit taking institutions.

8. Since the Mutual Savings Bank crisis, the FSS-FSC have implemented a number of initiatives. The FSS has heavily increased the frequency of its onsite supervision of MSBs and passed changes to corporate governance requirements in an effort to raise standards. In addition, a number of MSBs have been forced to exit the industry. Offsite surveillance has been strengthened with the implementation of a loan examination support system where MSBs submit loan reports containing asset classification data on a monthly basis. It is anticipated that better data and stronger offsite analysis will enhance the ability of the FSS to identify risks and act in a pre-emptive manner. One important development that is yet to be implemented by the FSS in its supervision of the MSB sector, is a more frequent and intrusive approach to assessing the effectiveness of the Board.

9. The FSS-FSC boasts skilled staff and a strong commitment to their mandate. They operate with a detailed off-site supervisory process, supported by a broad range of financial soundness indicators that are reported in a timely manner. More frequent assessments of risk management information will complement established offsite supervision processes to produce a comprehensive view of risk. By applying an intrusive approach to the assessment of the board, and challenging its oversight of risk management, the FSS will be able to encourage higher standards of corporate governance essential to a resilient banking sector.

Appendix III. Korea: Risk Assessment Matrix²⁶

Principal Sources of Risk	Likelihood of Realization (next 3 years)	Potential Impact on Macro-Financial Stability
A sharp re-intensification of financial stress in the euro area.	Medium <ul style="list-style-type: none"> Stalled or incomplete delivery on policy commitments in Europe could intensify financial stress and lead to yield reversal across economies in Southern Europe, with large negative consequences for economic growth in the area, and potential spillovers globally. 	Moderate to Severe <ul style="list-style-type: none"> A deterioration in external conditions could lead to weakening exports, with negative impact on domestic demand, higher unemployment, and weaker business performance translating into higher credit risk for domestic corporates and households. While Korean banks' reliance on wholesale funding has decreased markedly after the GFC, banks would likely face some funding pressures.
Sharp slowdown in growth in China	Medium <ul style="list-style-type: none"> A further build up in excess capacity would eventually lead to reduced returns on investment and cause bankruptcies and large financial losses and hamper employment and growth. 	Moderate <ul style="list-style-type: none"> This could lower annual growth by 3 percentage points on average over the medium term, impacting negatively economic growth in Korea. China is Korea's principal trade partner, accounting for about 25 percent of Korea's exports.
Protracted economic and financial volatility, triggered by prospective exit from UMP.	High <ul style="list-style-type: none"> Prospects of higher interest rates in advanced economies could trigger a sustained reversal of capital flows into risk assets, a sustained increase in risk premiums, and an intensification of liquidity strains. This could lead to market volatility and higher-than-expected increases in long-term rates. 	Moderate to Severe <ul style="list-style-type: none"> A sudden reversal of capital flows and fall in asset prices could hurt business sentiment and investment, which is already weak. Also, sharply tighter financial conditions could be a drag on growth as financing costs of banks and corporates rise. Given the high incidence of variable rate household loans, higher interest rates can increase household debt repayment burdens and possibly leading to higher credit risks in the banking sector. Severity of the impact remains uncertain and would depend on how smoothly markets normalize the pricing of risk.
Global oil shock triggered by geopolitical events	Low <ul style="list-style-type: none"> Geopolitical risks in the Middle East could precipitate a sharp fall in oil supply, leading to a price of \$140 per barrel. 	Moderate <ul style="list-style-type: none"> A spike in oil prices would raise domestic inflation and could unhinge inflation expectations. Monetary policy tightening to counteract this would lead to a slowdown of domestic lending, and impair households' repayment capacity (given prevalence of variable rate loans). Borrowing firms without sufficient pricing power would suffer from lower profit margins, resulting in a potential upsurge of NPLs; transmission of these risks to other sectors could lead to second-round effects.
A sharp deterioration of households debt repayment capacity, given the high debt level	Low to Medium <ul style="list-style-type: none"> Severe macroeconomic shocks could lead to a sharp rise in household debt repayment burden relative to income. Such a deterioration in the financial position of households could put downward pressure on house prices. 	Moderate <ul style="list-style-type: none"> The high level of household debt can put a strain on domestic demand and on economic growth, with negative implications for banks' credit risk. However, mitigating factors include (1) household net assets are high at over 100 percent of GDP; liquid assets (cash) also appear to be high; and (2) The low leverage of mortgage borrowers (average LTVs of about 50 percent) would have a mitigating impact. A sizeable decrease of loan collateral values—which in Korea predominantly takes the form of real estate—would amplify potential bank losses.
A considerable intensification of political instability in North Korea	Low <ul style="list-style-type: none"> A sharp rise in geopolitical tensions in the peninsula could potentially escalate and lead to destabilization of the Korean peninsula 	Severe <ul style="list-style-type: none"> The fallout of such an event would have a vast impact on South Korea and will be multifaceted, entailing considerable fiscal costs and financial market instability.

²⁶ The risk assessment matrix shows events that could materially alter the baseline path—the scenario most likely to materialize in the view of the staff.

Appendix IV. Korea: Stress Test Matrix (STeM) for the Banking Sector (Solvency)

Domain	Assumptions	
	Bottom-Up by Banks	Top-Down by Authorities
Institutions included	<ul style="list-style-type: none"> All nation-wide commercial banks (7). 	<ul style="list-style-type: none"> All nation-wide commercial banks (7); all other commercial banks (on an aggregate basis).
Market share	<ul style="list-style-type: none"> 89 percent of commercial bank assets. 60 percent of banking sector assets. 40 percent of broad financial sector assets. 	<ul style="list-style-type: none"> 100 percent of assets of commercial banks.
Data and baseline date	<ul style="list-style-type: none"> Banks' internal data as of December 2012 Bank consolidated. 	<ul style="list-style-type: none"> Bank-by-bank supervisory data as of December 2012. Bank consolidated.
Methodology	<ul style="list-style-type: none"> Banks' internal models. 	<ul style="list-style-type: none"> BOK's model (SAMP).
Stress test horizon	<ul style="list-style-type: none"> Five years up to December 2017. 	<ul style="list-style-type: none"> Five years up to December 2017 (instantaneous for sensitivity test).
Shocks	<p><u>Scenario analysis (all are macro scenarios, stressing asset prices and macroeconomic variables)</u></p> <ul style="list-style-type: none"> Baseline: April 2013 World Economic Outlook (WEO); real GDP growth rate is 2.8 ppt for 2013 and 3.9 ppt for 2014. A mild global double-dip: A GDP growth rate shock of 1 standard deviation (-3.3 ppts) from baseline in the first two years of a five-year horizon, with linear adjustment back to baseline in the third year. Growth rates at -0.5 percent (2013) and 0.6 percent (2014). A severe global double-dip: A GDP growth rate shock of 2 standard deviation (-6.6 ppts) from baseline in the first two years of a five-year horizon, with linear adjustment back to baseline in the third and fourth years after the shock. Growth rates at -3.8 percent (2013) and -2.7 percent (2014). Standard deviations for both scenarios are based on 1990-2012 data. Prolonged slowdown: A cumulative decline of real GDP by 1 standard deviation from baseline over 5 years (-2.5 ppts/year). This shock is estimated based on the 5-year cumulative growth rate between 1990 and 2012. An increase in interest rates: A 250 bps cumulative increase of domestic interest rates over 2½ years, starting in the second half of 2014, as a result of the advanced countries' potential exit from unconventional monetary policy. 	
		<p><u>Sensitivity Analysis (Single-factor analysis)</u></p> <ul style="list-style-type: none"> Interest rate-related credit risk: instantaneous impact of an interest rate spike (extreme shock: 300 bps; moderate: 200 bps). Exchange rate depreciation (extreme shock: 50 percent; moderate: 30 percent). A fall in real house prices (extreme shock: 20 percent; moderate: 15 percent).

Domain	Assumptions	
	Bottom-Up by Banks	Top-Down by Authorities
Risks/factors assessed	<ul style="list-style-type: none"> • Credit risk of loan portfolios by type of exposure (large corporations, SMEs, residential mortgage, credit cards, and others). • Market risk of trading and AFS securities, and off-balance sheet exposure. • All macro scenarios assess both credit and market risks. 	
Risk factor assumptions	<ul style="list-style-type: none"> • Credit losses are based on satellite models, using various macro/financial variables. • Profitability is based on satellite models, using various macro and bank-specific variables. • Mark-to-market valuation of trading and AFS securities. • Off-balance sheet positions are taken into account. 	
		<ul style="list-style-type: none"> • Contagion effects are incorporated through the channels of funding costs, credit crunch, and fire-sale of assets.
Behavioral Adjustments	<ul style="list-style-type: none"> • Net interest income estimated based on banks' internal model. 	<ul style="list-style-type: none"> • Net interest income estimated based on the authorities' model.
	<ul style="list-style-type: none"> • Balance sheet growth identical to projected credit growth • A constant share of non-loan assets in total assets based on average long-term growth. • Asset disposal not permitted. • Income composition assumed to remain constant. • Risk-weighted Assets (RWA) assumed to be adjusted in line with PDs (IRB approach). • Dividend payout ratio assumed to be zero if income is negative or capital falls below regulatory limit; else latest actual dividend payout ratio. 	
Regulatory standards	<ul style="list-style-type: none"> • RWAs as per Basel 2.5 and III. • Hurdle rate based on Basel III schedule. Relevant ratios include tier-1 and total capital ratio (8 percent). • Capital definition per Basel 2.5 and III. 	
Reporting format to the FSAP team	<ul style="list-style-type: none"> • Post-shock solvency ratios and losses by type of exposure (individual institutions). 	<ul style="list-style-type: none"> • Post-shock solvency ratios and losses by type of exposure (7 nation-wide banks individually, aggregate by type of institutions).

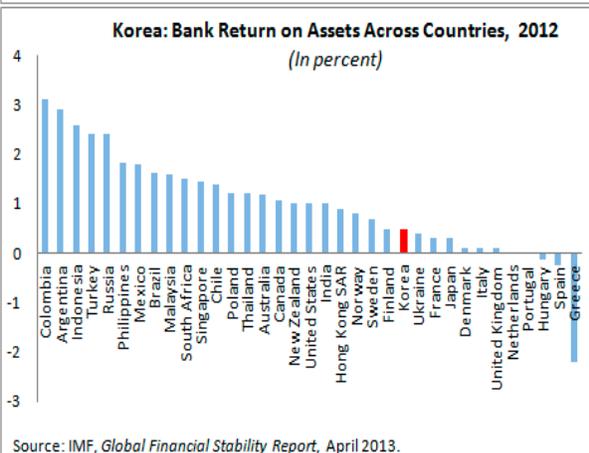
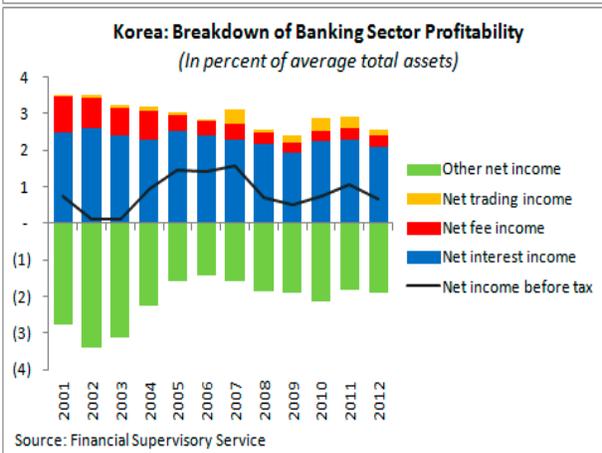
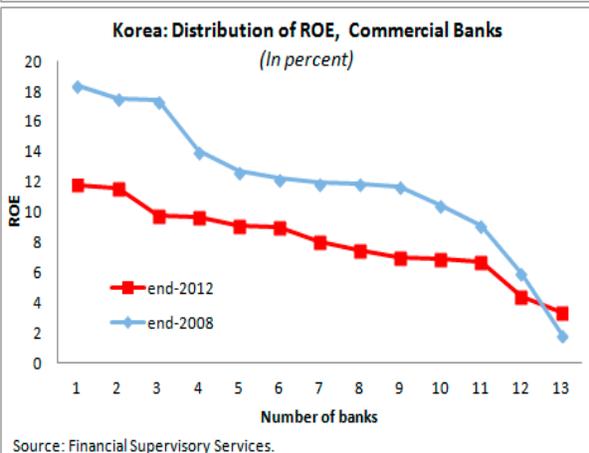
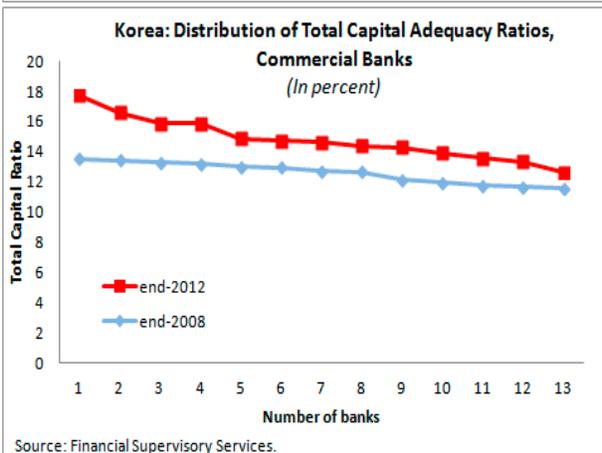
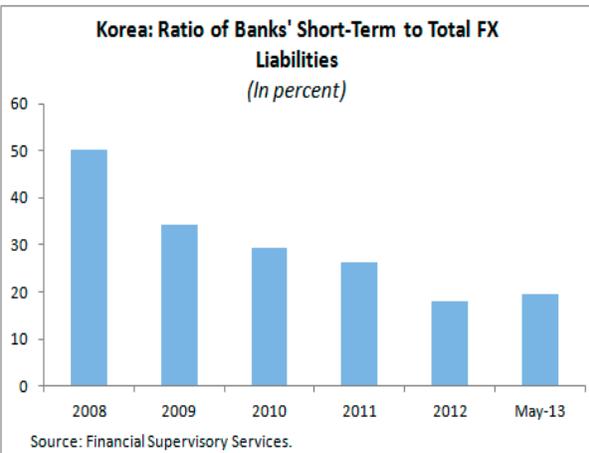
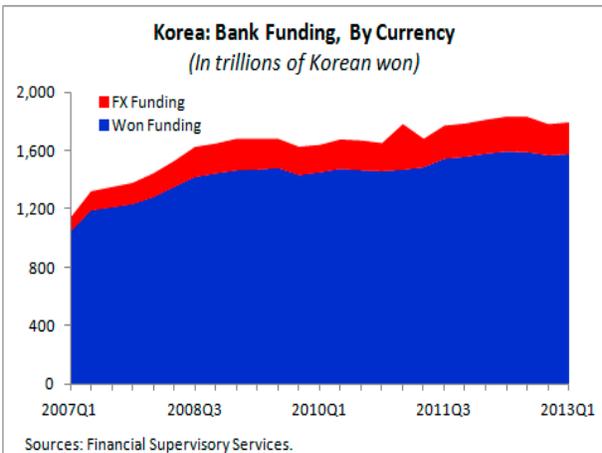
Note: The authorities did not provide the supervisory data. The IMF team was unable to carry out independent stress tests due to the unavailability of sufficient publicly available data.

Appendix V. Korea: Stress Test Matrix (SteM) for the Banking Sector (Liquidity Risk)

Domain	Assumptions	
	Bottom-Up by Banks	Top-Down by Authorities
Institutions included	<ul style="list-style-type: none"> All nation-wide commercial banks (7). 	<ul style="list-style-type: none"> All nation-wide commercial banks (7); all other commercial banks (on an aggregate basis).
Market share	<ul style="list-style-type: none"> 89 percent of commercial bank assets. 60 percent of banking sector assets. 40 percent of broad financial sector assets. 	<ul style="list-style-type: none"> 100 percent of the assets of commercial banks.
Data and baseline date	<ul style="list-style-type: none"> Internal bank data as of March 2013. An update of the FX liquidity tests was done by the authorities using data as of September 2013. Bank consolidated. 	
Risk factors	<ul style="list-style-type: none"> KRW and FX funding risk (deposit withdrawal and market freeze; uniform shocks across banks independent of solvency tests). Focus on access to funding, rather than funding cost. 	
Test horizon	<ul style="list-style-type: none"> 30 days. 	
Methodology	<ul style="list-style-type: none"> Cash flow analysis, based on internal models. Withdrawal rates are applied to deposits, wholesale funding, derivatives, and committed credit lines. Banks are assumed to be able to raise additional liquidity via the sale of unencumbered securities (with haircuts) and use of excess reserve deposits. 	<ul style="list-style-type: none"> Implied cash flow analysis. Stress tests incorporate wholesale funding difficulties and deposit withdrawals (funding risk), and fire sales of assets to meet liquidity constraints (market liquidity risk). Asset-specific haircuts are assumed.
Shocks	<ul style="list-style-type: none"> The magnitude of the wholesale funding shocks is in line with the severe liquidity difficulties experienced by banks globally after the Lehman collapse. The deposit withdrawal rates are more severe than the historical experience in Korea. 	
	<ul style="list-style-type: none"> Disruption of 100 percent of unsecured short-term wholesale funding; 80 percent of secured wholesale funding (both KRW and FX); outflows of 20 percent of maturing retail term deposits (40 percent for FX), 40 percent of retail demand deposits (20 percent for FX), and 10 percent of committed credit lines (both KRW and FX). 	<ul style="list-style-type: none"> Disruption of 100 percent of unsecured short-term wholesale funding; 80 percent of secured wholesale funding (both KRW and FX); outflows of 6 percent of retail term deposits (30 percent for FX), and 40 percent of retail demand deposits (20 percent for FX).
Assessment criteria	<ul style="list-style-type: none"> Maintaining no liquidity shortfall. 	
Reporting format to the FSAP team	<ul style="list-style-type: none"> Liquidity shortfall, and inflows and outflows by type of funding (individual institutions); domestic and foreign currency separately. 	

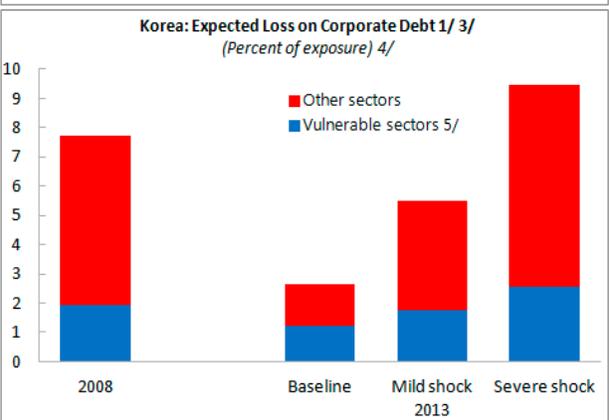
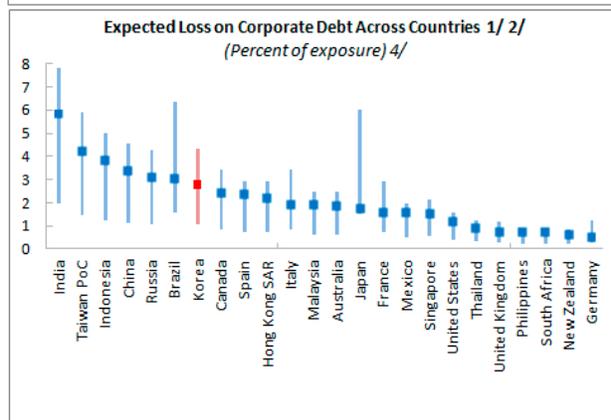
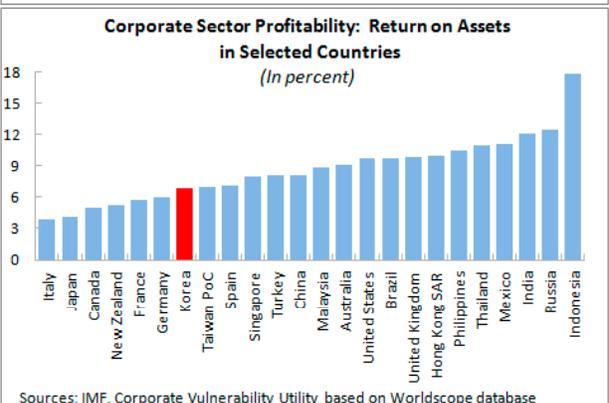
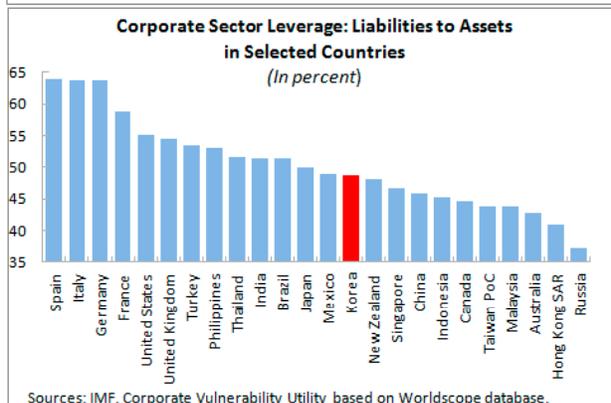
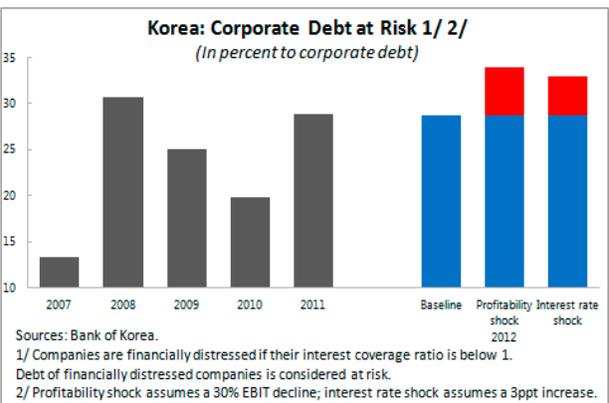
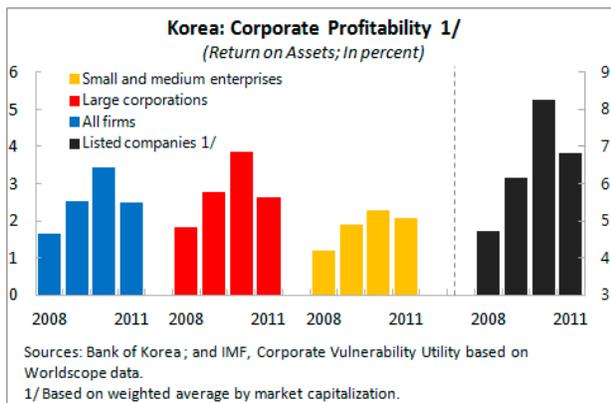
Note: The authorities did not provide the supervisory data. The IMF team was unable to carry out independent stress test due to the unavailability of publicly available data.

Appendix Figure 1. Korea: Banking Sector Soundness



Sources: Financial Supervisory Service and IMF, *Global Financial Stability Report*, April 2013.

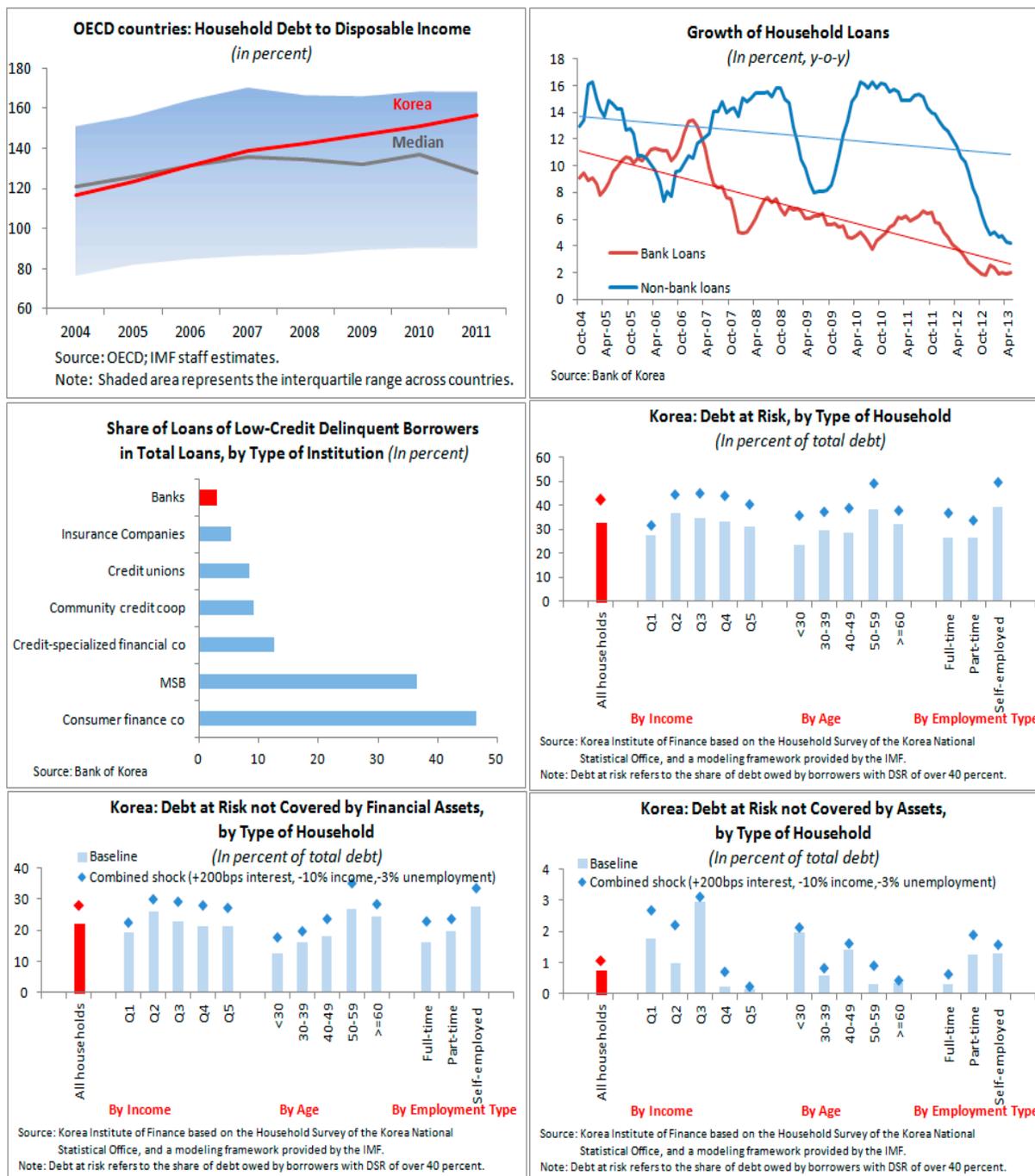
Appendix Figure 2. Korea: Corporate Sector Risks



Sources: Moody's Analytics - CreditEdge Plus; and IMF staff calculations.
 1/ Based on potential default over the next year.
 2/ Dots represent point estimates, with confidence intervals assuming 20 and 80 percent recovery rate in case of default.
 3/ The sensitivity analysis assumes an increase in credit spreads of individual companies based on their sectors' experience in 2008. The increase reflects the difference of credit spreads between November 2008 and May 2013. The mild shock assumes a credit spread increase of the median company of each sector, and the severe shock assumes that of the top quartile company.
 4/ Exposure is based on default point, which is equal to total short-term debt plus half of long-term debt.
 5/ Vulnerable sectors include construction, real estate development, shipbuilding, and transportation services.

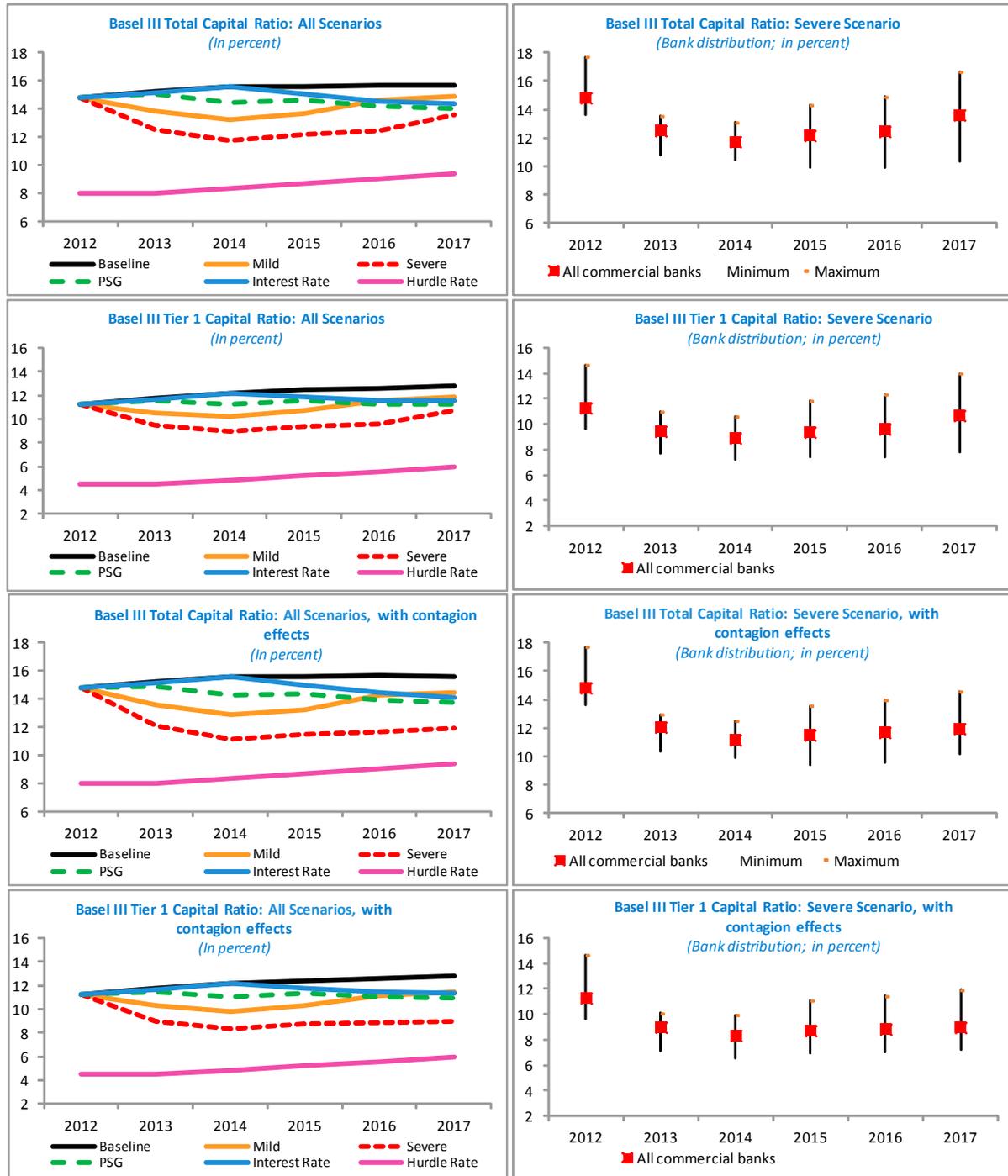
Sources: IMF staff calculations; Bank of Korea; IMF, Corporate Vulnerability Utility; and Moody's Analytics—CreditEdge Plus.

Appendix Figure 3. Korea: Household Sector Risks



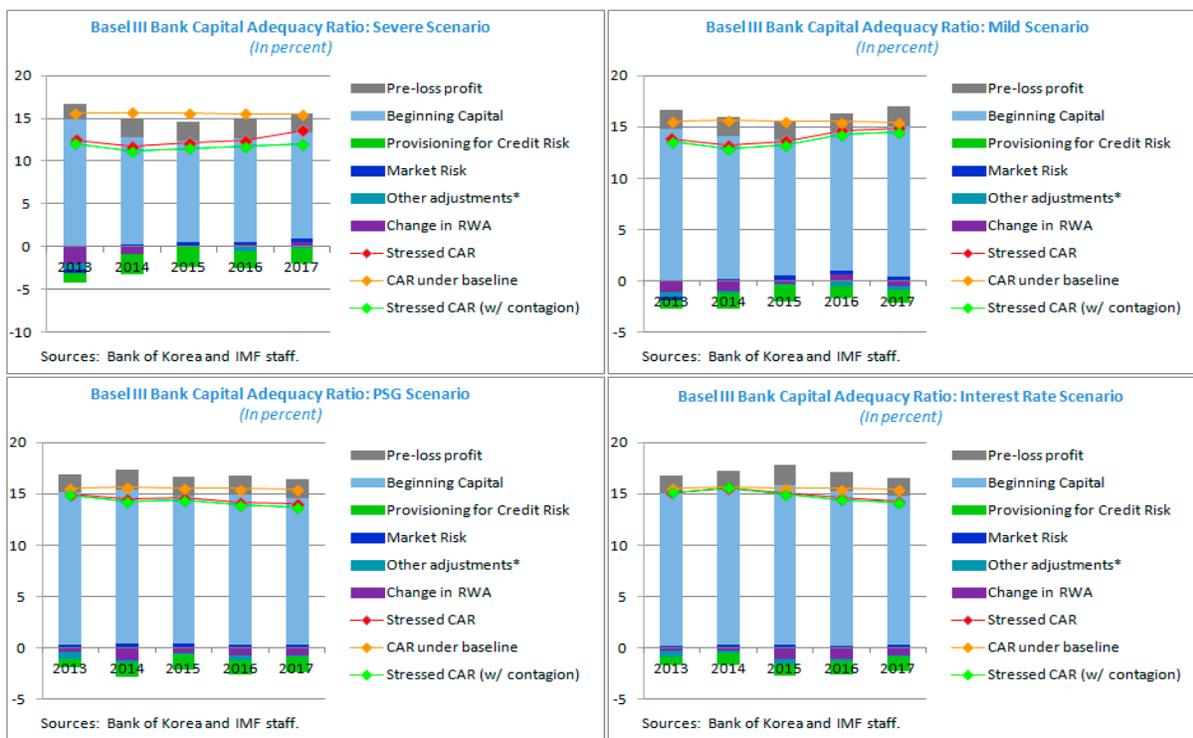
Sources: IMF staff estimates; BANK OF Korea, OECD; and Korea Institute of Finance based on the Household Survey of the Korea National Statistical Office and a framework provided by the IMF.

**Appendix Figure 4. Korea: Top-Down Solvency Stress Test—
Basel III Capital Ratios, Aggregate, and Distribution**



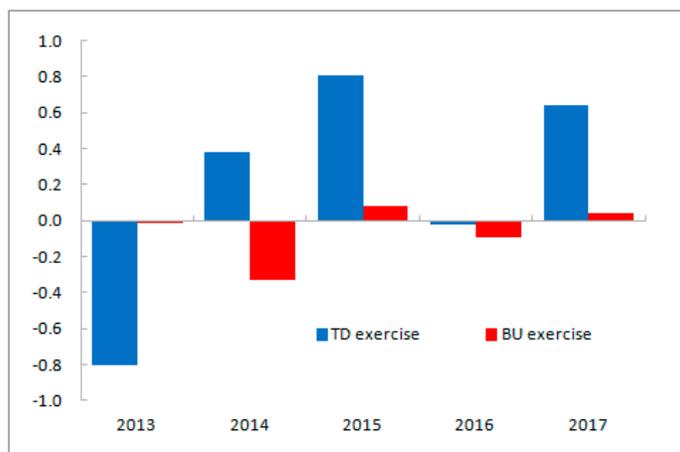
Source: Bank of Korea and IMF staff.

Appendix Figure 5. Korea: Top-down Solvency Stress Tests—Drivers of Cumulative Impact on Basel III Capital Adequacy Ratios



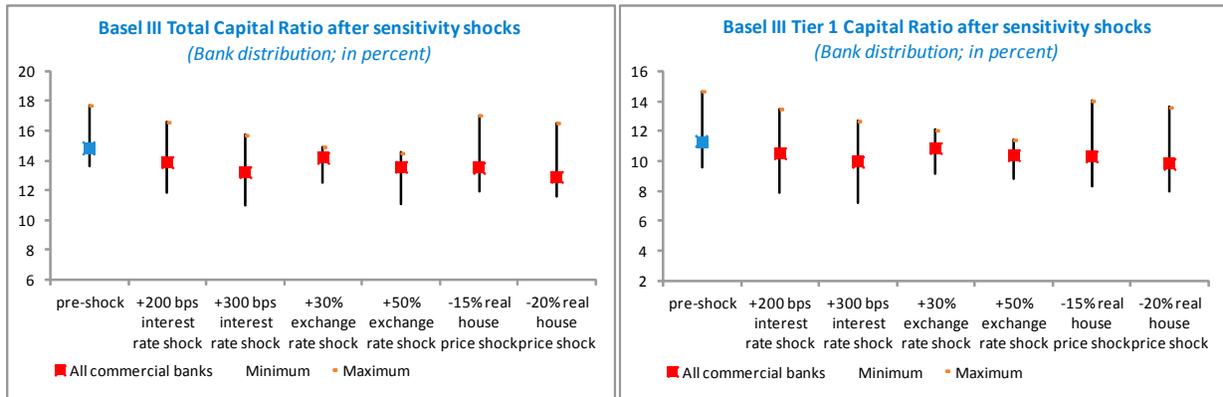
Sources: Bank of Korea and IMF staff.

**Appendix Figure 6. Korea: Solvency Stress Tests—
Impact of Market Risk in the Severe Scenario
(In percent of risk-weighted assets)**



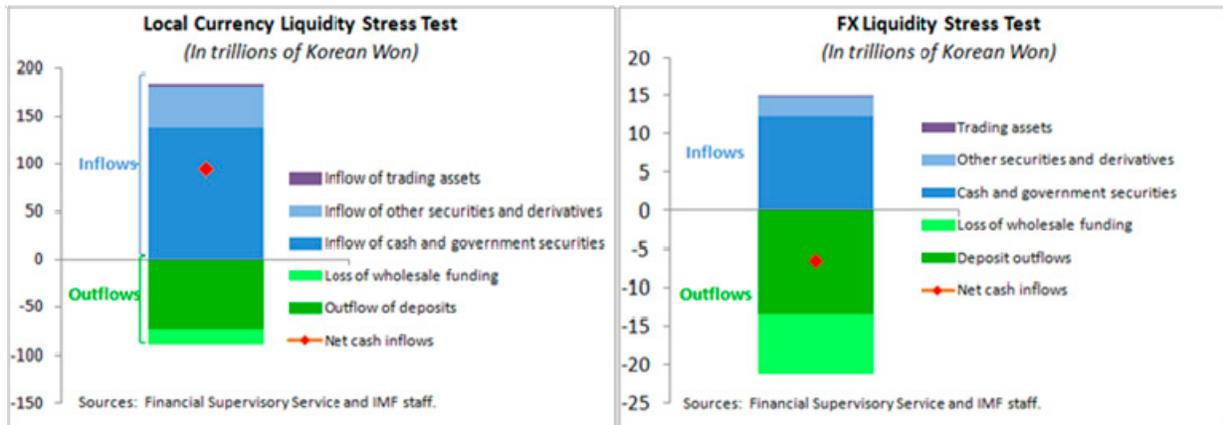
Sources: Bank of Korea, Financial Supervisory Service, and IMF staff.

Appendix Figure 7. Korea: Basel III Capital Ratios after Sensitivity Shocks



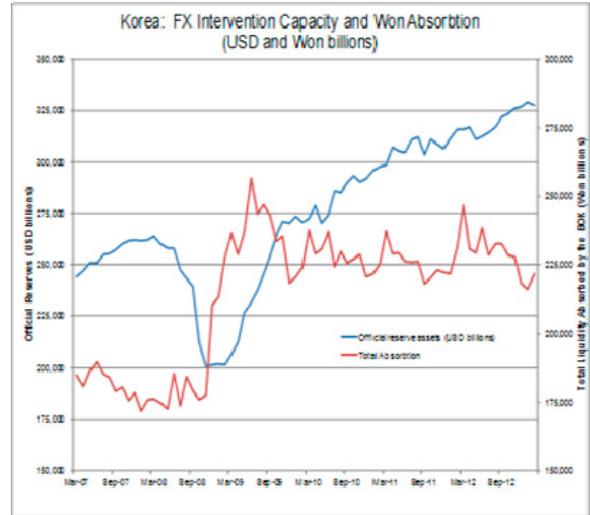
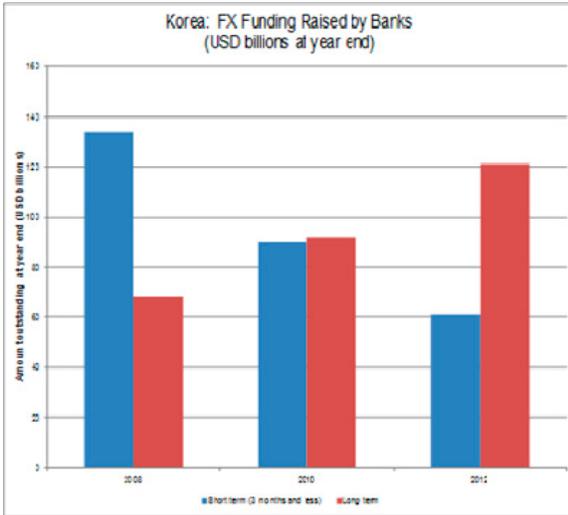
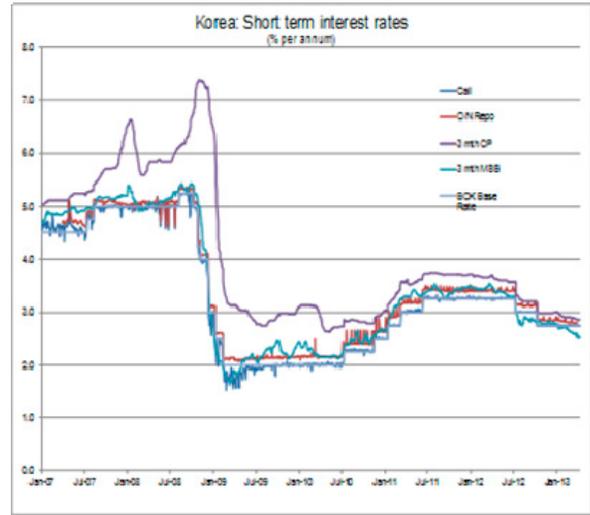
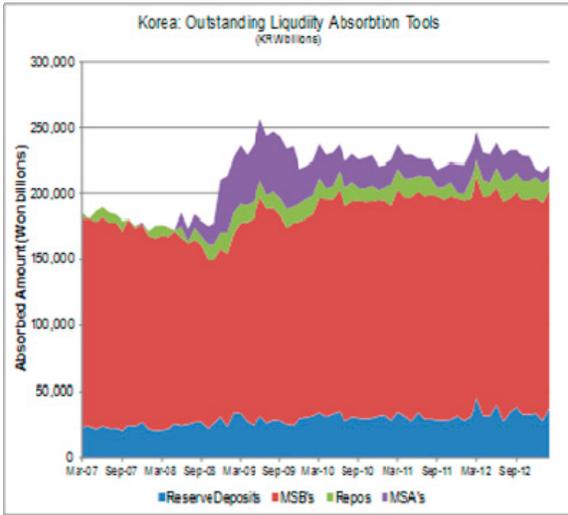
Sources: Bank of Korea and IMF staff.

Appendix Figure 8. Korea: Liquidity Stress Tests—Breakdown of 30-Day Cash Flows



Sources: Financial Supervisory Service and IMF staff.

Appendix Figure 9. Korea: Systemic Liquidity Indicators



Sources: Bank of Korea and IMF staff.

Appendix Table 1. Korea: Selected Economic Indicators, 2008–14

	2008	2009	2010	2011	2012	Projections	
						2013	2014
Real GDP (percent change)	2.3	0.3	6.3	3.7	2.0	2.8	3.7
Total domestic demand	1.4	-2.7	6.2	2.0	1.0	2.0	2.7
Final domestic demand	0.8	0.6	4.5	1.4	1.1	2.2	2.8
Consumption	2.0	1.2	4.1	2.3	2.2	1.9	2.7
Gross fixed investment	-1.9	-1.0	5.8	-1.0	-1.7	3.1	2.9
Net foreign balance 1/	1.1	2.8	0.1	1.9	1.1	1.2	1.3
Nominal GDP (in trillions of won)	1,026.5	1,065.0	1,173.3	1,235.2	1,272.5	1,343.0	1,414.2
Saving and investment (in percent of GDP)							
Gross national saving	31.6	30.2	32.4	31.8	31.8	32.3	32.0
Gross domestic investment	31.2	26.3	29.5	29.5	27.6	26.5	26.9
Current account balance	0.3	3.9	2.9	2.3	4.3	5.8	5.1
Prices (percent change)							
CPI inflation (end of period)	4.1	2.8	3.0	4.2	1.4	1.0	2.5
CPI inflation (average)	4.7	2.8	2.9	4.0	2.2	1.1	1.8
Core inflation (average)	4.3	3.6	1.8	3.2	1.7	1.5	2.0
Real effective exchange rate	-19.9	-12.4	11.4	0.6	1.1	...	...
Trade (percent change)							
Export volume	6.8	0.1	14.4	13.9	5.6	6.0	7.2
Import volume	0.9	-2.2	16.8	5.6	0.5	4.6	6.4
Terms of trade	-14.4	10.8	-0.9	-8.2	2.5	2.2	-1.4
Consolidated central government (in percent of GDP)							
Revenue	24.0	23.0	22.7	23.3	24.2	23.6	23.6
Expenditure	22.4	23.0	21.0	21.4	22.4	22.6	22.5
Net lending (+) / borrowing (-)	1.6	0.0	1.7	1.8	1.8	1.0	1.2
Overall balance	1.5	-1.7	1.4	1.5	1.5	0.7	0.9
Excluding Social Security Funds	-1.1	-4.1	-1.1	-1.1	-1.4	-2.1	-1.8
Money and credit (end of period)							
Overnight call rate 2/	3.0	2.0	2.5	3.3	2.8	2.5	...
Three-year AA- corporate bond yield 2/	7.7	5.5	4.3	4.2	3.3	3.3	...
M3 growth 3/	9.1	9.4	5.9	6.6	7.8	6.8	...
Balance of payments (in billions of U.S. dollars)							
Exports, f.o.b.	434.7	358.2	461.4	551.8	554.2	595.5	640.9
Imports, f.o.b.	429.5	320.3	421.4	520.1	514.4	533.3	577.8
Current account balance	3.2	32.8	29.4	26.1	48.1	69.5	65.3
Gross international reserves (end of period) 4/	201.1	269.9	291.5	304.2	323.2	363.3	385.3
In percent of short-term debt (residual maturity)	111.7	146.2	162.5	165.0	181.2	214.4	220.0
External debt (in billions of U.S. dollars)							
Total external debt (end of period)	317.4	345.7	359.8	398.7	409.4	427.1	453.8
Total external debt (in percent of GDP)	34.1	41.4	35.4	35.8	36.2	35.3	35.4
Debt service ratio 5/	7.9	7.8	6.8	6.4	7.5	7.5	7.8
Real effective exchange rate (level)	85.7	75.8	82.1	82.2	82.0	...	...

Sources: Korean authorities; and IMF staff estimates and projections.

1/ Contribution to GDP growth.

2/ Data for 2013 are as of November 4, 2013.

3/ Data for 2013 are as of August.

4/ Excludes gold.

5/ Debt service on medium- and long-term debt in percent of exports of goods and services.

Appendix Table 2. Korea: Financial System Structure, 2002–12

	Number of institutions	Total Assets					
		2002		2007		2012	
		(In billion won)	(In percent)	(In billion won)	(In percent)	(In billion won)	(In percent)
Banks	57	974,875	63.8	1,558,381	63.2	1,954,283	48.2
Commercial banks	52	701,326	45.9	1,114,427	45.2	1,425,768	35.1
Nation-wide banks	7	582,337	38.1	872,655	35.4	1,086,084	26.8
Regional banks	6	54,208	3.5	93,195	3.8	135,530	3.3
Foreign bank branches	39	64,780	4.2	148,577	6.0	204,134	5.0
Specialized banks	5	273,549	17.9	443,954	18.0	528,515	13.0
Non-Bank Depository Institutions	...	181,170	11.9	291,084	11.8	581,234	14.3
Credit cooperatives	2,339	155,709	10.2	233,052	9.5	457,174	11.3
Credit unions	949	19,589	1.3	27,224	1.1	55,340	1.4
Community credit cooperatives	...	–	...	–	–	104,836	2.6
Mutual banking entities	1,390	136,120	8.9	205,828	8.3	296,998	7.3
Merchant banking corporations	1	–	...	–	–	14,468	0.4
Mutual savings banks	93	25,461	1.7	58,032	2.4	49,392	1.2
Postal savings	1	–	...	–	–	60,200	1.5
Other Financial Institutions	...	371,970	24.3	616,494	25.0	1,521,331	37.5
Credit-specialized companies	...	101,703	6.7	88,983	3.6	164,907	4.1
Credit card companies	...	68,123	4.5	39,216	1.6	82,393	2.0
Financing companies 2/	...	33,580	2.2	49,767	2.0	82,514	2.0
Financial investment entities	...	51,047	3.3	133,017	5.4	588,459	14.5
Investment traders and brokers 3/	...	51,047	3.3	133,017	5.4	271,186	6.7
Collective investment business entities 4/	...	–	...	–	–	317,273	7.8
Insurance companies	56	219,220	14.3	394,494	16.0	767,965	18.9
Life insurance companies	24	164,223	10.7	305,400	12.4	569,837	14.0
Non-life insurance companies	31	35,414	2.3	66,020	2.7	156,463	3.9
Postal insurance	1	19,583	1.3	23,074	0.9	41,665	1.0
Total - Financial Institutions		1,528,014	100.0	2,465,959	100.0	4,056,848	100.0
In percent of GDP		212		253		312	
Memorandum Item:							
GDP		720,539		975,013		1,302,128	

Sources: Korean authorities; and IMF staff calculations.

1/ Some data are missing as some institutions are not supervised by the Financial Supervisory Services.

2/ Including installment financing companies, leasing companies and venture capital companies.

3/ Including futures companies and securities companies.

4/ Based on investment trust accounts.

Appendix Table 3 Korea: Core Set of Financial Soundness Indicators, 2008–12
(In percent)

	2008	2009	2010	2011	2012	2013Q1	2013Q2	2013Q3
Banking sector								
Regulatory capital to risk-weighted assets	12.3	14.4	14.3	14.0	14.3	14.0	...	...
Tier-1 regulatory capital to risk-weighted assets	8.8	10.9	11.3	10.7	11.1	11.0	...	...
Nonperforming loans to total loans	0.6	0.6	0.6	0.5	0.6	0.7	...	...
Provisions to total loans	0.3	0.3	0.2	0.2	0.2	0.3	...	...
Return on assets	0.7	0.6	0.7	1.0	0.7	0.5	...	...
Return on equity	9.9	8.6	9.7	13.2	8.2	6.4	...	...
Liquid assets to total assets	35	38	35	35	36	38	...	...
Liquid assets to short-term liabilities	101	104	117	109	111	121	...	...
Loans to deposits	135	126	139	121	119	116	...	...
Capital to assets	6.3	7.3	7.6	8.1	8.2	8.1	...	...
Corporate sector								
Debt to GDP	159	159	151	154	156	158	158	157
Debt to equity	157	122	108	117	113	114	116	113
Return on assets	1.6	2.5	3.4	2.5	...	...	...	...
Current assets to current liabilities	121	130	130	130	...	...	...	...
Liquid assets to debt repayment	104	116	111	110	...	...	...	...
At risk of default: Earning below interest payment								
Share of companies at risk	30.4	25.6	24.7	26.8	27.7	...	...	...
Share of debt at risk	30.7	25.0	19.8	28.9	28.7	...	...	...
Number of bankruptcies (annualized)	191	226	254	311	424	488	...	...
Delinquency rate (all bank loans)	1.5	1.0	1.1	1.1	1.2	...	...	...
Household sector								
Debt to GDP	70	87	87	90	91	90	92	92
o/w: Credit from banks	38	38	37	37	37	36	36	36
o/w: Credit from other financial institutions	33	49	50	53	54	...	...	...
Debt to disposable income	118	122	123	127	136	...	...	...
Delinquency rate (all bank loans)								
Loans to households	0.7	0.7	0.6	0.7	0.9	1.0	1.0	...
Credit cards	1.7	2.2	1.6	1.9	2.2	2.3	2.3	...
Change in residential prices (y/y)	4.0	0.2	2.4	5.3	0.3	0.0	-0.2	-0.5

Sources: Bank of Korea; CEIC; IMF, *Financial Soundness Indicators*; Financial Supervisory Services; and IMF staff calculations.