

**EXECUTIVE  
BOARD  
MEETING**

SM/20/65

March 10, 2020

To: Members of the Executive Board

From: The Secretary

Subject: **Republic of Korea—Financial System Stability Assessment**

Board Action:	Executive Directors' <b>consideration</b> (Formal)
Tentative Board Date:	<b>Monday, March 23, 2020</b>
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**\*Unless an objection from the authorities is received prior to the conclusion of the Board's consideration, the document will be published.**





# REPUBLIC OF KOREA

## FINANCIAL SYSTEM STABILITY ASSESSMENT

March 10, 2020

### KEY ISSUES

**Context:** Operating within a trade dependent open economy, Korea's financial system is among the most developed and internationally connected in Asia. The state keeps a tight control and operates a rules-based oversight system. On the back of robust past economic performance, new regulations, and continued state support, most parts of the banking system appear prudentially strong. Prospects for banks and insurers are, however, dimming due to growth related uncertainties, low interest rates, rising competition from fintech and nonbanks, and adverse demographics induced shifts in financial behavior of households.

**Findings:** The overall financial system appears resilient for the present, but with growing vulnerabilities. Stress tests suggest that banks and insurers, in aggregate, can weather severe macro financial shocks, although some banks would make use of capital conservation buffers. Growth related uncertainties, and elevated household debt remain key vulnerabilities to financial stability. The leasehold deposit market (Jeonse) —a unique aspect of Korean housing finance—presents a potential vulnerability for the real estate market. A strong rules-based financial supervision is in place, but financial conglomerates are not under adequate oversight, and stronger focus is needed to monitor transmission channels between securities markets and banks, and across asset classes.

**Policies:** While banks are adequately capitalized for now, a sectoral countercyclical buffer for their household exposures is desirable. A more robust identification of systemic risk conditions across entities and market activities is needed via enhanced stress testing practices as well as risk and impact assessments of the emerging fintech-based 'open banking' system that allows third-parties to access bank information and initiate payments. The institutional framework for financial stability would benefit by assigning the Macroeconomic and Finance Meeting (MEFM) (or a body empowered for the equivalent purpose) macroprudential oversight as its sole primary objective. High priority is needed to enhance oversight of financial conglomerates, and to review the role of state-controlled banks. Resolution plans must explicitly include cross-border activities, and the overseas operations of financial conglomerates.

Approved By

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Prepared By

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This report is based on the work of the Financial Sector Assessment Program (FSAP) mission that visited Korea in August 20–September 6, 2019 and December 4–19, 2019. The FSAP findings were discussed with the authorities at the end of the second mission.

- The FSAP team was led by Udaibir Das and included Thomas Harjes (Deputy Mission Chief), Zsofia Arvai, Farid Boumediene, Marco Gross, Roland Meeks, David Rozumek (all MCM), Jess Cheng and Anjum Rosha (both LEG), Sohrab Rafiq (APD) and Timo Broszeit, Tim Clark, Andrew Gracie, and Ranjit Singh (experts). At headquarters, Elizabeth Mahoney provided research support and Vanessa Guerrero provided administrative and editorial assistance.
- The mission met with Financial Services Commission (FSC) Chairman EUN Sung-soo, Governor of the Bank of Korea (BoK) LEE Juyeol, 1st Vice Minister of Economy and Finance KIM Yongbeom, and Governor of the Financial Supervisory Service (FSS) YOON Suk Heun; The mission closely interacted with other senior officials of these agencies and at the Korean Investment Corporation (KIC) and Korea Deposit Insurance Corporation (KDIC); industry associations; select academics, and representatives of the private sector.
- The FSAP assesses the stability of the financial system as a whole and not that of individual entities and is intended to help countries identify key sources of systemic risk and policies to enhance resilience to shocks and contagion. Certain categories of risk affecting financial institutions, such as operational or legal risk, or risk related to fraud, are not covered in FSAPs.
- The Republic of Korea is deemed by the Fund to have a systemically important financial sector according to Mandatory Financial Stability Assessments Under the Financial Sector Assessment Program—Update (11/18/2013), 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 Udaibir Das and Thomas Harjes with contributions from the FSAP team.

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## Glossary

AML/CFT	Anti-Money Laundering/Combating the Financing of Terrorism
APG	Asia/Pacific Group
BCP	Basel Core Principles
BoK	Bank of Korea
CCyB	Countercyclical Buffer
DIF	Deposit Insurance Fund
DX	Domestic Exchange
ELA	Emergency Liquidity Assistance
ESG	Environmental, Social and Governance
FHCs	Financial Holding Companies
FSAP	Financial Sector Assessment Program
FSB	Financial Stability Board
FSC	Financial Services Commission
FSS	Financial Supervisory Service
FSSA	Financial System Stability Assessment
FX	Foreign Exchange
GDP	Gross Domestic Product
GaR	Growth-at-Risk
ICAAP	Internal Capital Adequacy Assessment Process
ICP	Insurance Core Principle
ILAAP	Internal Liquidity Adequacy Assessment Process
IMF	International Monetary Fund
IOSCO	International Organization of Securities Commissions
KAMCO	Korea Asset Management Corporation
KDIC	Korea Deposit Insurance Corporation
KHFC	Korean Housing Finance Corporation
KIC	Korean Investment Corporation
K-ICS	Korea Insurance Capital Standard
K-IFRS	Korean International Financial Reporting Standards
KOSTAT	Statistics Korea
KRW	Korean Won
LL	Loan loss
LCR	Liquidity Coverage Ratio
MEFM	Macroeconomic and Finance Meeting
MMF	Money Market Funds
MOEF	Ministry of Economics and Finance
MOEL	Ministry of Employment and Labor
MOJ	Ministry of Justice
MPMs	Macroprudential Measures
NFCs	Non-financial Corporation
NSFR	Net Stable Funding Ratio
NDF	Non-deliverable Forward

NFCI	Net fee and commission income
NII	Net interest income
NPL	Nonperforming Loan
NTI	Net trading income
OCI	Other comprehensive income
OGC	Office of Government Coordination
OOE	Other operating expense
ORSA	Own Risk and Solvency Assessment
RWA	Risk weighted assets
SCCyB	Sectoral Countercyclical Buffer
SMEs	Small and Medium-sized Enterprises
TD	Top-down (Stress Test)



## EXECUTIVE SUMMARY

**The Korean financial system is one of the largest and most developed in Asia.** Important policy changes have been taking place since the 2013 FSAP and the system has remained relatively stable reflecting also the supporting role of the State. The authorities have continued their efforts at upgrading the prudential, legal, and supervisory framework for the financial sector, and keeping up with international standards and practices in other G20 jurisdictions.

**The banking system—and the broader financial system—has been steadily growing since the last FSAP.** On the back of robust economic growth, new regulations, and state provided facilities such as mortgage insurance, most parts of the banking system are prudentially strong. The authorities have been steeling the system with micro and macroprudential measures (MPMs) against vulnerabilities, strengthening the crisis management framework, and upgrading the prudential and legal framework.

**The triad of lower growth, adverse demographic shift, and potentially disruptive financial technologies are posing a challenge, however:**

- The systemic risk analysis finds the banking system broadly sound. The largest adverse impact on capital under a stress scenario is estimated for a few regional, mutual savings and state-owned banks. While the growth-at-risk (GaR) analysis points to sizable downside risk over the next few years, the risk of systemic contagion within the financial system appears presently contained. Prospects for banks and insurers are however appearing doubtful due to low interest rates and rising competition from fintech and nonbanks. Adverse demographic shifts are starting to impact the financial system through a persistent structural drag on interest rates and inflation, reflecting changing patterns of savings, household debt, consumption, and investment behavior.
- Fintech developments hold the promise of bringing many positives but would benefit from a comprehensive approach to avoid disruption. With the entry of large technology companies into the financial services market, the banking system has begun to face profitability and disintermediation pressures. This may add further to a need for banking consolidation. Intensification of the search for yield by depositors and households is leading to the retailing of risky wealth management and less transparent derivative securities products.

**The quality of micro-and macroprudential oversight is high but the financial stability framework needs greater clarity.**

- Korea has demonstrated a strong willingness to act on household sector risks and as many as 18 macroprudential and other measures have been taken to curb credit to households and house price growth. The macroprudential framework, however, needs enhancements to make the policy processes more predictable and to minimize undesired spillovers to the broader system.

- Supervision has a rigid rules-based foundation. There is a good level of transposition of international regulations, but oversight of corporate governance and Pillar 2 for D-SIBs remain work in progress. A systematic application of group-level supervision covering all types of financial conglomerates is absent. The state-owned banks and smaller depository entities, and securities market activities require stronger supervisory attention.
- Korea has a well-established financial safety net, and a resolution regime with many elements of the Financial Stability Board (FSB) Key Attributes. The key challenge is preparing to deal with the failure of a financial group, cross border activities, and ensuring orderly resolution of D-SIBs.

**Looking ahead, a more forward-looking monitoring and systemic risk identification mechanism must become a sine qua non for Korea's financial stability and oversight framework.** The reliability of various stress tests could be augmented with advanced methods, system-wide monitoring, and testing the overall leverage related to residential properties, households' resilience to adverse shocks, and sovereign contingent liabilities. Stronger focus is required on systemic risks emanating from market activities that can amplify contagion, including sudden redemption and liquidity pressures in the funds and asset management industry. Financial conglomerates and others connected directly or indirectly with the Korean financial system need to come under the purview of systemic monitoring. Onshore financial markets, including the foreign exchange (FX) market, must deepen to expand options for managing currency and capital flow risks. A review would be beneficial of housing market financing structures and implicit subsidies, pension funds market, and the overall role of state-owned banks.

**Table 1. Korea: FSAP Key Recommendations**

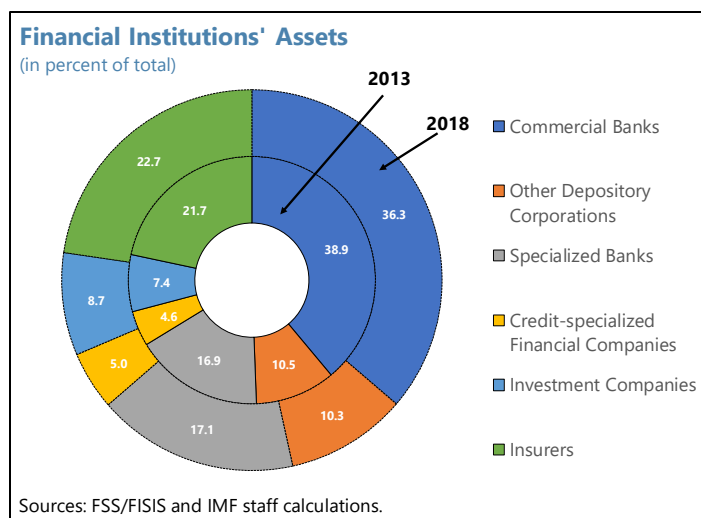
I= immediate (within one year), NT= near term (1–3 years), MT= medium term (3–5 years)

Recommendations	Agency	Timing
<b>More Robust Identification of Systemic Risk Conditions</b>		
<b>Conduct an impact assessment</b> of the 'open banking system' and e-money on security and operational risks and market structure	FSC/FSS and BoK	I
<b>Assess the potential rollover risk</b> implied by the <i>Jeonse</i> leasehold system and its connectedness to securities companies	FSC/FSS and BoK	NT
<b>Enhance stress testing practices</b> to better estimate vulnerabilities relating to nonperforming loan (NPL) sales, FX and domestic household liquidity, SME loans, securities intermediaries activities, and sovereign contingent liabilities	BoK and FSC/FSS	MT
<b>Strengthening the Preemptive Management of Systemic Vulnerabilities</b>		
<b>Strengthen the institutional framework for financial stability</b> by assigning the MEFM (or a body empowered for the equivalent purpose) macroprudential oversight as its sole primary objective	MOEF, FSC and BoK	I
<b>Widen the definition of financial holding company</b> and enhance legal powers to cover all financial conglomerates including requirements for group-wide liquidity risks and contingency plans	MOEF and FSC/FSS	I
<b>Implement a Sectoral CCyB framework</b> for secured and unsecured household exposures of the banking sector	FSC/FSS and BoK	NT
<b>Intensifying Supervision and Promoting a Level Playing Field</b>		
<b>Review the role of state-controlled banks and ensure that their</b> commercial lending and investment activities conform, at a minimum, with prudential requirements for nationwide banks	FSC/FSS	I
<b>Increase risk-based supervisory intensity of insurers</b> , ensure a prudent and proportionate implementation of Korea Insurance Capital Standard (K-ICS) (solvency regime) and design of the capital charge for longevity risks	FSC/FSS	I
<b>Focus the role of FSC</b> towards strategy, addressing nonbank data gaps, market development policies, and crisis preparedness while assigning greater operational and enforcement authority to the FSS	MOEF/OGC	NT
<b>Support the development of pension and contractual savings products</b> by introducing multi-employer pension schemes and building further capacity for oversight of pension funds market	FSC/FSS / MOEL	MT
<b>Reinforcing Crisis Management, Safety Nets, Resolution Arrangements</b>		
<b>Include cross-border activities and overseas operations</b> of financial conglomerates in resolution plans, clarify issues relating to resolvability, and relationship between ELA and resolution funding	FSC/FSS	NT
<b>Strengthen the insolvency and creditor's rights regime</b> through well-resourced courts and a functioning insolvency practitioners' profession	MoJ	MT

## BACKGROUND

### A. Financial System Structure

**1. The Korean financial system is one of the largest and most developed in Asia (Figure 1, Table 2).** Since the 2013 FSAP, Korea's financial system has grown by about 40 percentage points of Gross Domestic Product (GDP) and, as of 2018Q4, total assets of financial institutions reached about 300 percent of GDP. Real estate is the central asset class where leverage is high. Banks and other depository institutions (ODIs)<sup>1</sup> hold most financial institutions' assets, alongside a sizeable insurance sector. The asset management industry is small but a growing segment of the financial system. Growth in the onshore FX derivatives market lags cross-border investment flows while the offshore non-deliverable forward (NDF) market in Korean won (KRW) remains large and liquid.



**2. The state has a significant footprint in the financial sector.** Three large ("specialized") state-owned banks, the Korea Asset Management Corporation (KAMCO) and the Korean Housing Finance Corporation (KHFC) are the state's flagships through which it participates in and backstops intermediation. The KHFC provides mortgages insurance and issues fully guaranteed mortgage-backed securities composed of "conforming" loans for which it sets the maximum amount, maturity and interest rates in advance.<sup>2</sup> KAMCO has played an instrumental role after the Asian crisis when it acquired about USD 100bn of bad loans from the banking system and has also bought substantial amounts of NPLs in the wake of the credit card crisis (2003), global financial crisis (2008), and household debt crisis (2013). The National Pension Service (NPS) runs the third largest pension fund globally with USD 600bn in assets and is the largest on-shore investor in Korea. The Korean Investment Corporation (KIC) is a 'sovereign wealth fund' with about USD 130bn assets under management.

<sup>1</sup> 'Other depository institutions' (ODIs) include credit cooperatives and mutual savings banks clustered in regions or sectors such as agriculture and fishing and overseen by Ministry of Agriculture, Food and Rural Affairs and others.

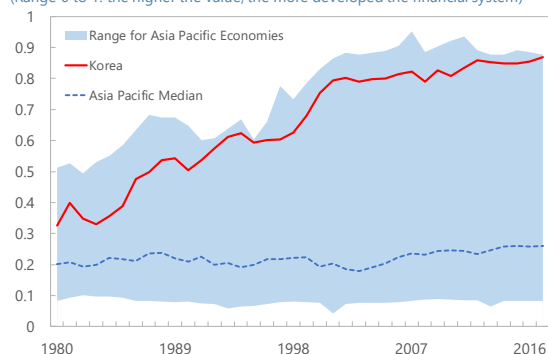
<sup>2</sup> Loans, securities and guarantees issued and provided in 2017 amounted to about 7% of GDP.

**Figure 1. Korea: Financial System Structure**

Korea's financial system is among the most-developed in Asia<sup>1</sup>...

#### Financial Development Index, 1980-2017

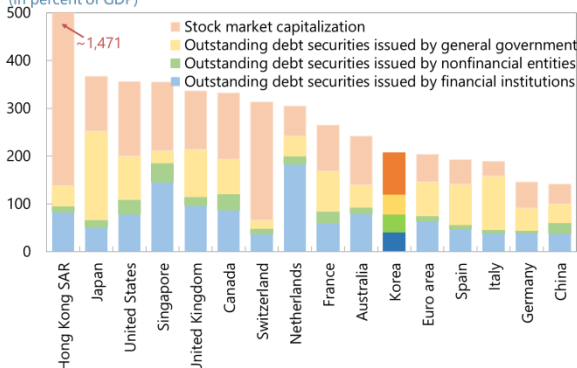
(Range 0 to 1: the higher the value, the more developed the financial system)



Market-based financing is low but compares well with other advanced economies...

#### Value of Financial Markets, 2018

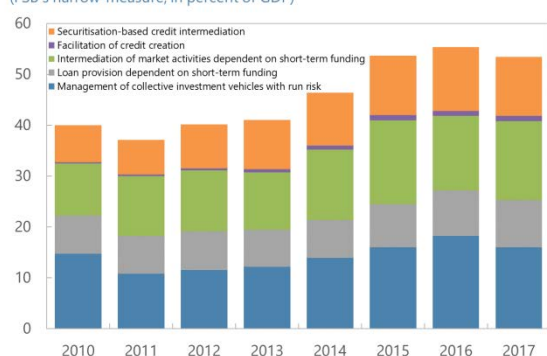
(In percent of GDP)



Nonbank financial intermediation is dependent on short-term funding...

#### Non-Bank Financial Intermediation Korea

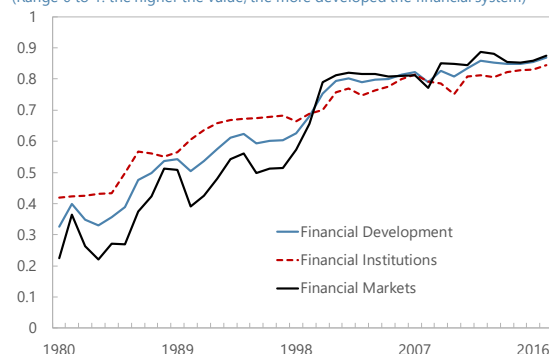
(FSB's narrow-measure, in percent of GDP)



...with both financial markets and institutions broadly - developed.

#### Financial Development Index, 1980-2017

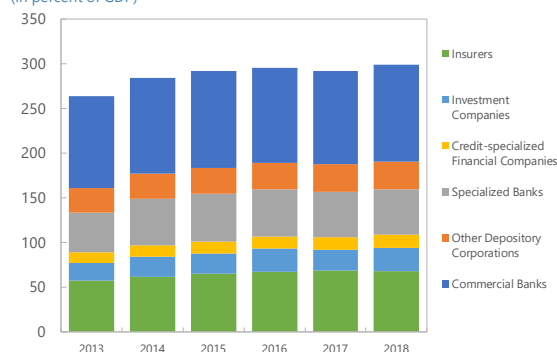
(Range 0 to 1: the higher the value, the more developed the financial system)



...while banks and other depository institutions hold most financial institutions' assets

#### Financial Institutions' Assets

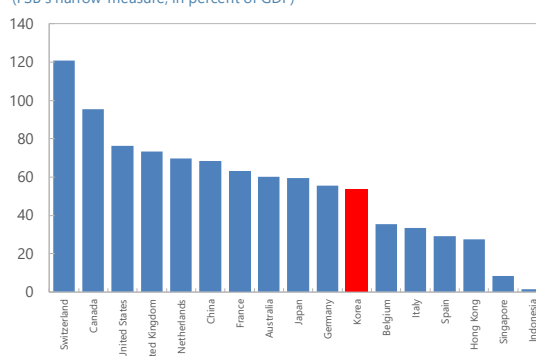
(in percent of GDP)



...but remains relatively small compared to other major jurisdictions.

#### Non-Bank Financial Intermediation, 2017

(FSB's narrow-measure, in percent of GDP)



Sources: Bloomberg, IMF Financial Development Index, IMF World Economic Outlook, FSB Global Monitoring Report on Nonbank Financial Intermediation 2018, FSS. 1/ For more details about the financial development index and its financial institutions and markets subcomponents see IMF SDN/15/08 and IMF WP/16/5.

**Table 2. Korea: Financial System Structure**

	Size					
	In percent of GDP		In percent of financial system assets		Number of institutions	
	2013	2018	2013	2018	2013	2018
<b>Depository Financial Institutions</b>	175.0	190.2	66.3	63.6	2435	2373
<b>Banks</b>	147.3	159.5	55.8	53.4	58	57
Domestic Commercial Banks	89.3	93.6	33.8	31.3	13	14
Nationwide (including internet only)	79.1	83.0	30.0	27.8	7	8
Local	71.6	76.3	27.1	25.5	5	6
Foreign Subsidiaries	7.6	6.7	2.9	2.2	2	2
Regional	10.2	10.5	3.9	3.5	6	6
Foreign Bank Branches	13.4	14.8	5.1	5.0	40	38
Specialized Banks	44.5	51.1	16.9	17.1	5	5
<b>Other Depository Corporations</b>	27.7	30.7	10.5	10.3	2377	2316
Mutual Savings Banks	2.5	3.7	0.9	1.2	79	79
Credit Unions	3.9	4.7	1.5	1.6	915	888
Agricultural Cooperatives	19.8	20.4	7.5	6.8	1161	1122
Fisheries Cooperatives	1.2	1.6	0.5	0.5	86	90
Forestry Cooperatives	0.4	0.4	0.1	0.1	136	137
<b>Non-Depository Financial Institutions</b>	89.1	108.7	33.7	36.4	440	660
<b>Credit-specialized Financial Companies</b>	12.2	14.9	4.6	5.0	67	105
Credit Card Companies	6.0	7.1	2.3	2.4	8	8
Leasing Companies	2.4	3.2	0.9	1.1	26	25
Installment Finance Companies	3.3	3.9	1.3	1.3	19	21
New Technology Venture Capital Companies	0.4	0.7	0.2	0.2	14	51
<b>Investment Companies</b>	19.6	26.0	7.4	8.7	315	501
Securities Companies	18.9	24.9	7.2	8.3	63	56
Futures Companies	0.2	0.3	0.1	0.1	7	5
Asset Management Companies	0.3	0.4	0.1	0.1	85	243
Investment Advisory Companies	0.1	0.0	0.0	0.0	148	185
Real Estate Trust Companies	0.1	0.2	0.0	0.1	11	11
Merchant Banks	0.1	0.1	0.0	0.0	1	1
<b>Insurers</b>	57.2	67.8	21.7	22.7	58	54
Life Insurance Companies	45.3	51.7	17.1	17.3	27	24
Nonlife Insurance Companies	12.0	16.1	4.5	5.4	31	30
<b>Total Financial System Assets</b>	264.1	299.0	100.0	100.0	2875	3033
of which: Financial Holding Companies	136.2	113.8	51.6	38.1	13	9

Sources: FSS/FISIS; IMF, World Economic Outlook database; and IMF staff calculations.  
Note: 2018 as of 2018Q3. Excludes community credit cooperatives.

**3. Financial holding companies (FHCs) play a systemically important role.** As of end-2018, nine FHCs held about 40 percent of total financial institutions' assets (114 percent of GDP) through complex networks of subsidiaries with operations across all segments of the financial system, and four FHCs have been identified as D-SIBs. The financial firms belonging to the bank holding companies operate across a broad cross-section of the financial sector, with key subsidiaries engaged in insurance, capital markets and asset management businesses.

**4. The business models of Korea's depository institutions are broadly conventional (Figure 2).** Both, banks and Other Depository Institutions (ODIs) are primarily funded by retail deposits, and assets are concentrated in loans often related to real estate. Bank loans are split equally across lending to households and firms, with about 80 percent of the stock of corporate

bank loans to SMEs. Most SME loans are collateralized against real estate and linked to floating rates. Commercial banks have a relatively diversified loan portfolio and securities' holdings while the lending activities of state-owned banks are focused on SMEs and the ailing shipbuilding sector driven by Korea's economic policy priorities. The share of foreign business in total assets remains relatively small at about 6 percent, up from 4 percent in 2013<sup>3</sup>.

**5. The insurance sector is large, highly concentrated, and saturated (Figure 3).** Insurance penetration (premiums to GDP) is one of the highest in the world, exceeded only by Taiwan and Hong Kong. This reflects, in part, the central role that life insurance has played as a conduit of savings in Korea with insurers typically offering financial consulting services and involved in asset management.<sup>4</sup> The market is dominated by large firms owned by FHCs and Korea's large conglomerates.

**6. The Korean capital market is one of the active markets in Asia.** The equity market has a market capitalization of around \$1.8 trillion with foreigners holding around 35 percent of the listed Korean stocks. The five large conglomerates account for over 50 percent of market capitalization. Compared with major advanced and emerging market economies, the price-to-book and price-to-earnings rates of Korean companies are significantly lower—this has been coined the “Korea discount” and attributed to the complicated ownership and governance structure of many Korean corporates and especially conglomerates.

**7. The Korean bond market is dominated by government and other public debt and includes green or environmental, social and governance (ESG) bonds.** Korea's asset management industry has experienced robust growth over the past few years reflecting changing saving patterns but also a search for yield by households and other investors frustrated by low bank deposit rates and yields for other traditional savings products. Assets under the management of privately placed funds, derivatives-linked securities and products such as equity-linked securities all grew fast and now amount to about KRW 500 trillion, roughly 30 percent of GDP.

<sup>3</sup> Nation-wide banks' largest exposure is to China, amounting to 1.7 percent of total assets in 2018 (1.1 percent in 2013).

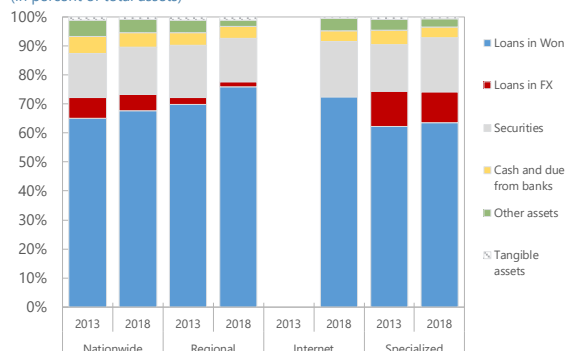
<sup>4</sup> The bancassurance market is well developed and 50 percent of new business in life is sold via banks.

**Figure 2. Korea: Depository Institutions' Business Models**

*Domestic bank assets are concentrated in domestic currency loans...*

#### Composition of Banks' Assets, 2013-18

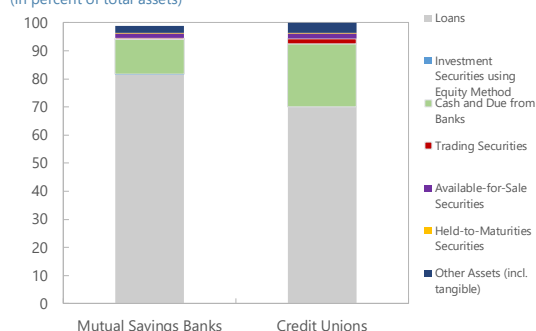
(in percent of total assets)



*Other depository corporations' assets are also concentrated in domestic lending...*

#### Other Depository Corporations' Assets

(in percent of total assets)

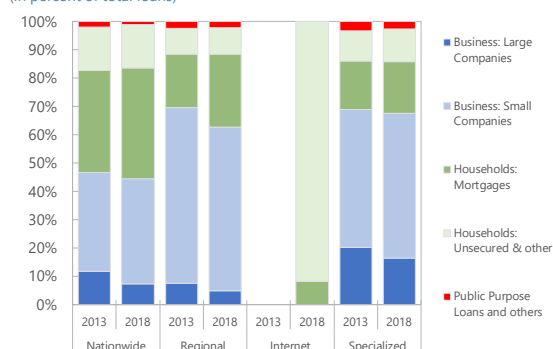


Sources: FSS/FISIS and IMF staff calculations.

*Banks' exposure to property markets has increased through their mortgage lending...*

#### Composition of Banks' Loans by Borrower, 2013-18

(in percent of total loans)

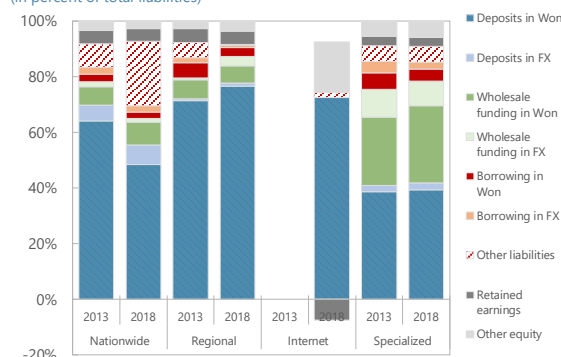


Source: FSS/FISIS and IMF staff calculations.

*.....primarily funded by deposits, exception for specialized banks which rely extensively on wholesale funding.*

#### Composition of Banks' Liabilities, 2013-18

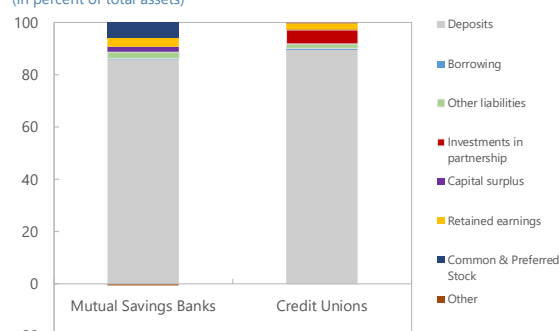
(in percent of total liabilities)



*...funded by deposits.*

#### Other Depository Corporations' Liabilities

(in percent of total assets)

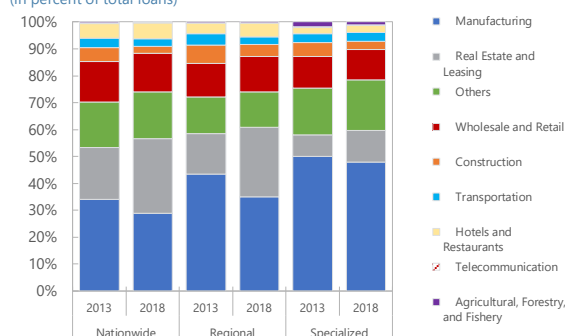


Sources: FSS/FISIS and IMF staff calculations.

*...and lending to firms for real-estate and leasing.*

#### Composition of Banks' Loans by Industry, 2013-18

(in percent of total loans)

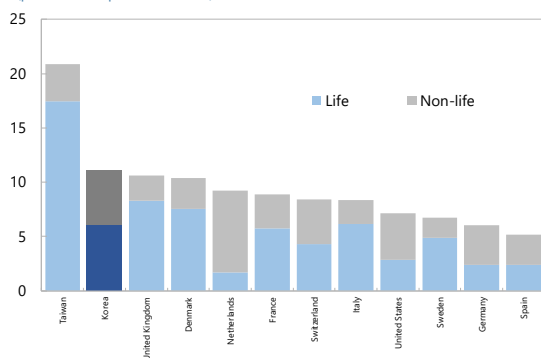




**Figure 3. Korea: Structure of the Insurance Sector**

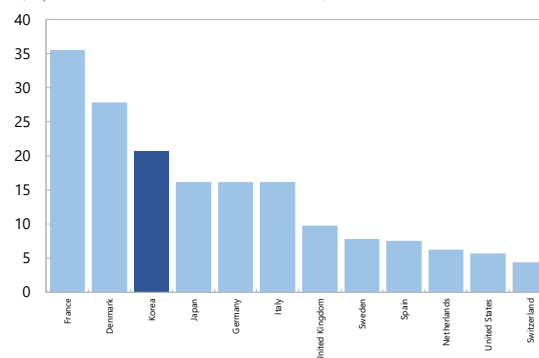
Insurance penetration in Korea is amongst the highest in the world...

#### Insurance Penetration (premiums in percent of GDP)



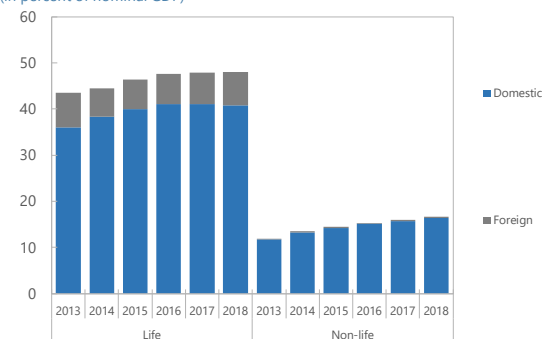
...as insurers play an important role in household wealth management, with a life insurance reserves representing a significant share of household financial assets

#### Life Insurance Reserves (In percent of total household financial assets)



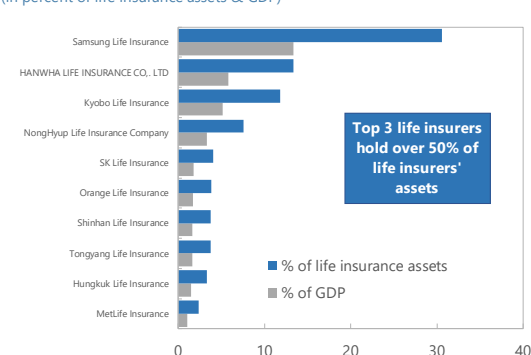
Total assets of the insurance account are sizeable, with limited foreign ownership.

#### Insurance Assets by Ownership, 2013-18 (in percent of nominal GDP)



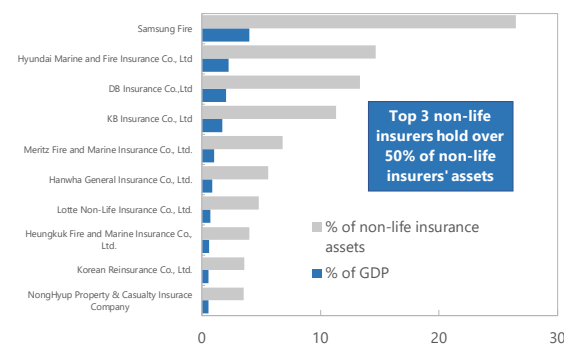
The top 3 life insurers hold over 50 percent of the life sector's assets...

#### Top Ten Life Insurers by Asset Size (in percent of life insurance assets & GDP)



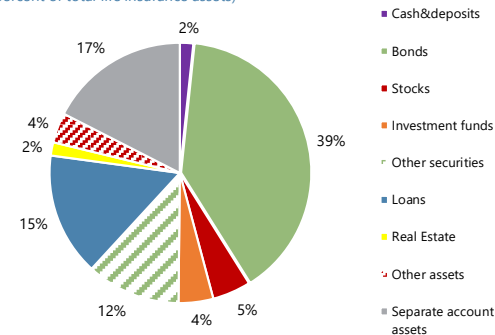
...as do the top 3 non-life insurers.

#### Top Ten Non-Life Insurers by Asset Size (in percent of non-life insurance assets & GDP)



Assets are concentrated in bonds, but loans are also sizeable.

#### Life Insurance Assets (in percent of total life insurance assets)



Sources: FSS, IMF World Economic Outlook Database, and IMF staff calculations.

## B. Macrofinancial Developments and Demographic Rotation

**8. Korea's open economy has performed well since the last FSAP but remains vulnerable to external shocks.** The export-oriented manufacturing sector, closely integrated into international supply chains and accounting for approximately a quarter of GDP, includes Korea's steel, telecommunications equipment, electronics, auto, and shipbuilding industries. Production is concentrated, with the top five conglomerates dominating the Korean stock index. Growth slowed to about 2 percent last year as Korea's large semiconductor industry experienced a cyclical slowdown. While cross-border financial flows have remained resilient, the KRW has depreciated partly on the back of trade and political tensions between the United States and China (Table 3).

**9. The financial cycle has reached an advanced phase with household debt among the highest for OECD countries.** The ratio of total non-financial private sector debt to GDP has reached an elevated level—to stand close to 200 percent—and core debt (debt of the non-financial sector owed to banks) amounts to about 130 percent of GDP, which is high in international comparison. After some deleveraging, corporate credit has picked up again, particularly to the SME sector and often secured by lending against real estate. The upward trend in house prices has moderated, but household leverage in real estate remains high. More broadly, large sections of the financial sector are exposed to the housing market. Household lending growth, primarily related to housing, has slowed but remains above nominal GDP growth while household debt as a ratio of disposable income stands at about 180 percent among the highest in OECD countries.

**10. Demographic rotation is starting to pose a long-term challenge for the Korean financial sector (Figure 5).** It is one of the most adverse world-wide and old-age poverty in Korea is highest among OECD countries. This demographic shift is raising concerns that Korea might be destined for low levels of capital formation and a prolonged period of low growth and inflation with an erosion of its financial buffers. The negative impact of demographics would typically transmit through several channels relevant for financial stability (Figure 6). The impact on banks stems from lower interest rates, a flatter yield curve, resulting in structural downward pressure on net interest income. Demand for long duration loans (mortgages) could fall due to a shrinking young population cohort. Banks would likely need to shrink their branch structure networks to reduce cost structure and offset falling interest income and increased nonbank activities.

**11. Long-term scenarios used to derive long-term forecasts show that all financial sector components except pension funds are likely to shrink or stagnate eventually.** Nation-wide, regional and specialized banks are expected to move sideward in terms of size. Non-life insurers and pension funds appear to be most dependent on the demographic scenario assumptions and may still grow somewhat. Another major implication is that the proportion of debt held by older households will increase, also reflecting reverse mortgages promoted by the KHFC, and the debt service-to-income ratio of older cohorts will rise significantly.

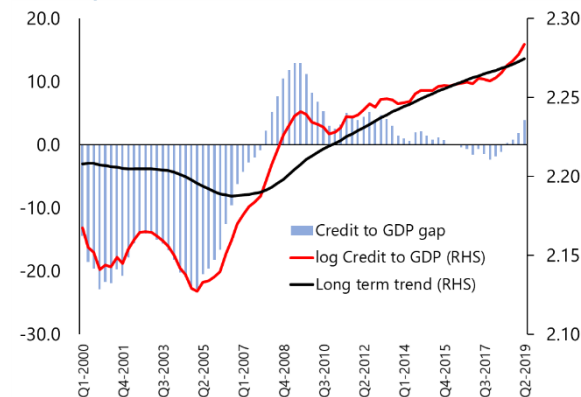
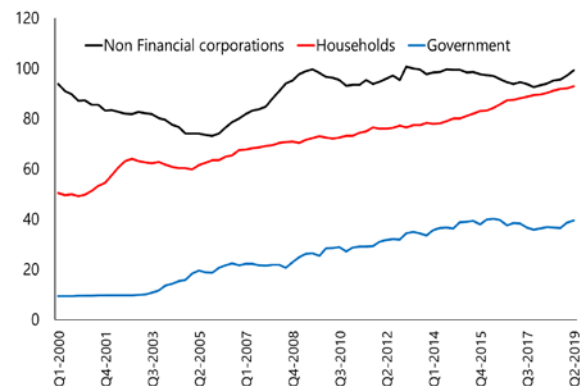
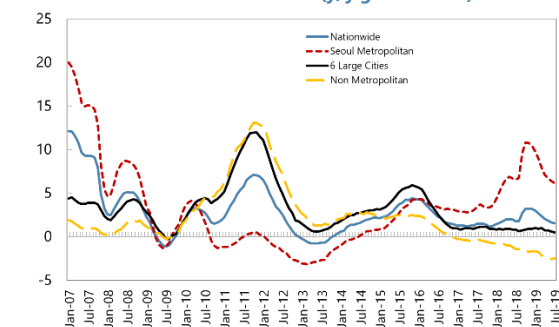
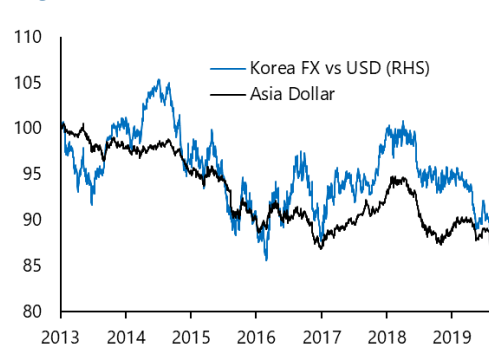
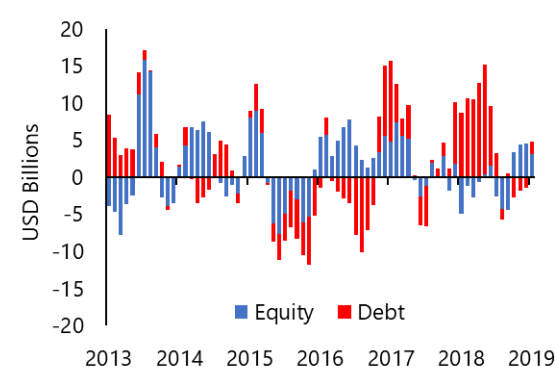
Table 3. Korea: Selected Economic Indicators, 2017–23

	2017	2018	Projections				
			2019	2020	2021	2022	2023
<b>Real GDP (percent change)</b>	3.2	2.7	2.0	2.2	2.7	2.9	2.9
Total domestic demand	5.6	1.7	2.0	1.8	2.9	3.1	3.1
Final domestic demand	5.2	1.5	1.2	3.0	2.9	3.1	3.1
Consumption	3.1	3.5	3.0	3.3	3.0	3.2	3.2
Gross fixed investment	9.8	-2.4	-2.6	2.3	2.7	2.8	2.8
Stock building 1/	0.4	0.2	0.7	-1.1	0.0	0.0	0.0
Net foreign balance 1/	-2.2	1.2	0.0	0.5	0.0	0.0	-0.1
Output gap (percent of potential GDP)	-0.7	-0.7	-1.2	-1.5	-1.3	-0.9	-0.5
<b>Saving and investment (in percent of GDP)</b>							
Gross national saving	36.9	35.8	34.6	33.5	33.3	33.0	32.7
Gross domestic investment	32.3	31.3	31.4	30.6	30.4	30.1	29.8
Current account balance	4.6	4.4	3.2	2.9	2.9	2.9	2.9
<b>Prices (percent change)</b>							
CPI inflation (end of period)	1.4	1.3	0.7	0.9	1.4	1.8	1.9
CPI inflation (average)	1.9	1.5	0.5	0.9	1.4	1.8	1.9
Core inflation (average)	1.5	1.2	...	...	...	...	...
GDP deflator	2.2	0.5	-0.9	0.1	1.1	1.6	1.8
Real effective exchange rate	3.1	0.9	...	...	...	...	...
<b>Consolidated central government (in percent of GDP)</b>							
Revenue	21.8	23.0	22.9	22.6	22.7	22.8	22.8
Expenditure	19.6	20.4	22.1	23.4	24.0	24.1	24.2
Net lending (+) / borrowing (-)	2.2	2.6	0.7	-0.8	-1.3	-1.3	-1.4
Overall balance	1.3	1.6	-0.3	-1.8	-2.4	-2.4	-2.5
Excluding Social Security Funds	-1.0	-0.6	-2.6	-4.1	-4.5	-4.4	-4.4
Structural primary balance	1.4	1.7	0.3	-0.9	-1.3	-1.3	-1.3
Fiscal impulse (+ expansionary)	-0.3	-0.4	1.4	1.2	0.4	0.0	0.0
General government debt	37.7	37.9	40.1	43.4	46.4	49.0	51.3
<b>Money and credit (end of period)</b>							
Overnight call rate	1.6	1.9	...	...	...	...	...
Three-year AA- corporate bond yield	2.7	2.3	...	...	...	...	...
Credit growth	6.3	6.1	5.9	5.9	5.9	5.9	5.9
M3 growth	6.6	7.2	...	...	...	...	...
<b>Balance of payments (in billions of U.S. dollars)</b>							
Exports, f.o.b.	580.3	625.4	578.0	570.1	592.2	619.6	648.1
Imports, f.o.b.	466.7	513.6	500.7	501.2	521.8	545.3	571.4
Current account balance	75.2	76.4	52.8	46.4	49.5	51.5	55.0
Export volumes	5.3	6.1	-2.4	3.0	3.5	3.6	
Import volumes	8.6	1.6	-1.9	1.7	3.9	4.0	
Terms of trade	-0.4	-5.9	-4.8	-2.7	0.2	0.5	0.3
Gross international reserves (eop; excl. gold)	384.5	398.9	399.9	396.4	400.8	410.1	424.9
In percent of short-term debt (residual maturity)	227.2	226.8	220.5	212.2	207.5	205.7	206.8
<b>External debt (in billions of U.S. dollars)</b>							
Total external debt (end of period)	412.0	448.8	487.8	530.1	576.5	626.1	678.8
Total external debt (in percent of GDP)	25.4	26.1	29.9	32.6	33.9	35.0	36.0
Debt service ratio 2/	8.2	8.8	10.1	10.9	11.6	12.3	12.8

Sources: Korean authorities; and IMF staff estimates and projections, as of October 2019.

1/ Contribution to GDP growth.

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

**Figure 4. Korea: Macrofinancial Risks***Financial conditions have slightly tightened...***Financial Conditions Index (IMF GFSR methodology)***...while the credit gap has turned slightly positive again***Credit Gap***Leverage has increased significantly for households...***Debt in % of GDP***...on the back of a strong housing market.***Kookmin Bank House Price Indices (y/y growth in %)***KRW has caught up with Asian peers...***Exchange Rates***...while portfolio flows have held up so far despite the recent global trade frictions and tech downturn***Portfolio Flows**

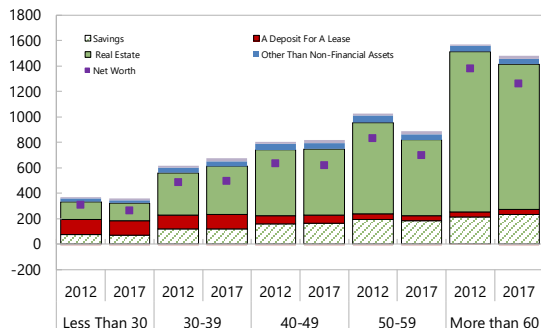
Source: Bloomberg, IIF, BIS, Haver, IMF staff estimates

**Figure 5. Korea: Demographics Shifts and Household Debt**

*HH assets have fallen since 2013 and remain concentrated with the older aged.*

#### Assets Holdings, By Age

(In percent of disposable income)

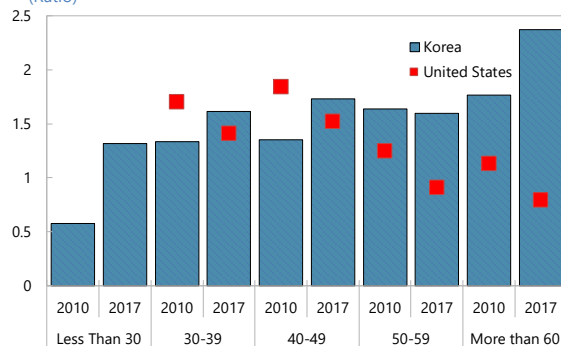


Sources: Korea Survey of Household Finances and Living Conditions and IMF staff calculations.

*Engagement with the credit market does not necessarily decline with age, as with other advanced economies.*

#### Debt-to-Income, by Age

(Ratio)

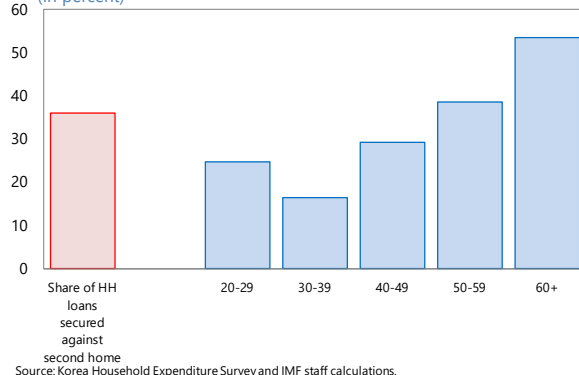


Sources: CEIC and Federal Reserve Consumer Survey of Finance and IMF staff calculations.

*A significant share of HH debt is secured against a second property, most of which is concentrated in older aged HHs.*

#### HH Debt Secured on Second Property

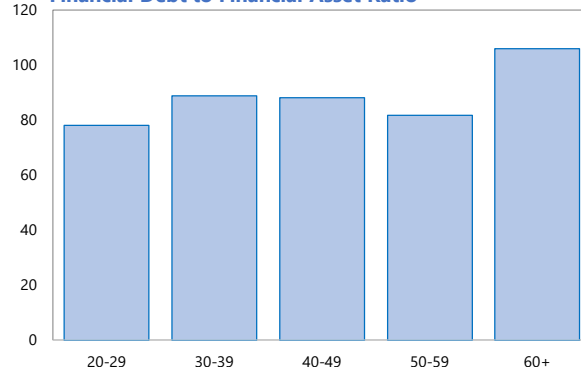
(In percent)



Source: Korea Household Expenditure Survey and IMF staff calculations.

*HH leverage tends to rise with age.*

#### Financial Debt to Financial Asset Ratio

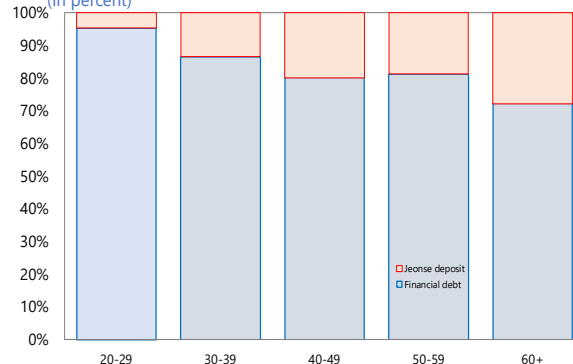


Source: Korea Survey of Household Finances and Living Conditions and IMF staff calculations.

*Older aged HHs are also more likely to have a Jeonse deposit debt.*

#### HH Debt Decomposition by Age Groups

(In percent)

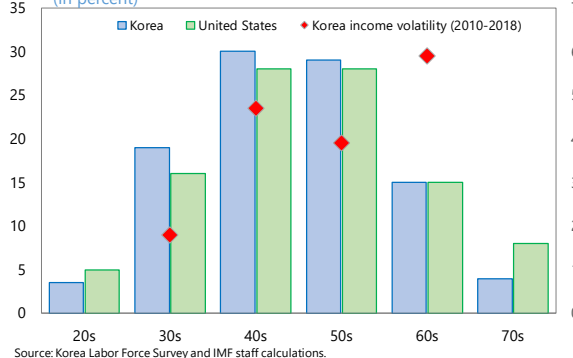


Source: Korea Survey of Household Finances and Living Conditions and IMF staff calculations.

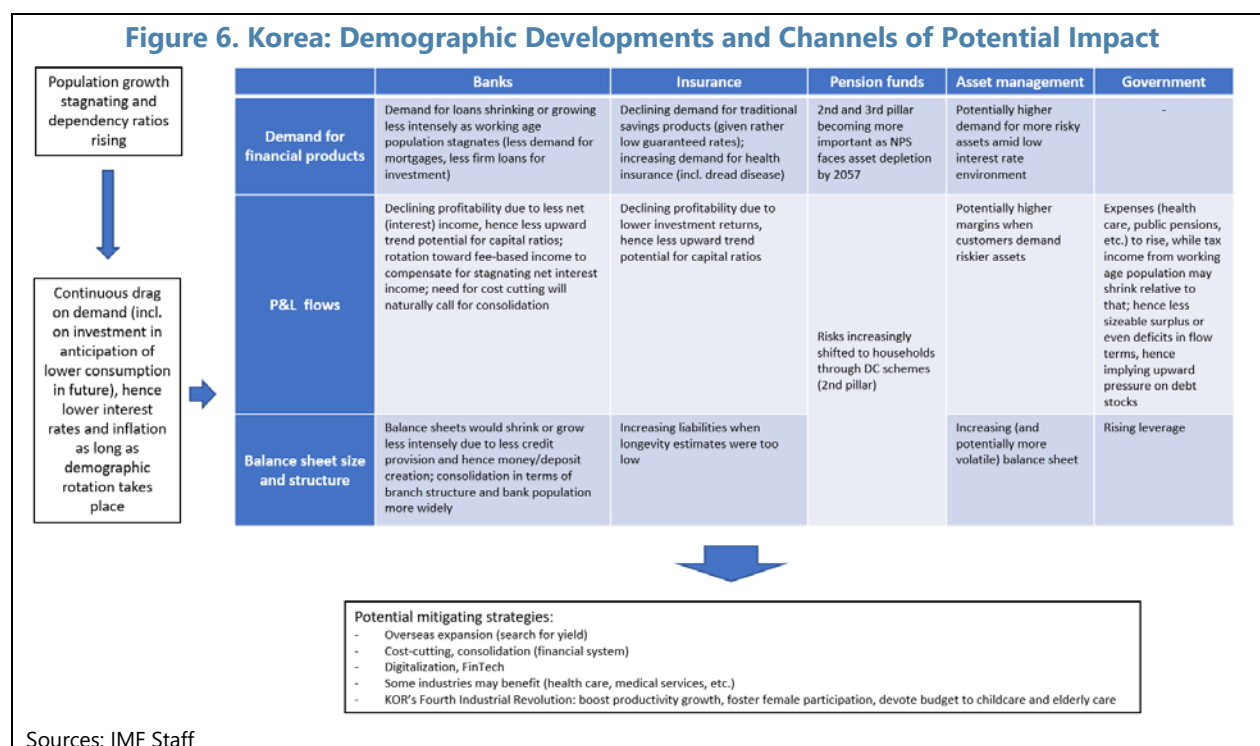
*Korean HHs suffer a sharper fall in income following retirement while income volatility tends to rise.*

#### Household Annual Income Ratio

(In percent)



Source: Korea Labor Force Survey and IMF staff calculations.



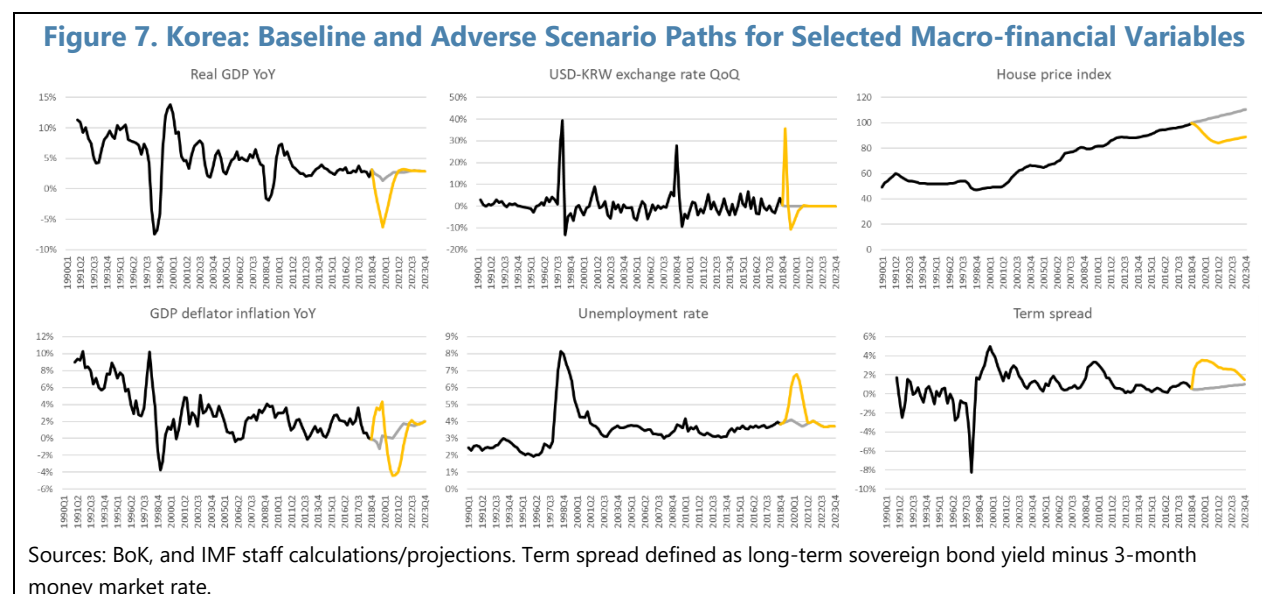
## SYSTEMIC RISK ANALYSIS

**12. Several vulnerabilities could amplify shocks in Korea.** The FSAP analysis points to five sources: (i) high household leverage and housing market structure; (ii) corporate debt; (iii) liquidity risks including for FX; (iv) structural shifts towards digital finance and technology; and (v) longer-run risks from demographic transition on life insurers and real estate market.

**13. The potential shocks stem from spillovers from trade tensions, a protracted global growth slowdown, and tightening of global financial conditions.** The FSAP's quantitative risk assessment is based on the October 2019 WEO forecast and an adverse scenario over a five-year horizon. The adverse scenario narrative and calibration was rooted in the assumed escalation of global trade tensions, which would hit Korea hard due to its strong export orientation and limited export diversification. The scenario was assumed to entail a broad-based, world-wide sell-off in equity markets, reflecting a general fall in investors' risk appetite and significant capital outflows, coupled with strong currency depreciation, due to Korea's close ties with China in terms of trade, and hence being close to the epicenter of the escalating trade tensions. Korea's term and risk premia would widen markedly, house prices drop materially, and the exchange rate depreciate while its economy fall into severe recession (Figure 7).

**14. The rapid rise in COVID-19 virus cases in South Korea since February 2020 likely implies a significant, though hopefully only temporary, drag on economic activity, which is being tempered by a proactive policy response of Korea's government.** The authorities have

taken bold steps to contain the COVID-19 outbreak and mitigate its impact on the population, including through large-scale testing of the population to rapidly identify, isolate, and treat infected patients. The government is also using its fiscal space to mitigate the macroeconomic impact of the outbreak, including through a proposed KRW 11.7trn (0.6 percent of GDP) supplementary budget that provides resources to step up disease control efforts, support small merchants and SMEs, provide transfers to sustain consumption and employment, and support local economies hit hardest by the spread of COVID-19. The FSAP team's assessment is that the adverse FSAP macro-financial scenario is severe enough to encapsulate a COVID-19 implied fallout on economic activity, both in terms of depth and duration of the shock (the scenario's deep downturn spans over two full years before normalizing).



## A. Household Debt and the Housing Market

**15. Over the medium term, elevated household debt and growing balance sheet vulnerabilities pose a risk to financial stability.** First, approximately 50 percent of household debt is linked to floating interest rates and structured as bullet payments. Bullet loans are riskier than traditional installment loans because of the large payment due at the end. Second, over 30 percent of debt is held by households that have a debt service ratio above 40 percent. Third, household balance sheets have weakened since 2010 as leverage and debt service ratios have risen. Fourth, on both the asset (via real-estate investments) and liability side (via a Jeonse deposits), household balance sheets are vulnerable to real-estate price fluctuations. Fifth, around one-quarter of the total stock of debt is held by households who are retired or close to retirement. Finally, a significant share of household debt is secured against a non-primary residence.

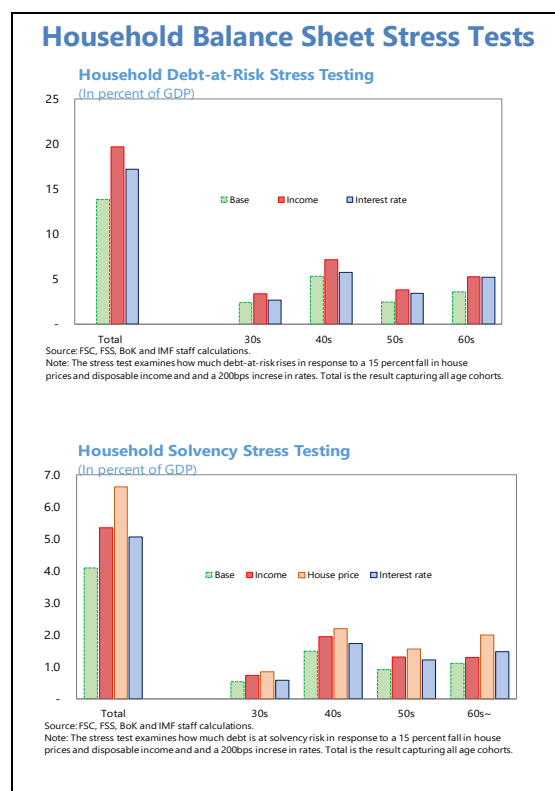
**16. House prices, thus far, appear to have developed in line with fundamentals at the national level, but regional pockets of vulnerabilities are on the rise.** While price-to-income

and price-to-rent measures do not suggest overvaluation at the national level, a model-based valuation, based on regional data, points to some overvaluation in the Seoul market (Figure 8).

**17. The leasehold deposit market (Jeonse) is a unique aspect of the Korean financial system and a potential vulnerability for the Korean real estate market.**<sup>5</sup> Jeonse tenants give landlords a deposit equivalent to an average about 50-70 percent of the house value (“Jeonse price”) that is to be paid back to the tenant at the end of the two-year contract, if the lease contract is not extended. In lieu of rental income, Jeonse landlords rely on rising house prices and the financial return from investing the Jeonse deposit if they do not use it to finance the property instead of or in addition to a mortgage. According to a recent BoK study, 78 percent of landlords could cover the financing gap resulting from a 20 percent fall in the Jeonse deposit price with other financial assets while 22 percent would need additional loans. This suggests the need for continued vigilance on: (i) rollover risk of Jeonse contracts; (ii) potential claims on the state in case of wide-spread defaults and social pressure; and (iii) potential amplification of house price shocks through adverse conditions in the Jeonse market. The potential vulnerability associated with household leverage related to Jeonse leasing---possibly in addition to bank debt---could be mitigated by policy measures limiting, for example, the combined value of mortgage and Jeonse deposits.

**18. The state backstops housing market risks and the consequent contingent liabilities could potentially be large.** The KHFC securitizes long-term mortgages and total MBSs issued and guaranteed by the KHFC amounts to KRW 116trn. The KHFC also offers several guarantees on housing related loans and reverse mortgages to low-income pensioners. Therefore, contingent liabilities could amplify under the adverse scenario of a recession featuring a severe correction of house prices. A general lack of transparency regarding the state’s total contingent liabilities related to the housing market makes it hard to determine whether current capital buffers are adequate.

**19. Household balance sheet vulnerabilities have grown heterogeneously, particularly across age cohorts, and ongoing demographic shifts will increase household debt risks** (Figures 9 and 10). Almost one-fifth of household debt is held by retirees. As households age income volatility tends to rise while seniors also experience a large fall in income.



<sup>5</sup> The Jeonse market had an approximate value of 757bn USD end-2019, equivalent to 40 percent of GDP.

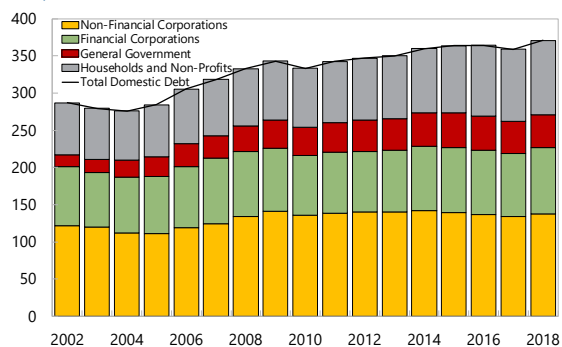


**Figure 8. Korea: Household Balance Sheet and House Price Developments**

Korean leverage has risen due to higher HH debt...

### Debt

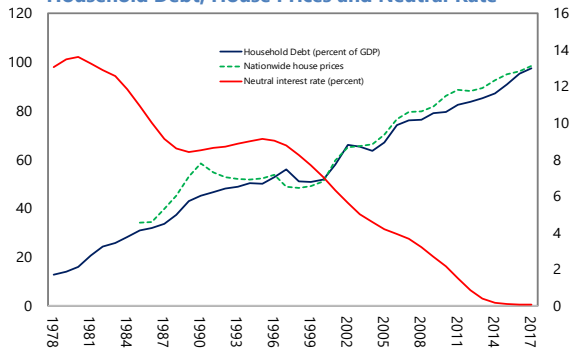
(In percent of GDP)



Sources: Haver Analytics.

HH debt is closely tied to real-estate...

### Household Debt, House Prices and Neutral Rate

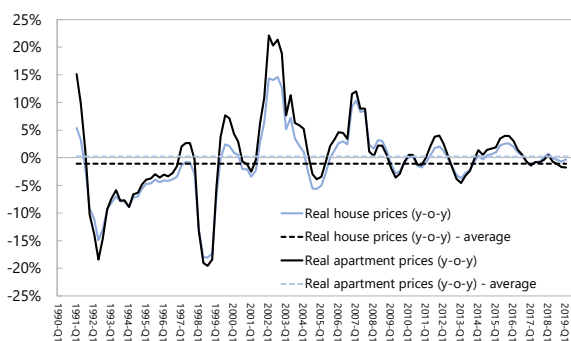


Source: Authorities data, IMF staff calculations

National house price growth has stabilized since the GFC...

### Korean nominal house and apartment prices y-o-y

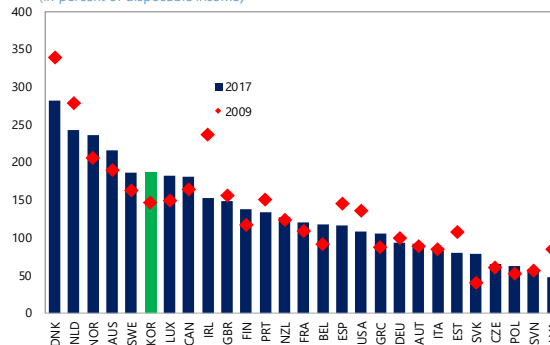
(Percent)



...which is higher than the OECD average....

### Household Debt

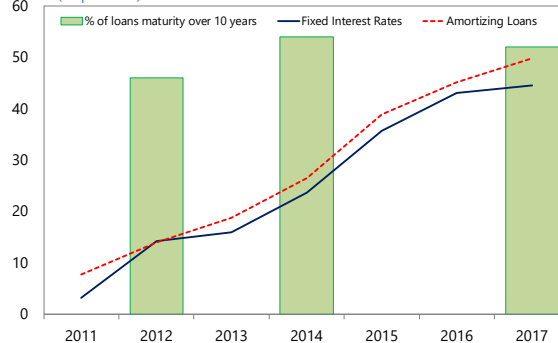
(In percent of disposable income)



...and around 50 percent of mortgages have floating rates, and bullet payment structures.

### Bank Mortgages

(In percent)

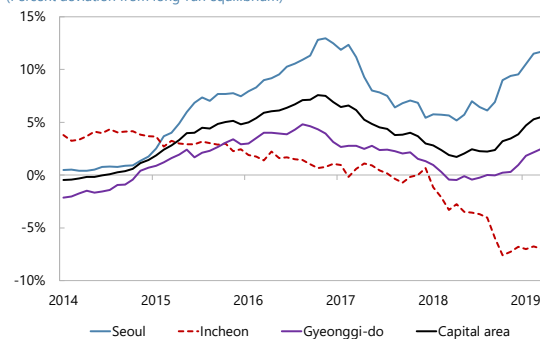


Source: Bank of Korea and CEIC.

...but house prices could be overvalued in some regions.

### Model-based valuation measure, capital area apartments

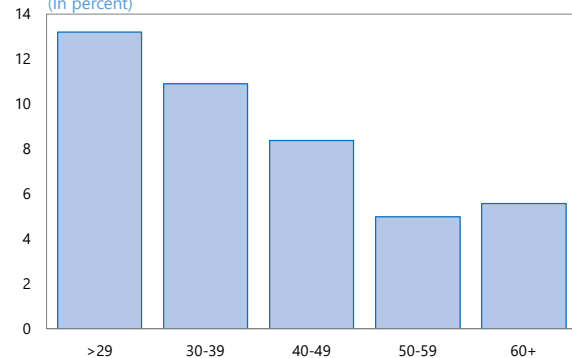
(Percent deviation from long-run equilibrium)



**Figure 9. Korea: Household Balance Sheet Vulnerabilities and Demographics**

Since 2011 HH debt has grown quickest for younger age groups...

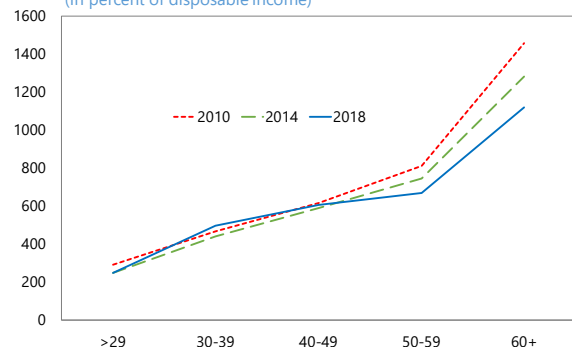
**Average Growth in Household Debt (2011-2018)**  
(In percent)



Source: Korea Survey of Household and Living Conditions and IMF staff calculations.

Household net worth has risen greatest for younger aged households and fallen most for older aged households.

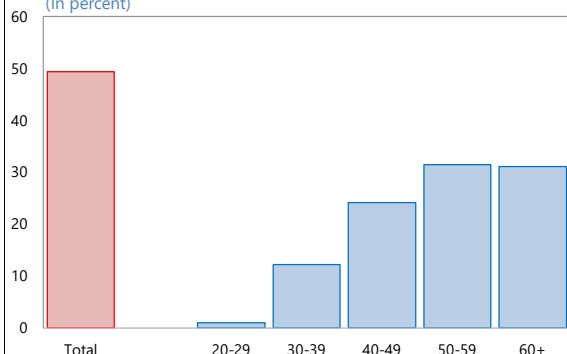
**Net Worth**  
(In percent of disposable income)



Source: Korea Survey of Household and Living Conditions and IMF staff calculations.

Around 50 percent of loans are structured as bullet payments and are concentrated in older aged cohorts.

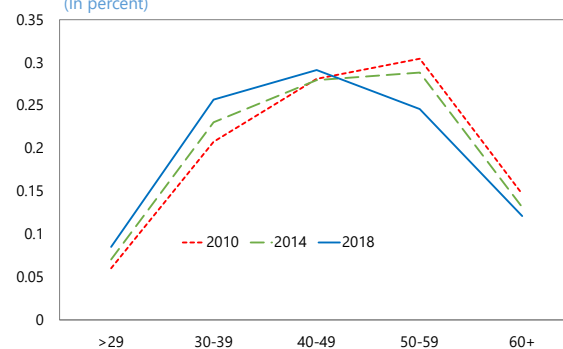
**Distribution of Bullet Loans**  
(In percent)



Source: Korea Household Expenditure Survey and IMF staff calculations.

... which has shifted the distribution of household debt.

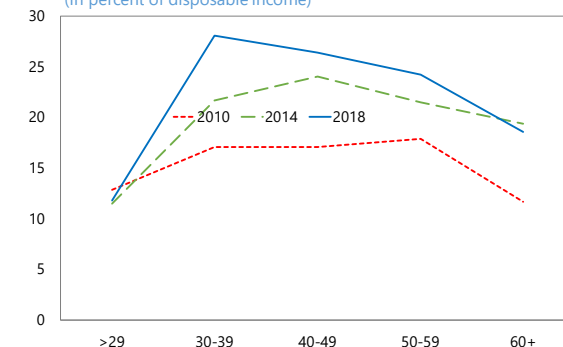
**Distribution of Household Debt**  
(In percent)



Source: Korea Survey of Household and Living Conditions and IMF staff calculations.

Since 2010 household debt servicing has risen for all age groups, reflecting higher leverage.

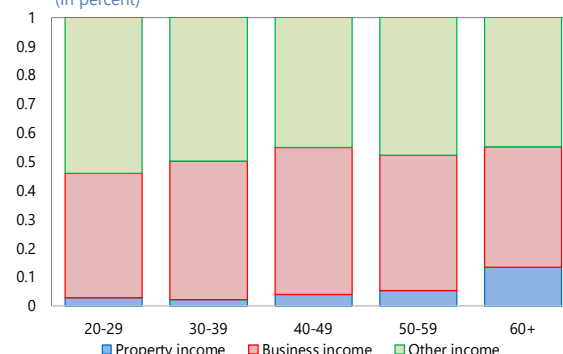
**Debt Service Ratio**  
(In percent of disposable income)



Source: Korea Survey of Household and Living Conditions and IMF staff calculations.

Households are mainly reliant on salaried income, but this declines slightly with age.

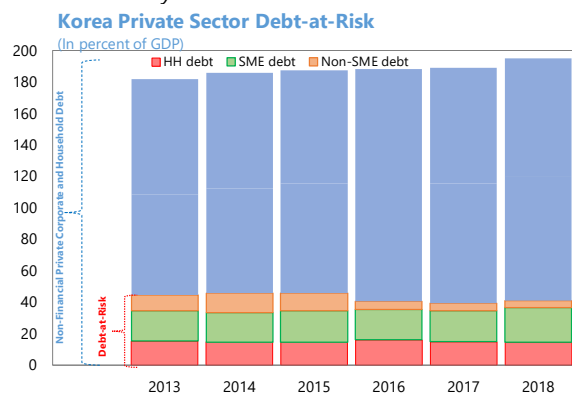
**Distribution of Income Across Age Groups**  
(In percent)



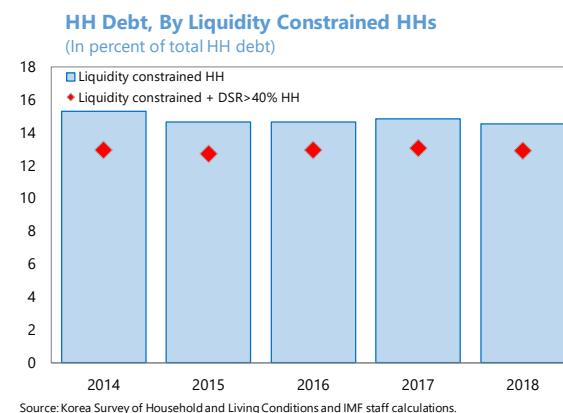
Source: Korea Household Expenditure Survey and IMF staff calculations.

**Figure 10. Korea: Household Debt-at-Risk**

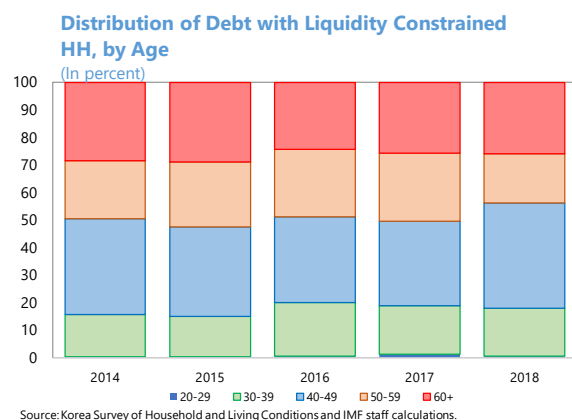
*Around one-third of the share of total non-financial debt at-risk is held by the household sector.*



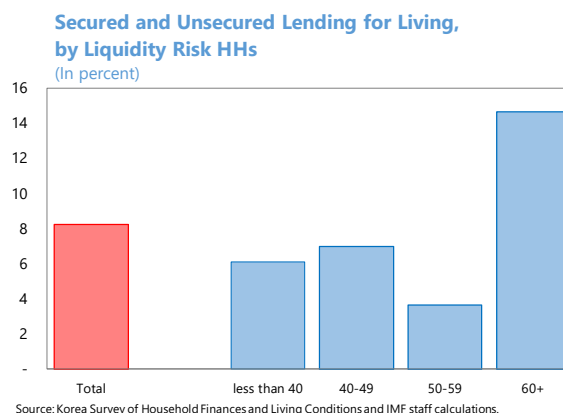
*Around 15 percent of HH debt is registered at-risk...*



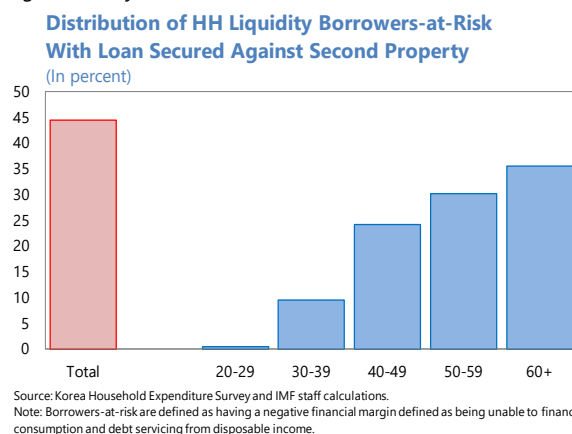
*...of which around one-quarter is held by retirees.*



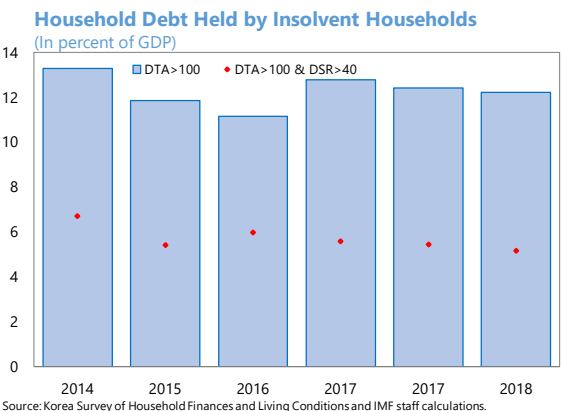
*Around 50 percent of debt-at-risk HH's have unsecured borrowing for living and property expenses...*



*...and loans secured against a second property, and once again mostly retirees.*



*Around 13 percent of household debt is held with households that have a debt-to-asset ratio above 100%.*



**20. Around 16 percent of total household debt is currently registered ‘at-risk’ and around 13 percent at immediate solvency risk.** Around 4 percent of household debt is held by households who are both at solvency risk (defined as having a debt-to-asset ratio above 100) and liquidity constrained.<sup>6</sup> Higher household leverage ratios—debt-to-income and loan-to-value ratios, collectively known as the double trigger of mortgage default—are associated with a higher probability that a household’s debt is at-risk. Household stress tests, done jointly with the BoK, suggest that the amount of debt held with liquidity constrained insolvent households will rise following an adverse income (house price) shock from around 4 to 5.6 (7.1) percent of GDP. The impact of shocks on household balance sheets grow with age, with retiree households most at risk from a hike in interest rates.

## B. Non-Financial Corporate Sector Vulnerabilities

**21. Korean non-financial corporate debt (about 100 percent of GDP) is higher than the G20 average and one quarter appears “at-risk”, which mostly resides with SMEs (Figure 11).** The debt of larger firms is concentrated in market-based instruments, while SMEs (about 35 percent of total corporate debt) are largely funded by bank credit. Despite strong global trade growth since 2013 there has been an increase in the number of firms reporting (i) a negative ROA, (ii) negative revenue growth, (iii) insufficient liquidity and (iv) an interest coverage ratio below 1. Corporates are most vulnerable to a slowdown in global growth coupled with higher funding costs, while a weaker exchange rate would have a limited impact on corporate balance sheets, given low FX debt and natural hedges.<sup>7</sup> Balance sheet stress tests show a rise in corporate debt-at-risk (where earnings before interest and taxes are less than their interest expenses) under the adverse scenario, although total credit losses would likely remain contained reflecting large cash buffers.<sup>8</sup>

**22. The statutory framework for corporate debt resolution (including for SMEs) could be a mitigating factor in an adverse scenario.** The efficiency of in-court procedures has improved with the establishment of the Seoul Bankruptcy Court in 2017. Key challenges to effective reorganization are delays in filing which negatively impact the possibility of successful business rescue; and the difficulties in securing post-commencement financing for companies undergoing rehabilitation. The framework could benefit from establishing an insolvency practitioner profession, including to ensure that the highly supervised judge-led institutional framework does not become gridlocked with a high volume of cases in a crisis.

<sup>6</sup> Debt is considered “at-risk” if held by liquidity constrained households, defined as being unable to meet consumption, debt servicing payments, and monthly rent from disposable income and highly liquid savings.

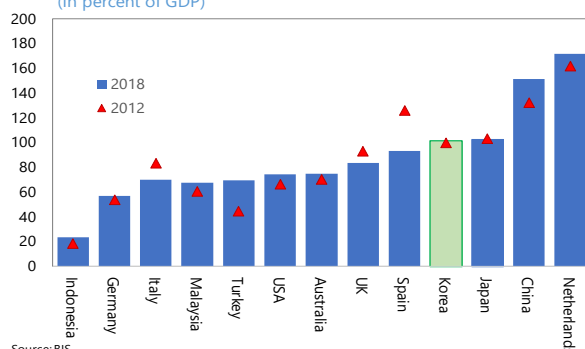
<sup>7</sup> Since the GFC, FX onshore corporate debt has declined to about 4 percent of bank loans and 11 percent of market-based debt.

<sup>8</sup> Based on data for listed corporates. There are some concerns about the reliability of SME balance sheet data and profit and loss statements.

**Figure 11. Korea: Corporate Leverage and Debt Structure**

Corporate debt is slightly higher than peers.

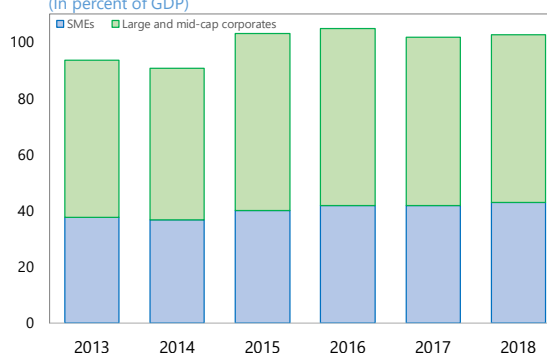
#### Private Non-Financial Corporate Core Debt (In percent of GDP)



Source: BIS.

Most debt is held by large firms relying on market finance.

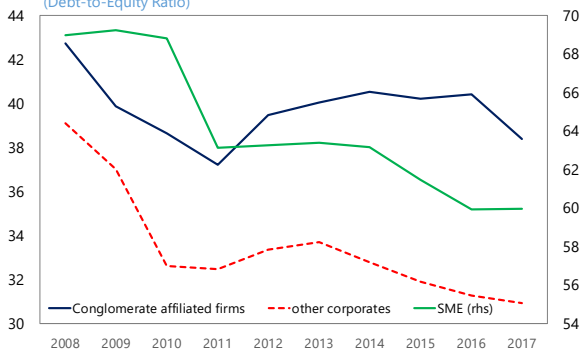
#### Corporate Debt (In percent of GDP)



Source: Orbis, Bank of Korea and IMF staff calculations.

Leverage is higher among conglomerate-affiliated firms.

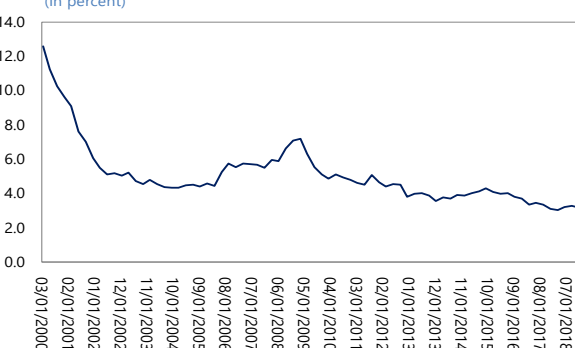
#### Firm Leverage (Debt-to-Equity Ratio)



Source: Orbis, KIS Value and IMF staff calculations

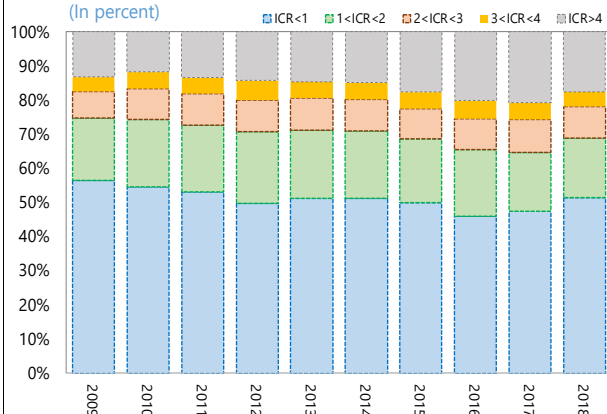
Corporate FX borrowing is low.

#### Share of FX Credit in Total Bank Credit (In percent)



Around 50 percent of SME debt is at-risk...

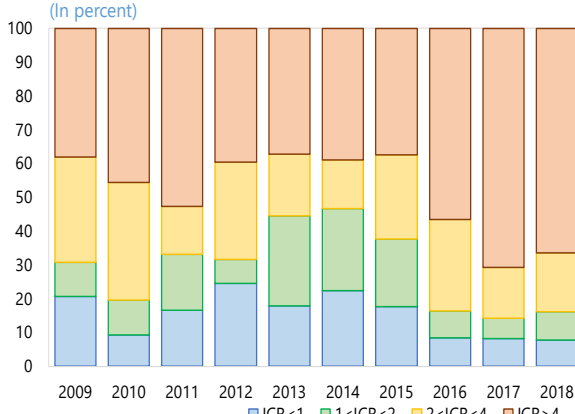
#### SME Debt-at-Risk (In percent)



Source: KIS Value and IMF staff calculations.

...with the share much lower for listed firms.

#### Distribution of Debt by ICR (In percent)



Source: Orbis and IMF staff calculations.

## C. Fintech Vulnerabilities

**23. The Korean payment services market is changing in ways implying new potential risks and vulnerabilities.** Payments innovation is driven by large technology firms. To facilitate innovation, the authorities have introduced an “open banking” system, requiring Korean commercial banks to open their payment network to fintech payment service providers and other commercial banks upon customer consent; parallel initiatives are being introduced to clarify and relax the legal frameworks for electronic financial transactions and use of personal data. New fintech entrants might improve efficiency and customer choice in payment services but new risks could arise such as increasing interconnectedness and complexity in the financial sector, greater operational risk, and negative impact on the profitability of incumbent banks.

**24. Implied financial stability risks should be monitored in terms of solvency, systemic liquidity, and system-wide operational risks.** Fintech developments in Korea may evolve in ways that drive up market concentration in the payment system, and potentially crowd out innovative business models as large technology firms already enjoy significant network effects. Banks will face higher competition, which may imply pressure on their income (see Box 1). Systemic liquidity dynamics and emerging system-wide operational risks need to be monitored. In fully implementing the “open banking system”, including its legal foundation, heightened attention is needed on security and operational risks that accompany the greater sharing of data and growing connectivity among diverse market players.

## D. Banking Sector Solvency

**25. Korean banks have been improving their capital positions and asset quality (Table 4, Figure 12).** Banks’ aggregate capital ratio at about 16 percent of risk-weighted assets does not stand out compared to other banks in the region<sup>9</sup>. NPL ratios are structurally low but must be interpreted cautiously because banks sell NPLs swiftly into a liquid market for distressed assets. Korean banks underperform their regional peers in terms of profitability (Figure 13). Nation-wide banks’ asset exposures are diversified, regional banks’ and mutual savings banks’ (MSBs) exposures are concentrated in SME lending, and ODI’s lending is concentrated in consumer credit (Figure 14).

**26. The banking system appears resilient under an adverse macro-financial scenario.** The FSAP conducted a top-down dynamic balance sheet solvency analysis with a five-year horizon for the Korean banking system. The analysis was based on public and supervisory data for 24 banks, covering 95 percent of banking system assets at end-2018 with sub-aggregates for the ODI category (Credit Unions, MSBs, credit cooperative banks). A few regional, specialized banks and ODIs face the biggest capital losses (Figure 15). All banks’ capital ratios would stay above regulatory minima when allowing the consumption of the capital conservation buffer (CCB). The risk-weighted

<sup>9</sup> On average across nation-wide, regional and policy banks, aggregate risk weights fell by about 6 percentage points since 2013 (63 percent at end-2013, 57 percent at end-2018). The fall is attributed to a fall in risk parameters over the past years. For the same group of banks, the IRB in total exposure share equals 64 percent at end-2018.

CET1 ratios of nation-wide, regional, and specialized banks fall by 3.4, 3.5 and 4.9 percentage points up to the low point. The banking system-wide loss shares under the adverse scenario amount to 60, 30, 2, and 8 percent, for corporates, households, the sovereign, and a residual category, respectively. The lower share for households reflects partly the mortgage insurance schemes which protect the banks' capital and provide relief in terms of risk weight densities.

**27. Pressure on bank profitability and eventually capital ratios, however, may grow as competition with Fintech intensifies while demographic rotation becomes firmer.** A "Fintech Overlay" (Box 1) to the solvency analysis shows that regional banks, ODIs and selected specialized banks would be most adversely affected by intensifying competition due to the "Open Banking" and e-money developments with regional banks' capital ratios falling by 0.6 to 1.3 percentage points below the baseline. In the longer term, an aging population may require further adjustment of bank business models and possibly more consolidation as savings and lending patterns change.

**Table 4. Korea: Core Financial Soundness Indicators, 2013–18**

	2013	2014	2015	2016	2017	2018
	(In percent)					
<b>Core FSIs</b>						
Regulatory capital to risk weighted assets	14.5	14.0	13.9	14.8	15.2	15.4
Regulatory Tier 1 capital to risk-weighted assets	11.4	11.4	11.7	13.1	13.1	13.3
Non-performing loans net of provisions to capital	3.6	2.8	2.1	2.1	1.7	1.3
Non-performing loans to total gross loans	0.6	0.5	0.5	0.5	0.4	0.3
Return on assets	0.3	0.5	0.5	...	0.7	0.8
Return on equity	4.0	6.0	6.6	...	8.5	9.8
Interest margin to gross income	82.2	62.1	62.9	65.0	58.7	65.1
Non-interest expenses to gross income	75.3	73.5	59.6	65.4	65.6	63.2
Liquid assets to total assets	33.8	37.9	34.4	32.9	29.9	31.2
Liquid assets to short-term liabilities	107.9	122.0	105.0	102.6	101.2	114.5
Net open position in FX to capital	-0.2	0.5	0.0	0.0	-1.0	0.0
<b>Sectoral distribution of loans</b>						
Domestic residents	92.5	92.5	91.0	92.6	92.6	92.7
Deposit takers	3.5	4.0	3.7	3.6	4.3	3.7
Central bank	0.4	0.6	0.5	1.2	0.5	0.2
Other financial corporations	0.8	0.7	0.8	0.9	1.1	1.5
General government	0.6	0.8	1.0	2.0	0.7	0.5
Nonfinancial corporations	50.7	50.0	48.7	49.5	46.1	45.4
Households	36.5	36.3	36.3	35.3	39.9	41.3
Nonresidents	7.5	7.5	9.0	7.4	7.4	7.3
<b>Additional FSIs</b>						
Capital to assets (leverage ratio)	8.3	8.1	8.0	7.9	8.0	8.0
Large exposures to capital	72.9	64.4	70.0	46.6	37.9	34.7
Gross assets position in derivatives to capital	15.0	16.6	17.0	20.2	17.1	9.9
Gross liabilities position in derivatives to capital	16.8	17.8	18.5	21.9	18.0	10.9
Trading income to total income	2.5	5.8	9.3	8.4	6.2	6.0
Personnel expenses to total income	32.2	32.5	41.5	38.2	31.6	34.3
Customer deposits to total non-interbank loans	84.1	81.6	76.0	71.2	75.4	74.0
FX loans to total loans	12.8	13.4	12.2	11.7	10.9	10.9
FX liabilities to total liabilities	14.3	14.6	13.7	11.6	13.2	13.0

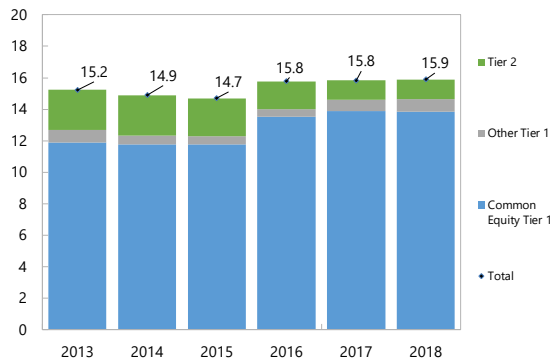
Sources: Korean Ministry of Economy and Finances

**Figure 12. Korea: Financial System Performance**

Capitalization of Korean banks has improved with the implementation of Basel III...

#### Capital Adequacy

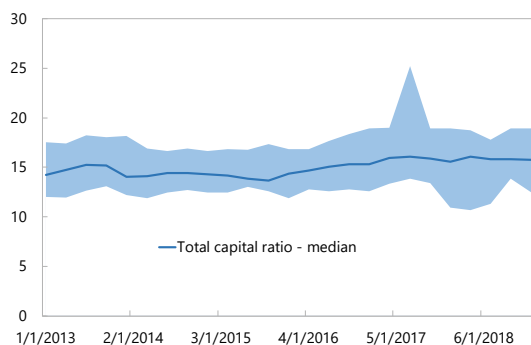
(Commercial banks, in percent of risk-weighted assets)



...and across Korean commercial banks.

#### Capital Adequacy

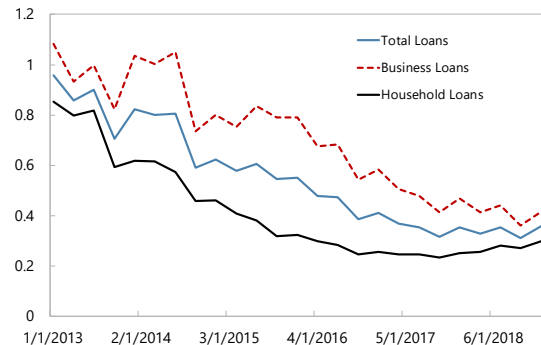
(Commercial Banks, total capital in percent of risk-weighted assets)



NPLs are low across all loan categories...

#### Bank Asset Quality

(Non-performing loans in percent of total loans, commercial banks)



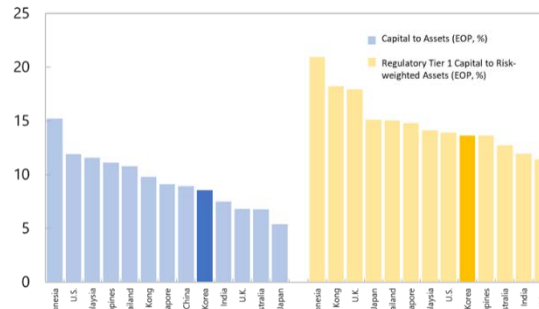
Sources: FSS, Haver, and IMF staff calculations.

<sup>1</sup> Korea data is for commercial banks.

...and capital is of high quality compared to a broad set of comparator countries.

#### Capital Adequacy and Leverage

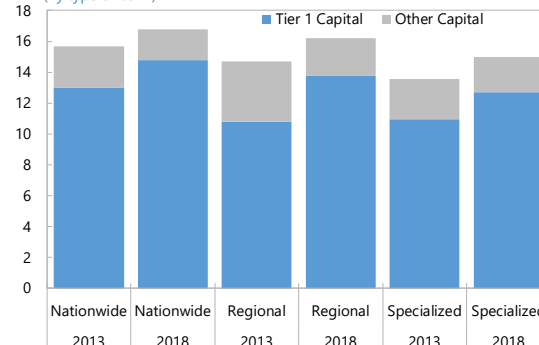
(Commercial banks, 2019Q2 or latest, in percent)



Specialized banks have seen also some improvement in capital adequacy but from a lower base.

#### Capital Adequacy

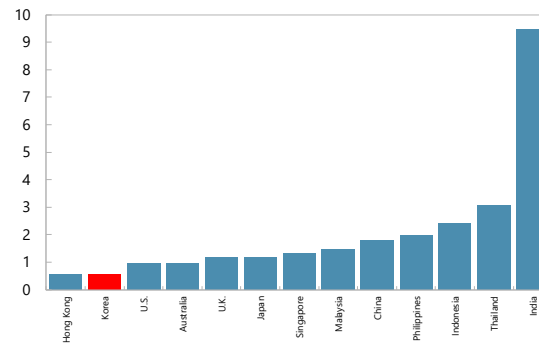
(By type of bank)



...and in comparison, to other countries reflective of rapid disposable of bad loans to asset management companies.

#### Bank Asset Quality 1/

(Non-performing loans in percent of total loans, 2019Q1 or latest)



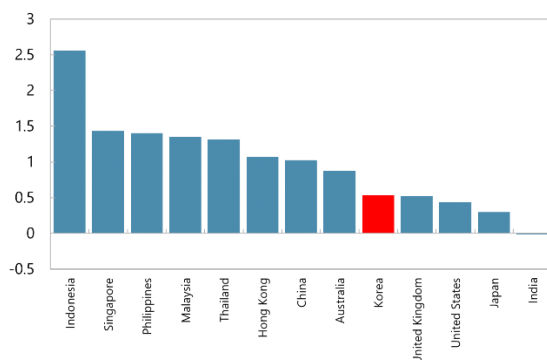


**Figure 13. Korea: Bank Profitability (Significant Institutions):<sup>1</sup> Key Trends**

Korean banks have experienced low profitability relative to other advanced and neighboring economies.

#### Return on Assets (ROA)<sup>2</sup>

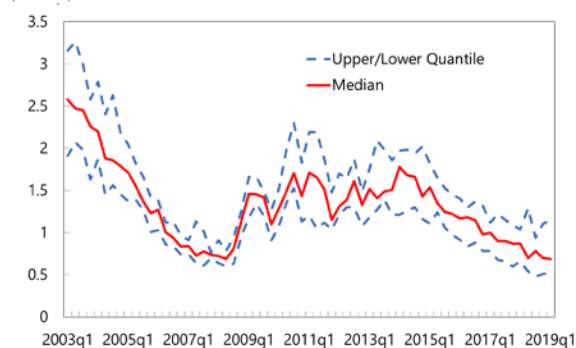
(Percent, 2019Q1 or latest)



Bank asset quality has been improving since 2013, though there has recently been some dispersion across banks.

#### NPL ratio

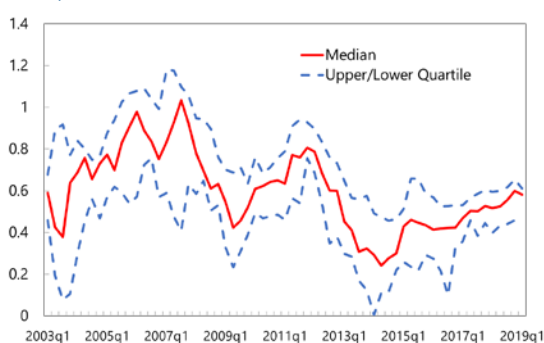
(Percent)



While NPL ratios are dispersed across banks, there is no significant dispersion in profitability...

#### Return on Assets (ROA)

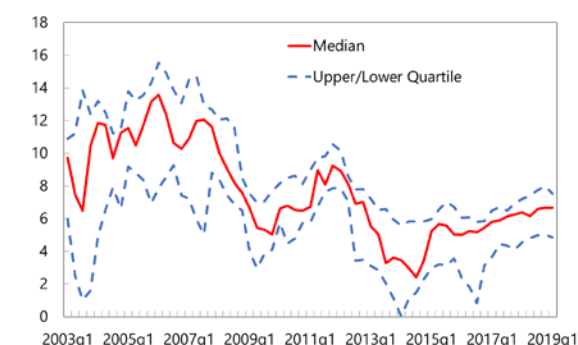
(Percent)



...though across all quartiles, profitability remains low.

#### Return on Equity (ROE)

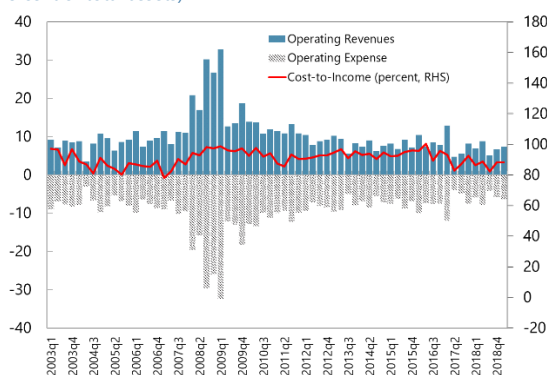
(Percent)



Bank's cost-to-income ratio has remained stable since the GFC...

#### Cost-to-Income

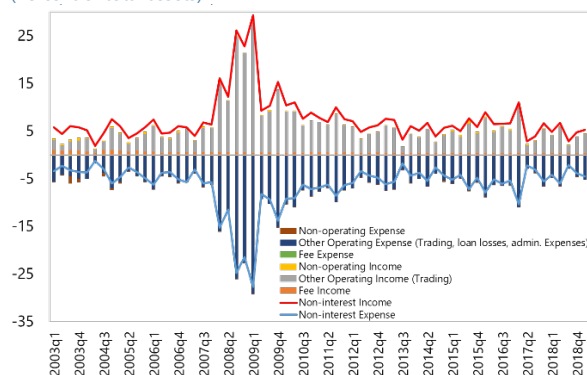
(Percent of total assets)



...with trading income making up a significant portion of non-interest income.

#### Non-interest Components

(Percent of total assets)



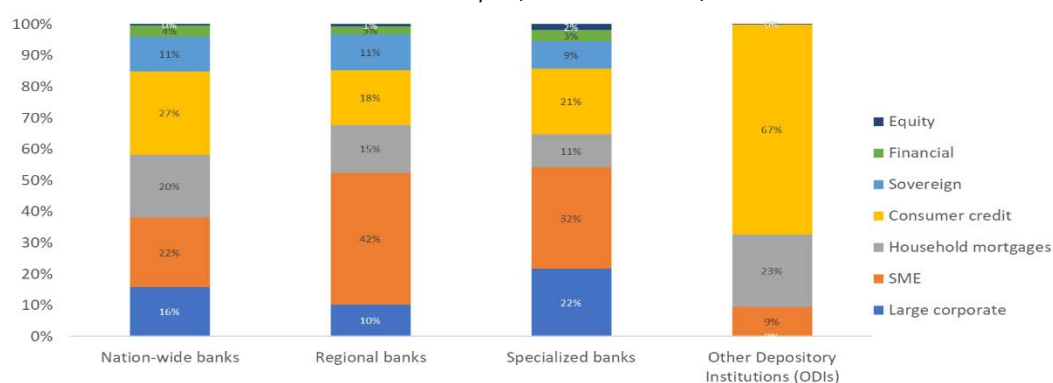
Sources: Haver, FISIS, IFS

<sup>1</sup> Includes commercial and specialized banks that are currently active

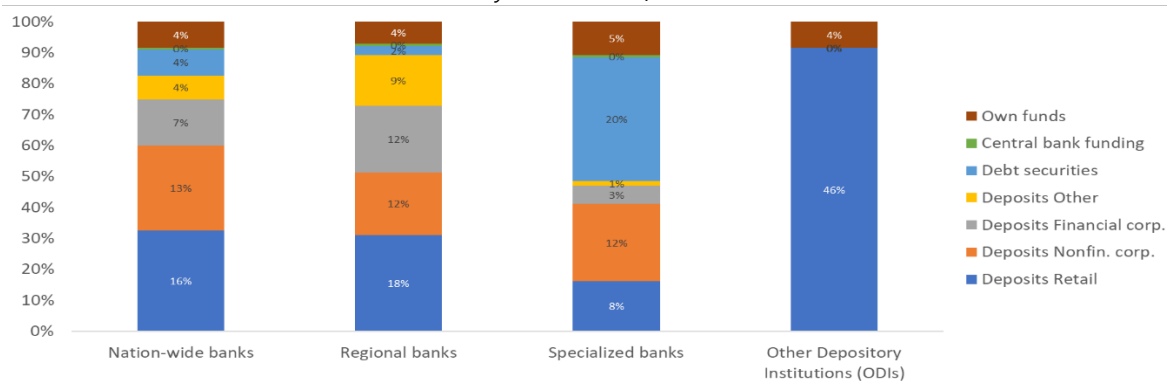
<sup>2</sup> Includes internet banks

**Figure 14. Korea: Korean Banks' Asset Portfolio Structure, Liability Structure, and P&L Components**

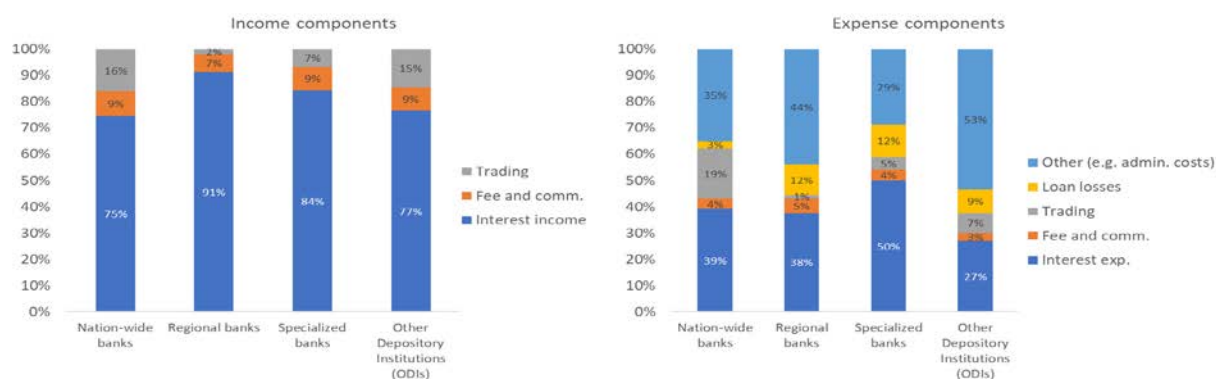
*Korean banks' asset portfolio structure as of end-2018*



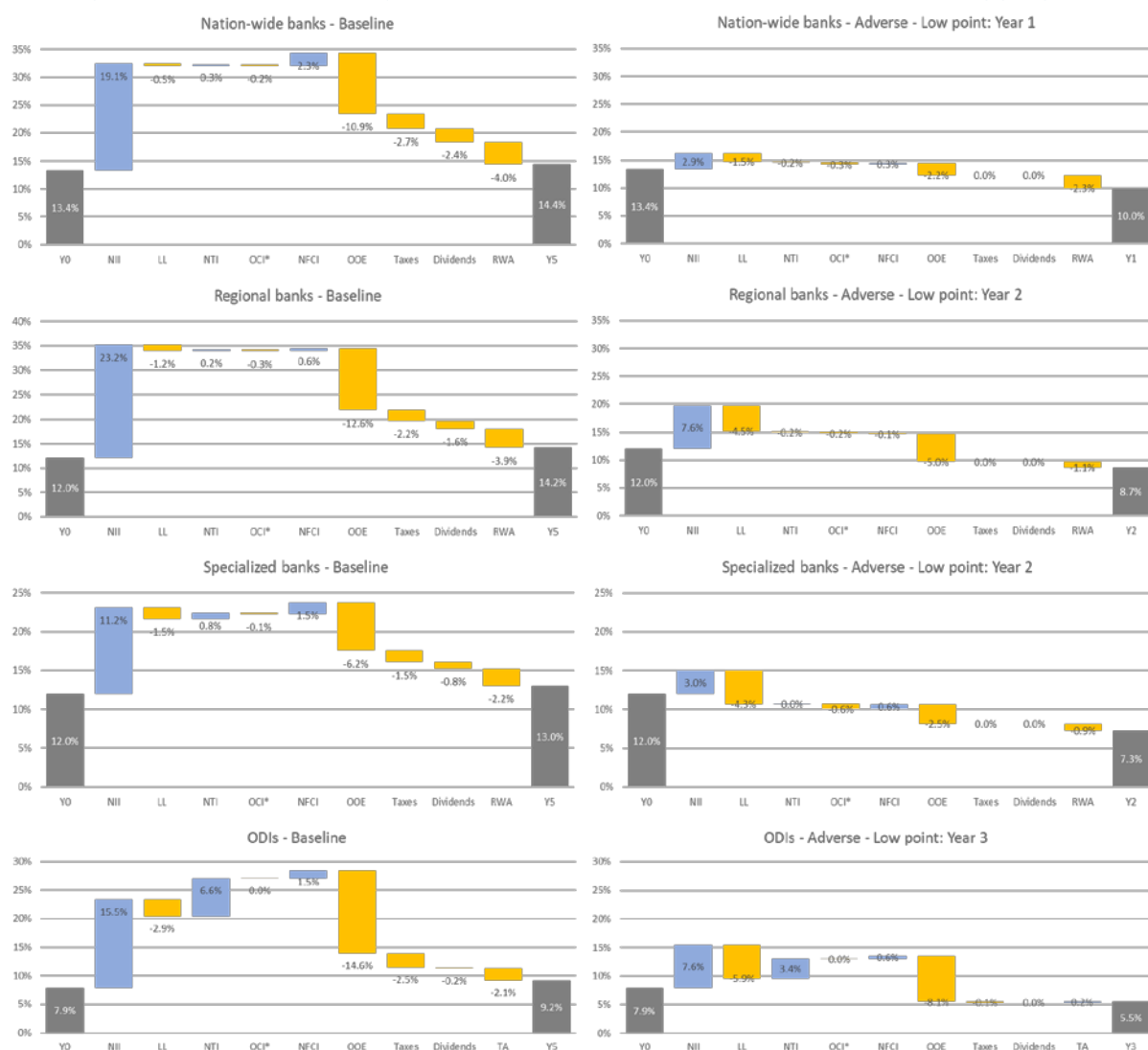
*Liability structure as of end-2018*



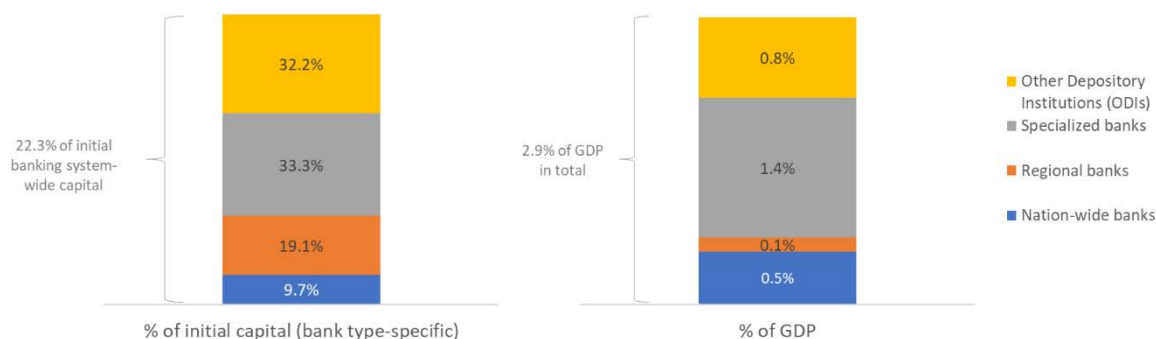
*P&L as of 2018*



Sources: Supervisory data from the FSS, publicly available data for banks (FISIS), and IMF staff calculations. Based on data for underlying 8 nation-wide banks, 5 regional banks, 6 specialized banks, and 2,316 ODIs (888 Credit Unions, 79 Mutual Savings Banks, 1,122 Agricultural Cooperatives, 90 Fisheries Cooperatives, 137 Forestry Cooperatives).

**Figure 15. Korea: Solvency Stress Test Results: CET1 Ratios, Sub-Sector Aggregates**

Sources: Supervisory data from the FSS, publicly available data for banks (FISIS), and IMF staff calculations. See Glossary for abbreviations. The forecasts conditional on the baseline scenario are displayed in cumulative terms up until Year 5 (2023). The adverse scenario results are reported in cumulative terms up to the low point, as indicated in the title of the charts (year 1-5 correspond to 2019-23). The capital ratios are defined as CET1/RWA for nation-wide, regional and specialized banks. For Other Depository Institutions (ODIs), the ratios are defined as accounting equity (net of loan loss provision stocks) over total assets.

**Figure 16. Korea: Capital Depletion Under the Adverse Scenario from End-2018**

Sources: Supervisory data from the FSS, publicly available data for banks, and IMF staff calculations.

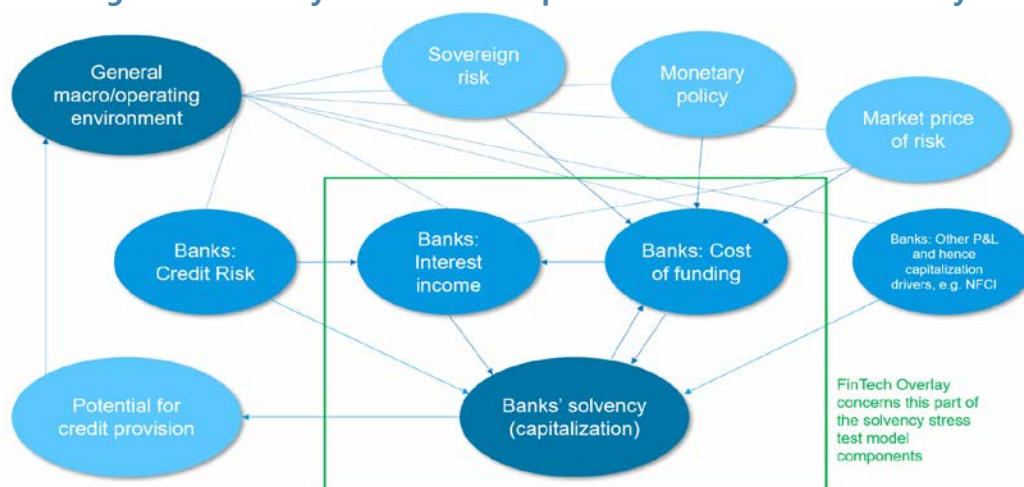
**Figure 17. Korea: Asset Exposure Shares vs. Credit and Market Loss Shares Under the Adverse Scenario**

Sources: Supervisory data from the FSS, publicly available data for banks (FISIS), and IMF staff calculations. Each dot (24) is a bank (including five ODI aggregates). The "loss share" is based on the maximum cumulative loan loss per bank-portfolio from along the adverse scenario horizon (2019-23). The "exposure share" is measured as of end-2018.

### Box 1. Fintech Overlay to the Bank Solvency Analysis – Rationale and Results

Figure A shows the solvency stress test components impacted by the Fintech Overlay.

Figure A. Solvency Stress Test Components and the Fintech Overlay



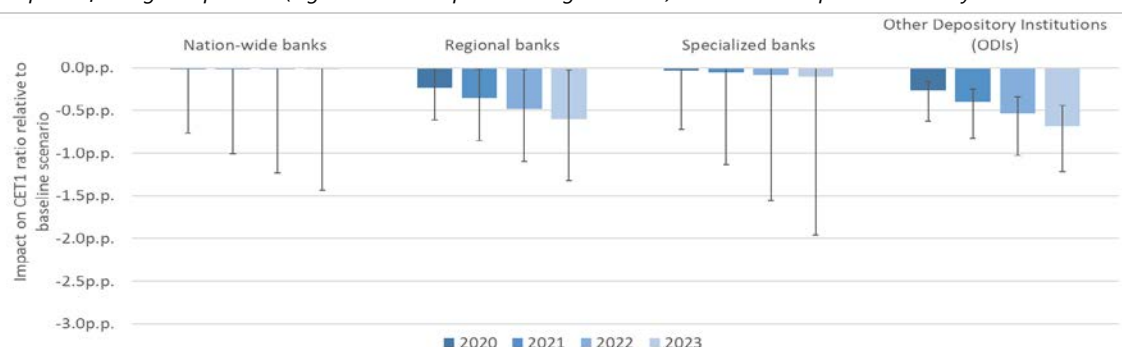
Sources: IMF staff.

**Fintech and Open Banking imply rising competition for banks.** E-money providers<sup>1</sup> may compete for commercial bank deposits enabled by the ongoing de-regulation initiative while, using mobile phone applications, bank retail customers can swiftly transfer deposits or lend from banks and other operators with the most competitive deposit/lending, putting downward pressure on interest rate margins. Banks with currently lower deposit rates and higher household deposit shares, as well as those with higher loan interest rates and high household loan shares (the two largest specialized banks and most Mutual Savings Banks) would be affected the most.

**The quantitative results of the Fintech Overlay analysis are shown in Figure B.** The blue bars indicate the impact on banks' capital ratios under the baseline scenario year by year, when the strength of the overlay is set to 50 percent. The upper and lower bounds reflect the case when the strength is set to 10 percent and 100 percent, respectively<sup>2</sup>. The capital depletion under the adverse scenario may move from 2.9 percent of GDP when the overlay is off to 3.9 percent when the overlay strength is at 90 percent (Figure B, lower part).

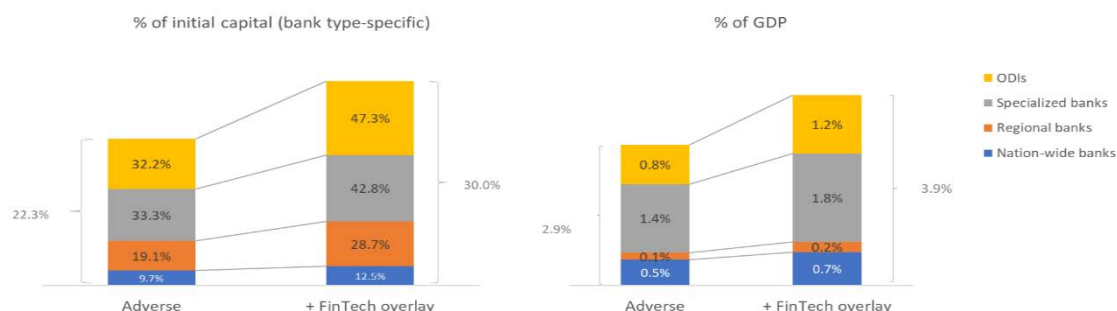
Figure B. "Fintech Overlay" – Impact on Banks' Capital Ratios

The impact of rising competition (e.g. due to the Open Banking initiative) on baseline capital ratios may be sizable...



### Box 1. Korea: Fintech Overlay to the Bank Solvency Analysis – Rationale and Results (concluded)

Capital depletion with and without Fintech Overlay, as percentage of initial capital and relative to nominal GDP (2018)



Sources: Supervisory data from the FSS, publicly available data for banks, and IMF staff calculations.

**Open Banking and the growing popularity of e-money service providers could also raise liquidity risks.** Most bank customers can react immediately to ‘bad news’ by moving funds to other banks—representing an ‘electronic deposit run’. Moreover, the re-depositing of customer funds by e-money service providers in few banks would lead to concentration risk.

<sup>1</sup> E-money providers are currently not allowed to pay interest in the form of e-money on their customers’ e-money holdings. They do, however, provide cash back-type remuneration schemes, that is, purchases in e-money form may be offered with a discount, which effectively is equivalent to an interest payment from an economic perspective.

<sup>2</sup> The Fintech overlay “strength” parameter describes the assumed degree of competitive pressure that banks would face from emerging Fintech firms in the analysis. A strength parameter at 1 implies maximal impact in terms of upward (downward) pressure on retail deposit (loan interest) rates, toward the currently most competitive ones in Korea’s banking system. The methodology accounts for differences in banks’ retail portfolio shares and their initial competitiveness, that is, banks with higher retail portfolio shares and/or less competitive pricing conditions (e.g., selected regional banks) are affected more.

## E. Banking Sector Liquidity

**28. The authorities have taken measures to strengthen the liquidity conditions of the banking system.** Liquidity coverage ratios (LCR) were gradually introduced to levels of 100 percent for all currency and 80 percent for FX in 2019, together with a Net Stable Funding Ratio (NSFR) of 100 percent, complementing (or replacing) earlier liquidity measures. Most banks’ liquidity exceeded these regulatory requirements in 2019Q1 (see Figure 18). Banks’ funding mix is diversified, and the FX funding structure has become more stable with short-term FX funding now mostly reflecting FX deposits by domestic corporates. And while retail deposits still account for most KRW funding, the NSFR funding structure appears more diversified with funding from retail and SME deposits, corporates, other financial institutions and sovereigns being more balanced. Maturities of assets and liabilities are generally well matched except some short-term maturity mismatch for regional banks and internet banks in KRW.

**29. A liquidity stress test (LST) was conducted to assess banks’ ability to withstand net-cash outflows amid shocks to asset prices, retail funding and wholesale funding.** Regulatory data from 2018Q4 was used to assess bank liquidity in all currencies, KRW, and FX separately; it included 18 domestic banks and foreign bank branches (KRW liquidity only); and the hurdle rate was

set to 100 percent. The LST considers the ability of banks to withstand net-cash outflows under even more severe crisis assumptions<sup>10</sup> than the LCR's, and a liquidity ratio below 100 percent would hence imply a liquidity shortfall, regardless of the regulatory LCR requirement.

**30. Falls in financial asset prices have only marginal effects on banks' liquidity buffers (Figure 19).** Asset price shocks consistent with the bank solvency stress test would have little effect on liquidity with liquidity coverage decreasing from 121 percent to 120 percent.<sup>11</sup> Banks are also resilient to retail funding shocks. These mainly affect KRW liquidity, with the average liquidity coverage of nationwide banks falling to 98 percent, implying only a marginal liquidity shortfall; meanwhile, FX liquidity coverage would remain above 100 percent. Overall, the banking system is likely to maintain adequate liquidity following a wholesale funding shock. However, state-owned banks reliance on unsecured wholesale funding would lead to a fall in FX liquidity coverage from 112 percent to 85 percent. Monitoring of bank sector liquidity can be further upgraded by improving bank LST for domestic currency and developing FX LST by major currencies. It would also be useful to expand the methodology of the joint BoK and FSS FX liquidity stress test to include FX LCRs, add an NDF stress scenario in different types of stress tests; and periodically survey the resident NDF FX market participants for any potential macroprudential effects as global shifts take place in currency and interest rate markets.

## F. Insurers and Pension Fund

**31. Insurers are currently well capitalized but low interest rates are weighing on profitability, and additional capital needs are expected under the new solvency regime.** Life insurance has long been an important savings channel. Increasing difficulties to match higher interest rate guarantees with dwindling returns have led most insurers to extend asset durations (through foreign investments) and to offer more 'protection' instead of savings products. Still, profitability is low; the sector's return on assets stood at 0.3 percent in 2018. With unfavorable demographics and competition from other financial institutions, growth prospects are limited, triggering foreign expansion and cooperation with fintech providers. Non-life companies too have material exposure to long-term saving and protection business. Profitability is impacted by underwriting losses, especially in health insurance where the government aims for lower cost of private coverage. Nevertheless, the return on assets is still higher than in the life sector, with 1.3 percent for the median company in 2018.

<sup>10</sup> For example, the LCR assumes 40 percent of runoff rate on unsecured non-operating deposits, whereas the LST assumes 50 percent.

<sup>11</sup> Mainly central bank reserves withdrawable in stress and (15 percent) and securities with 0 percent risk-weight (73 percent).



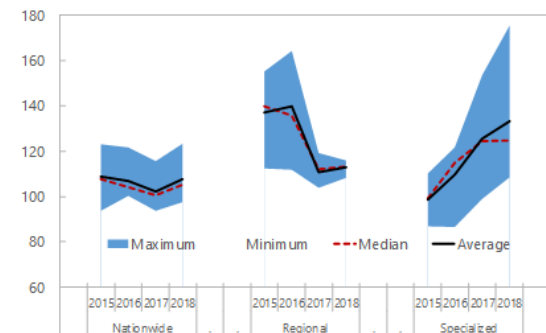
**Figure 18. Korea: Liquidity and Stable Funding**

Banks' LCRs remain above the recently introduced requirement of 100 percent

#### Liquidity Coverage Ratio (LCR) in KRW

##### Liquidity Coverage Ratio

(in percent)

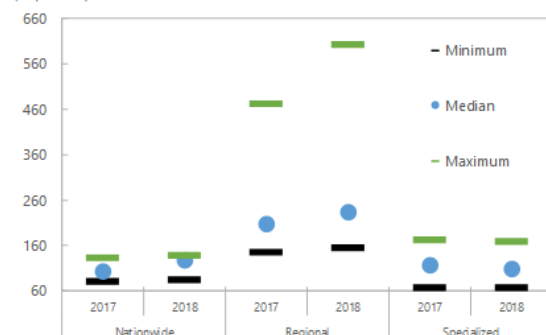


Most banks have FX LCRs above the 80 percent minimum requirement introduced in 2019

#### Liquidity Coverage Ratio (LCR) in FX

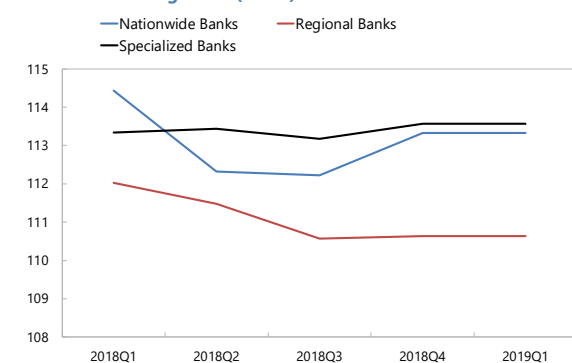
##### Foreign Currency Liquidity Coverage Ratio

(in percent)



The NSFR suggests that banks will have buffers to meet the funding requirements for the next 12 months

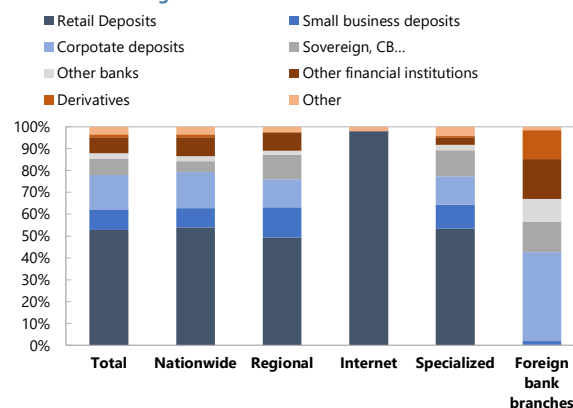
#### Net Stable Funding Ratio (NSFR)



Source: FSS and IMF staff calculations

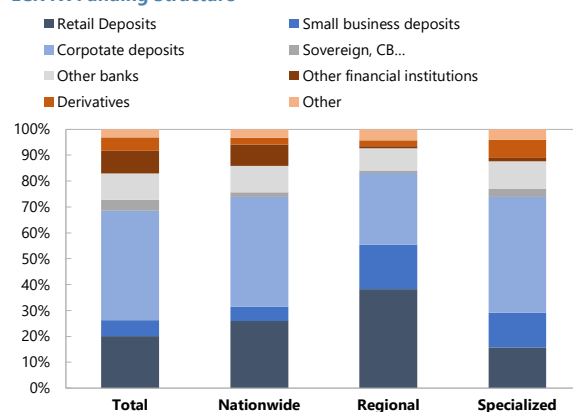
Domestic banks' KRW funding is mainly from retail deposits, while foreign bank branches rely on corporate deposits

#### LCR KRW Funding Structure



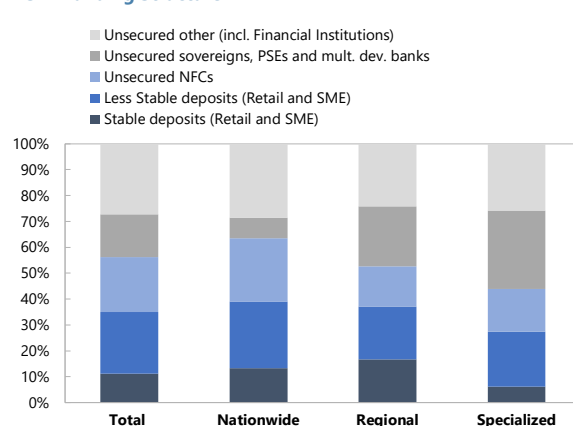
Korean banks largely rely on the deposits of domestic corporates for FX funding

#### LCR FX Funding Structure



The NSFR funding structure is well diversified.

#### NSFR Funding Structure

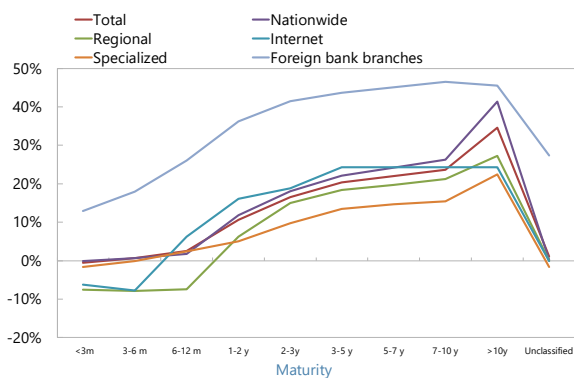




**Figure 19. Korea: Liquidity Stress Test**

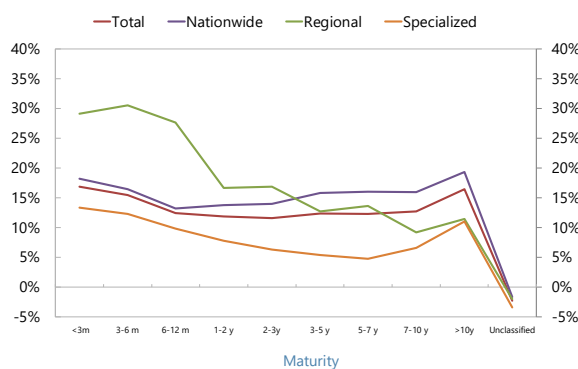
*Regional and internet banks have negative funding gaps over the next 6 months*

#### All Banks- LCR and Stress Test Results



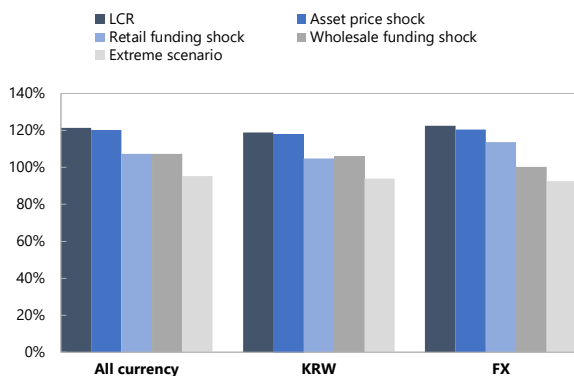
*The maturities of FX assets and liabilities are well matched*

#### Nationwide Banks- LCR and Stress Test Results



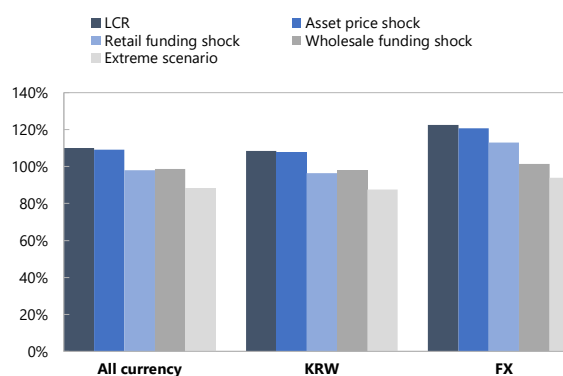
*The LST results suggest that the banking sector is resilient to asset price falls and funding shocks*

#### All Banks- LCR and Stress Test Results



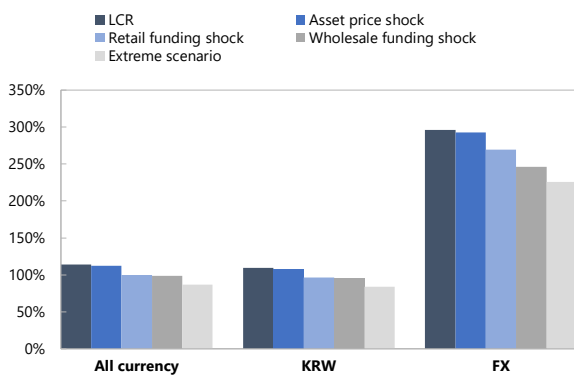
*Nationwide banks are most sensitive to run-offs in KRW retail deposits*

#### Nationwide Banks- LCR and Stress Test Results



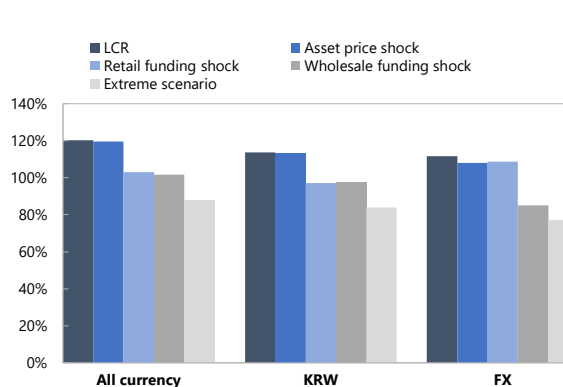
*Regional banks have ample FX liquidity buffers but are somewhat sensitive to run-offs in KRW wholesale funding*

#### Regional Banks- LCR and Stress Test Results



*Specialized banks have lower FX LCR requirements and are sensitive to FX wholesale funding shocks*

#### Specialized Banks- LCR and Stress Test Results

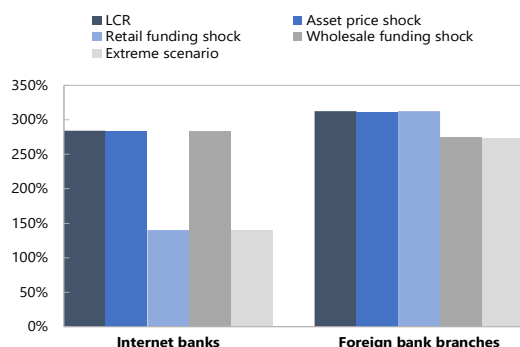


Source: FSS and IMF staff calculations

**Figure 19. Korea: Liquidity Stress Test (concluded)**

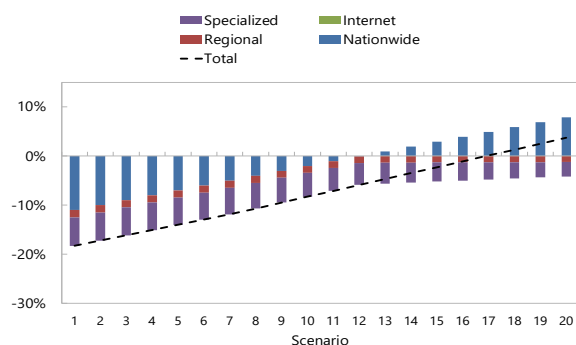
*Internet banks are sensitive to KRW retail deposit shocks, but currently have ample liquidity to withstand such shocks*

**Internet Banks and Foreign Bank Branches- LCR and Stress Test Results (KRW)**



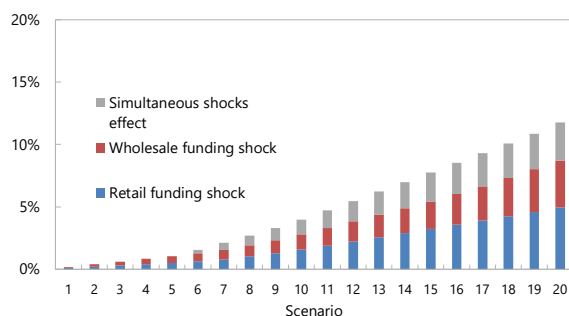
*FX liquidity shortfall of nationwide banks exceed surplus of regional and specialized banks*

**Liquidity shortfalls for different scenario severity as percentage of counterbalancing capacity (FX)**



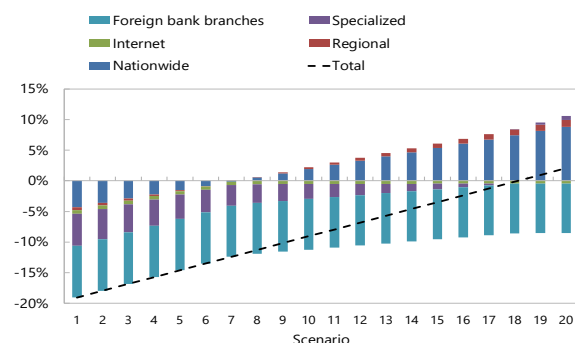
*Liquidity shortfalls in KRW liquidity are sensitive to retail deposit shocks*

**Liquidity Cash Flow Analysis for different severity levels (KRW)**



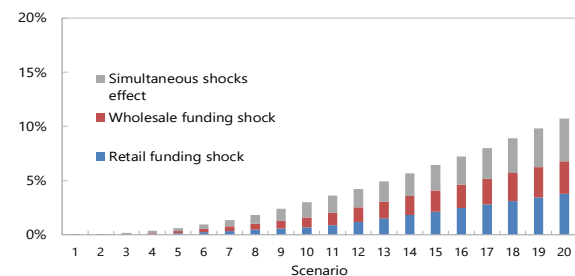
*Sum of liquidity shortfalls as percentage of initial counterbalancing capacity from retail and wholesale funding shock show shortfall for nationwide banks*

**Liquidity shortfalls for different scenario severity as percentage of counterbalancing capacity (KRW)**



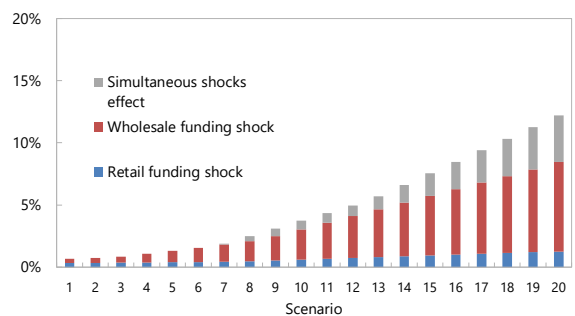
*Retail and wholesale funding shocks have similar effects on banking liquidity*

**Liquidity shortfalls (excl. surplus banks) as percentage of counterbalancing capacity (KRW)**



*Reliance on FX deposits of domestic corporates makes banks sensitive to shocks in FX wholesale funding*

**Liquidity Cash Flow Analysis for different severity levels (FX)**



Source: FSS and IMF staff calculations

**32. Under stress, insurers' available capital declines substantially—still all companies stay above regulatory thresholds** (Figure 20). The FSAP conducted a top-down solvency ST for seven life and six non-life insurance firms covering about 75 percent of the market. Narrative and severity of the scenario were adopted from the banking solvency ST, but more emphasis put on instantaneous market shocks.<sup>12</sup> Under the current accounting regime held-to-maturity designation is still allowed—and widely used among life insurers—hence around 23 percent of the sample's investments were shielded from market price changes. The median life company's RBC ratio drops from 239 to 169 percent, and in non-life from 214 to 158 percent. Two life insurers and one non-life company fall slightly below the recommended level of 150 percent, though still well above the 100 percent regulatory threshold.

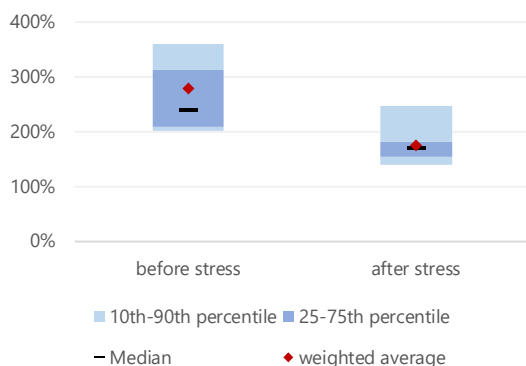
**33. Life insurers would experience an accelerated decline in profitability forcing, perhaps, further restructuring.** With declining premium income, underwriting results of life companies have been pressurized recently, turning negative in 2018. While this downward trend was largely compensated by slightly higher investment income, the top-down ST model assumes no recovery of asset prices after the instantaneous shock. Net income before tax would drop by 42 percent in the first year of the projection horizon, recovering afterwards. Still, the result exemplifies the urgency with which life companies should restructure their business to increase underwriting profitability, shifting further from guaranteed savings products into lower guarantees and protection business.

**34. The National Pension Service (NPS) faces challenges from the combination of low interest rates and adverse demographics, but also in its day-to-day operations.** NPS is still in an accumulation phase and expected to grow until 2041 when benefit payments would start exceeding contributions. Leaving parameters unchanged, the fund will be depleted by 2057. Options to cope with these long-term sustainability concerns include reducing benefits, increasing contribution rates, increasing the retirement age, broadening the membership (e.g., through an increase in female labor force participation), and increasing targeted investment returns. With increasing foreign investments (Figure 21), NPS is exposed to higher currency risk—currently largely unhedged—and will have to develop its risk management capacity accordingly. Historically however, the KRW/USD exchange rate tended to co-vary negatively with foreign asset prices, especially in the long term.

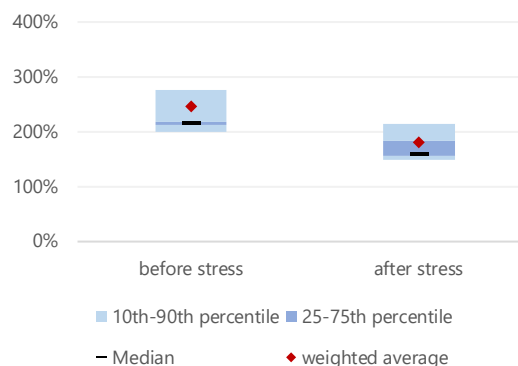
<sup>12</sup> For details on the scenario specification, see the Insurance Stress Test Matrix in Appendix IV.

**Figure 20. Korea: Insurance Stress Test Results**

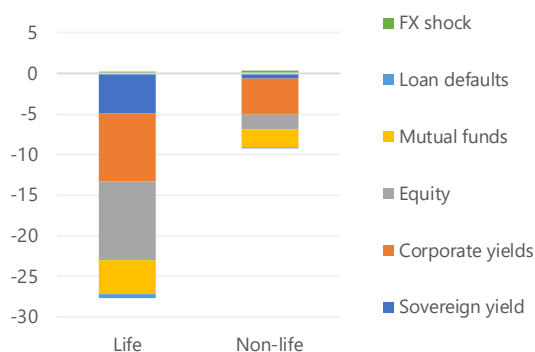
For the median life company, the RBC coverage declines from 239 to 169 percent.

**RBC coverage - Life**

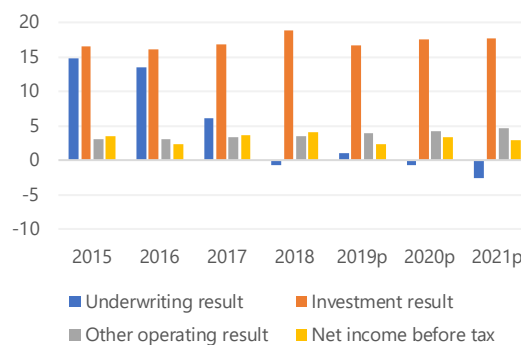
Non-life insurers' solvency ratios are more homogenous both before and after stress. The scenario results in a decline in the RBC coverage of 56 percentage points.

**RBC coverage - Non-life**

The largest impact on available capital stems from the shocks on equity prices and corporate bond yields.

**Contribution to change in available capital (in KRW trn.)**

Assuming no recovery after the instantaneous stress in financial markets, life insurers' profitability remains positive, with muted underwriting results.

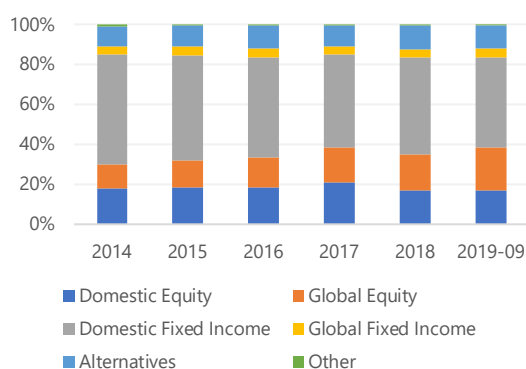
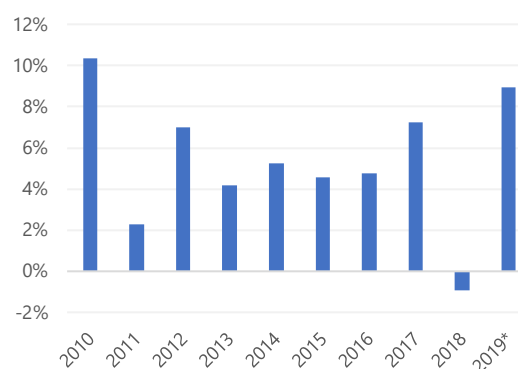
**Projected profitability under stress - Life (in KRW trn)**

Sources: IMF staff calculations based on FSS and company data.

**Figure 21. Korea: The National Pension Fund**

*NPS is still mostly invested in domestic assets (60 percent), but gradually expanding its overseas portfolio.*

*After a negative performance in 2018, NPS has recorded an almost double-digit yield in the first three quarters of 2019.*

**NPS asset allocation****NPS investment performance**

Notes: \*/ 2019 performance is for the first nine months only.

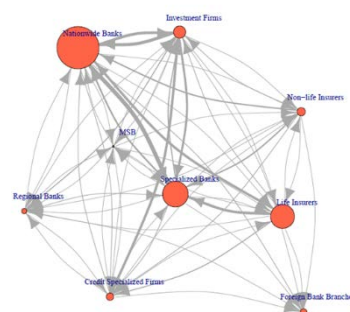
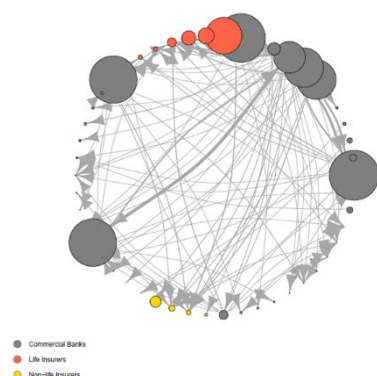
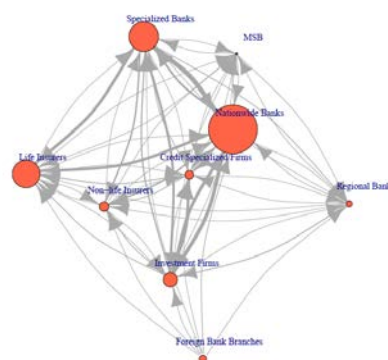
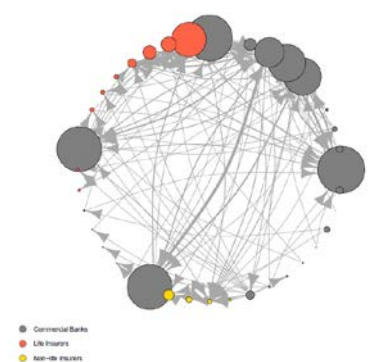
Source: IMF staff calculations based on NPS data.

## G. Interconnectedness and Contagion

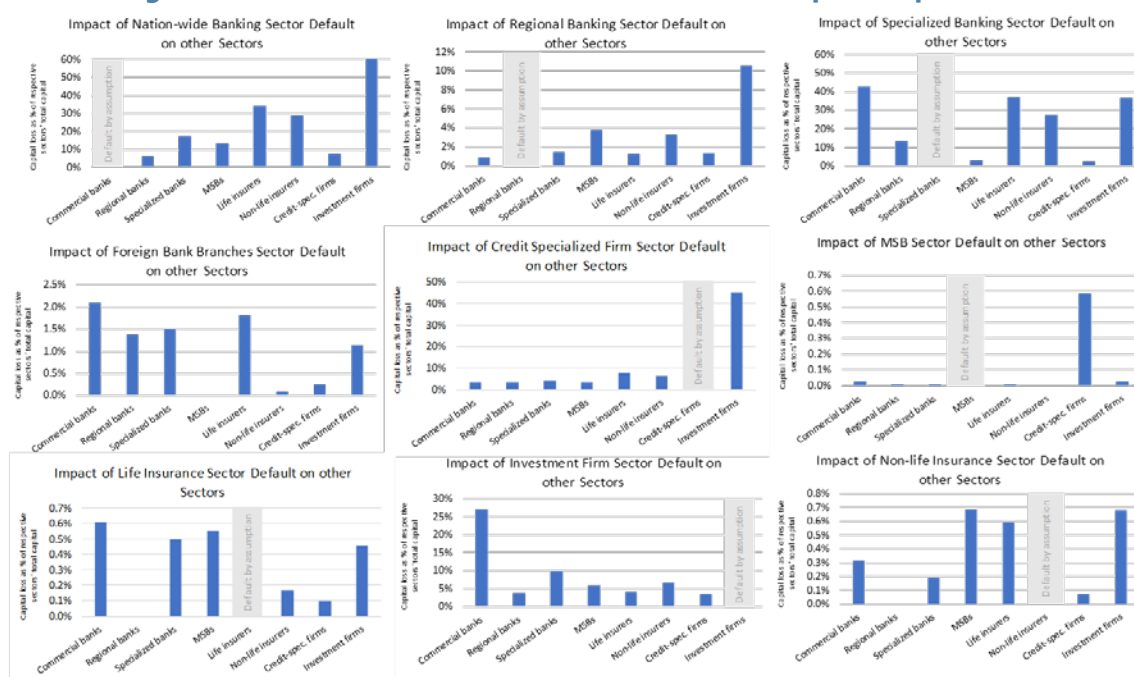
**35. Korea's financial institutions are linked through significant direct balance sheet and interbank market exposures, as well as material exposures to the real estate sector.** The FSAP's analysis employs a network approach based on on-balance sheet cross-exposures for 64 large financial institutions across financial sectors (banks, insurance, investment firms, and credit-specialized firms). A network visualization is presented in Figure 22, based on raw exposure data as well as based on the outcome of a default simulation, which follows closely the methodology developed by Espinosa-Vega and Solé (2010). Figure 23 shows the results in terms of capital depletion across sectors.

**36. The network and default simulation analysis reveal that specialized banks are about as systemic as nationwide banks.** Nationwide banks are net lenders to specialized banks, and hence are more vulnerable to specialized banks than the other way around. Life and non-life insurance firms are not as systemic, but vulnerable to stress in specialized banks and nation-wide banks. Insurers are net lenders to all other subsegments of the Korean financial system.

**37. The banks and insurance firms that face the hardest hit on capital under the adverse scenario in the solvency stress test are not tightly linked with the rest of the financial system.** The spillover potential from such firms appears sufficiently contained at the current juncture. The assessment should be treated cautiously, however, because confidence effects can imply spillover effects beyond the direct financial linkages between firms.

**Figure 22. Korea: Financial System Network Structure***Firm-level interconnectedness, raw debt exposure data-based**Sector-level interconnectedness, raw debt exposure data-based**Firm-level interconnectedness, default simulation-based**Sector-level interconnectedness, default simulation-based*

Sources: FSS supervisory exposure data and IMF staff calculations. The sample includes 21 banks, 25 life insurers, 29 non-life insurers, foreign bank branches as a block (38 underlying entities), Mutual Savings Banks as a block (79 entities), credit-specialized firms (102 entities), and investment firms (485 firms). The size of the bubbles is proportional to the size of the assets of an institution, or institution type. At the top: The width of a connecting line and arrow from A to B is proportional to the size of the exposure of A (asset side) to B (liability side). At the bottom: A line connects A to B if the default of A induces a positive capital depletion for B. The width of the connecting line and arrow is proportional to the capital impact of B expressed relative to the initial capital stock of B. The underlying multi-round simulation engine is adopted from Espinosa-Vega & Sole (2010), with an assumed LGD equal 100 percent.

**Figure 23. Korea: Sector-level Default Simulation: Capital Depletion**

Sources: FSS supervisory exposure data and IMF staff calculations. The sample includes 21 banks, 25 life insurers, 29 non-life insurers, foreign bank branches as a block (38 underlying entities), Mutual Savings Banks as a block (79 entities), credit-specialized firms (102 entities), and investment firms (485 firms). The underlying multi-round simulation engine is adopted from Espinosa-Vega & Sole (2010), with an assumed LGD equal 100 percent.

## SYSTEMIC OVERSIGHT

### A. Macroprudential Framework

**38. Experience with financial crises places systemic risk oversight at the core of Korea's approach to the financial system.** The Korean authorities have amassed over a decade of experience with macroprudential policies and put in place a rigorous process for risk monitoring. They have actively developed and deployed mitigating measures notably to meet risks to the financial system from FX exposures and household indebtedness. The main areas in which improvements are required relate to the institutional setting in which macroprudential policy operates, to completing the policy toolkit aimed at mitigating household sector risks, and to policy strategy and communication.

**39. Korea is exposed to the global financial cycle.** The principal risk events in Korea's recent history are the Asian financial crisis of 1997-98 and the global financial crisis of 2007-09. Both episodes saw liquidity risks emerge as banks struggled to rollover short-term FX denominated liabilities. As a small and financially open economy, Korea remains vulnerable to swings in non-core funding—especially from foreign wholesale sources—driven by changes in global risk appetite. A portfolio of prudential policies is in place. These include: (a) a leverage limit on net derivative

positions; (b) a macroprudential stability levy, or tax, on short-term FX exposures; and (c) prudential liquidity measures, including a foreign currency-denominated LCR and a minimum foreign currency-denominated liquid asset ratio (LAR). The measures differ in their institutional coverage and transmission mechanisms.<sup>13</sup> In the view of the authorities the measures are mutually reinforcing and have been effective in extending the maturity of external debt and reducing maturity mismatches without undue limitations on economically-valuable services to the real economy or any form of residency-based discrimination.<sup>14</sup>

**40. Household indebtedness is high** and there are pockets of at-risk debt owed by liquidity-constrained households. Korean lenders' exposure to real estate is systemically significant. Mortgage loans account for around a third of the loans outstanding at domestic banks, and banks also make loans secured against *jeonse* (leasehold) deposits.<sup>15</sup> Household exposures, including unsecured loans, are also material for some ODIs and non-banks. In this context, the borrower-based prudential limits are conservative. Restrictions on loan-to-value (LTV) and repayments-to-income ratios for mortgages are tight—as low as 40 percent in speculation-prone metropolitan markets areas. Recent measures have aimed to further strengthen borrowers' ability to repay loans: Loan underwriting standards have been tightened, borrowers have been incentivized to take safer amortizing fixed-rate mortgage products, and measures that limit overall borrowing by restricting high-DSR loans have been introduced. There is evidence that tighter MPMs have crimped house price appreciation and lessened the near-term risk of sharp house price corrections.

**41. A sectoral countercyclical buffer for household lending should be implemented at the appropriate time.** A sectoral countercyclical buffer (SCCyB) targeting secured and unsecured household exposures would allow banks to build up and release capital as risks from the sector wax and wane. Banks with larger exposures would be required to build comparatively greater quantities of additional capital to ensure that they have enough resources to support lending in the event of an adverse shock. A SCCyB would complement the borrower-based MPMs already in place. Implementation should be completed following appropriate review and taking into consideration international guidelines.<sup>16</sup> An ancillary effect of the SCCyB might be to slow the pace of household

<sup>13</sup> As indicated in the 2019 IMF Article IV Consultation Staff Report for Korea, the leverage limit on net derivative positions and the macroprudential stability levy are classified as CFM/MPPs by staff. Under the Fund's *Institutional View on the Liberalization and Management of Capital Flows* the authorities should consider measures that directly address systemic financial risks but do not limit capital flows.

<sup>14</sup> Other empirical support for the measures may be found in [Kim, C. and J-Y Lee \(2017\)](#): "Estimating the effects of FX-related macroprudential policies in Korea", *International Review of Economics and Finance* 50: 23-48; and the [Korea Case Study](#) accompanying the 2017 [IMF Board Paper](#), *Increasing Resilience to Large and Volatile Capital Flows*.

<sup>15</sup> Leasehold deposit lending is around a tenth the size of domestic banks' mortgage lending. Loans are partly guaranteed, and so carry zero risk weight, which have made them a growth product. Guarantees are written by the KHFC and the KHUG, and other specialist firms.

<sup>16</sup> Basel Committee on Banking Supervision (2019): "Guiding principles for the operationalization of a sectoral countercyclical buffer". Bank for International Settlements, Basel.



lending, with possible knock-on effects for housing valuations, but such effects are not the purpose of the measure.

**42. Macroprudential frameworks show notable variation between countries**, and there is no “one-size-fits-all” template.<sup>17</sup> The Korean authorities have demonstrated a willingness to act, supporting the view that their system has been operating in a healthy manner. But continued good performance of the macroprudential framework will require some adaptation and modernization. At present, responsibility for macroprudential oversight is shared between financial regulators, supervisors, the central bank, and the government ministry. However, no agency has financial stability as its sole, overriding objective. Neither is there a single institution where expertise in macroprudential policy is concentrated.<sup>18</sup> When multiple agencies have multiple primary objectives, the resulting lack of focus between parties’ risks delay and hinders accountability.

**43. To make the institutional framework for financial stability clear and accountable priority should be given to macroprudential objectives.** The MEFM (or a body empowered for the equivalent purpose) must be assigned the task of ensuring financial stability as its sole primary objective—perhaps along with a limited number of secondary objectives.<sup>19</sup> The clarity brought to the institutional setting in which macroprudential policy is decided would strengthen extant decision-making processes and enhance accountability. It would further ensure that the goal of safeguarding financial stability cannot be subordinated to other objectives. To support its macroprudential oversight role, an interagency team (possibly located at the BoK) should be tasked to synthesize, prioritize, and direct regular risk assessments to the MEFM.

**44. A macroprudential policy strategy should be developed.** A macroprudential strategy sets out how the stages of the policy cycle unfold to ensure identified risks lead to policy action, effective implementation, monitoring of effects, and policy review. In Korea, the policy process is most developed in the case of borrower-based measures. But in other areas, such as the use of the CCyB, it is less advanced. With an increasing number of tools being deployed, an overall approach is required that (a) can be consistently applied by policymakers, (b) is commonly understood between the responsible agencies, and (c) takes account of the complementarities (or otherwise) between different macroprudential policy measures.

**45. A revised communication strategy should be developed in parallel to improve the transparency, accountability, and predictability of policy decisions.** At present, financial stability

<sup>17</sup> IMF-FSB-BIS (2016): “Elements of effective macroprudential policies: Lessons from international experience”. Report to the G20.

<sup>18</sup> Formal power to deploy macroprudential tools rests with regulators in the FSC. The independent BoK has the analytical resources to conduct system-wide risk assessments and uses its position to shape the financial stability narrative. And a meeting of deputy-level officials of the main agencies—the MEFM—convened within the MOEF effectively decides what MPMs should be taken.

<sup>19</sup> A summary of the interlocking intermediate objectives that support the goal of financial stability are set out in IMF (2014): “Staff guidance note on macroprudential policy”, Board Paper, November. Washington, DC.

messages are complex and disclosure is minimal for some key decisions.<sup>20</sup> Clear statements of policy intentions improves the effectiveness of MPMs, both on activation and on release. A thorough review would help that : (a) considers broadening the group of stakeholders that financial stability communications reach; (b) ensures each agency has a clearly delineated area of responsibility; (c) bears in mind the need to link risk assessments to mitigating actions; and (d) considers the appropriate level of disclosure for meetings that discuss, recommend, or decide financial stability policy actions.

**46. The interactions between monetary and macroprudential policies must be better accounted for.** Monetary policy impacts incentives for risk-taking, leverage, and liquidity creation. But at the same time, the overall effect of monetary policy on the likelihood of financial crises is small.<sup>21</sup> Macroprudential policy should therefore be used first to mitigate financial stability risks. Because the BoK's Monetary Policy Board does not have direct control over macroprudential policy tools, undesirable policy trade-offs may arise between its price and financial stability objectives. More formal inter-agency coordination provisions are needed to ensure that interactions between monetary and macroprudential policies are properly internalized and help support the BOK's price stability mandate. To that end, a protocol should be established laying out a process to ensure that MPMs are taken with due regard for the ability of the BoK to fulfil its price and financial stability roles.

## B. Microprudential Framework

**47. Oversight of the Korean financial system is broadly effective.** Korea's FSC and FSS have in place regulatory and supervisory regimes in line with international standards with only few remaining gaps. The authorities have addressed most of the recommendations of the previous FSAP and made good progress in benchmarking their frameworks with Basel Core Principles (BCP), Insurance Core Principle (ICP) and International Organization of Securities Commissions (IOSCO) principles. The multiagency arrangement for entity level regulation and supervision has influenced the choice of Korea's prudential policies. From an accountability point of view, the FSC - as part of the Government - oversees prudential policies, legislation, as well as supervision. Several protocols for cooperation and joint consultative groups have been set up. This creates conditions where coordination across two dimensions is essential: horizontal coordination between government and agencies, and vertical coordination between levels (or tiers) of governance becomes extremely challenging.

**48. Operationally, the regulatory and supervisory practices reflect the idiosyncrasies of the market structure and risks elaborated above.** The post-crises regulatory agenda has been

<sup>20</sup> There is minimal disclosure of policy discussion at the MEFM. Disclosure standards must balance the public's need to scrutinize decision-makers with the need to maintain frank discussion of sometimes opposing views between policymakers.

<sup>21</sup> Adrian and others (2018): "Monetary policy and financial stability", in *Advancing the Frontiers of Monetary Policy*, T. Adrian, D. Laxton, and M. Obstfeld (eds): 69-82. IMF, Washington DC.

translated to a rules-based system with regulatory requirements implemented broadly in line with international standards. As a result, however, the system misses a ‘forward looking’ character and hampers the ability of supervisors to proactively address buildup of risks.<sup>22</sup> The remit of financial conglomerates supervision covers only groups dominated by banking business which implies that a significant component of risk is not yet fully covered given the significance of nonbanking activities. Moreover, group-level supervisory approaches miss a consistent application across financial holding groups.<sup>23</sup> The non-existence of a modern resolution and recovery framework increases costs for handling financial stress in complex groups and implies significant fiscal risks. The prudential and supervisory regime needs to evolve to place greater emphasis on risk management capabilities in firms, on-site examinations could be more targeted at the key risks while the judgmental component of the assessments could be strengthened.

**49. Given the plans of large Korean financial institutions to continue overseas expansion, cross-border supervisory activities would benefit from enhanced cooperation.** The FSC/FSS perform examinations of foreign branches and subsidiaries of banks and insurers. Also, visiting programs and conferences are organized for foreign supervisors. Closer and intensified monitoring of overseas expansion, closer cooperation with host authorities at the working level, and setting up supervisory colleges is warranted.

**50. The awareness of climate risk is rising.** The first ESG foreign currency bonds were issued in 2017 and Korea has reportedly become a large supplier of such bonds. Banks and financial groups have subscribed to the ESG principles and founded the Sustainable Climate Finance Forum in Korea. The authorities are considering membership in the Network for Greening the Financial System (NGFS). The FSC/FSS focused on climate risk in its latest survey of the banking system, as well as the BoK in its estimates of potential losses. Korea would benefit from a comprehensive action plan and interagency coordination on climate risk to assess climate or green finance trends, disclosure aspects, stress testing, and climate-related capital market reforms.

## Banking and Insurance

**51. Korea has a solid, rules-based regulatory and supervisory regime largely in line with international standards.** Credit risk management is a key focus for bank supervisors, and offsite monitoring of banks’ credit risks is adequately robust, including the verification of provisioning levels. While capital requirements are in place at the holding company level, liquidity requirements currently apply only at banks and other financial subsidiaries. This is an important gap that should be addressed given the growth of non-banking activities in DSIB banking groups. In some areas, such as concentration and large exposure restrictions, the authorities are piloting some thresholds but are still considering the best approach for the Korean banking system.

<sup>22</sup> Approaches like Pillar 2 or an Own Risk and Solvency Assessment (ORSA) are not fully adopted in supervisory practice. The tools used by supervisors do not have a preemptive effect and only ex-post follow up on identified risks and shortcomings.

<sup>23</sup> E.g. group level boards’ accountability, group-level capital planning.

**52. The rules-based approach may, however, hamper the FSS' supervisory ability to proactively address new and emerging risks in the financial sector.** When rules effectively restrict financial institutions from certain activities and risks, they may find ways that are not directly constrained by regulation. Supervisors play a key role by identifying such behaviors and requiring effective internal practices at financial institutions to identify and incorporate them into their assessments of capital and liquidity needs. The FSC/FSS should consider greater use of forward-looking measures which requires significant changes to laws and regulations that currently are not particularly supportive of *ex ante* actions when institutions' risk management practices are deemed to be less than adequate, but no violation of rules and regulations has occurred.<sup>24</sup>

**53. There should be greater emphasis on in-depth qualitative assessments of critical group-wide practices.** These include Credit Risk Management, Internal Capital Adequacy Assessment Process (ICAAP), Internal Liquidity Adequacy Assessment Process (ILAAP) and recovery planning. To support this, the Korean supervisors need the authority to put in place meaningful requirements and expectations/guidelines in these areas on a group-wide basis. While the FSS has implemented ICAAP requirements for capital planning and stress testing requirements for liquidity risk management, reviews of these practices could be strengthened and forward-looking measures of financial condition could be better integrated into the rating framework and supervisory outcomes interactively communicated with banks, and most importantly for DSIBs at the consolidated group level. Evaluations of banks' internal capital assessments can play an important role in promoting bank resilience and feed into Pillar 2 assessments framed by a formal annual supervisory review process, at least for large banks, as done in other jurisdictions.

**54. The prudential and/or supervisory approach for state-owned banks, mutual savings banks and ODIs is a concern.** The FSS's ability to promptly act in an even handed and prudential way is limited by a lack of competent jurisdiction and/or delegation and freedom to take prompt supervisory action. Pursuing economic and social goals via commercially oriented financial institutions erodes the soundness of the system, further builds up contingent liabilities for the public balance sheet and send mixed signals.

**55. In insurance, implementation of the new K-ICS and IFRS 17 are important reforms.** The FSS has run two quantitative impact studies on the new fully risk-based solvency regime, the K-ICS to be introduced in 2022 together with the valuation of insurance liabilities based on IFRS. While the public debate has focused on perceived capital shortfalls, there is also a clear need for structural adjustments in the life insurance sector. The FSS should assess the long-term viability of business models and, for companies with a weak solvency position and low profitability, the need for capital injections. High-guarantee legacy business could be addressed by evaluating the legal basis for portfolio transfers, run-offs, and conversion offers. Rising longevity risk should be addressed with prudent calibration of capital charges.

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<sup>24</sup> Overall, the interaction of supervisors with the boards of directors could be more intrusive; it should include the assessment of their effectiveness, including at holding companies; boards and management need to be held directly accountable for weak practices, either enterprise-wide or for important subsidiaries.

## Securities and Capital Markets

**56. Korea has established a functioning securities markets regulatory and supervisory structure, broadly aligned with international standards.** The deregulation and liberalization efforts by the authorities since the last FSAP are maturing but the securities market oversight function is confronting new challenges. The registration in the private funds markets has increased, while alternative investments including into the real estate sector are on the rise. Within the asset management industry there has been a rise in new investment firms, particularly hedge funds in Korea. Korean savings are now also getting channeled via the securities/capital markets to cross border locations and asset classes. The current processes to monitor systemic risk could be enhanced to fully account for the data gaps and new risks arising from the nonbanking sector.

**57. Instances of mis-selling and misconduct have begun to rise.** This is amplifying the underdeveloped consumer and investor protection framework in Korea and could impact market confidence, if risks related to severe redemption and liquidity pressures in the funds and asset management industry are not recognized sufficiently. The authorities should: (i) fully implement the key IOSCO Money Market Funds (MMF) recommendations; (ii) conduct stronger surveillance of capital market and nonbank risks accompanied by a more regular inspection program; (iii) develop a systemic risk framework that incorporates the securities sector and features stress tests on the asset management industry particularly for MMF funds; and (iv) accelerate the implementation of the reforms to address risks of accounting and audit fraud.

## Financial Conglomerates

**58. Supervision lacks a legal mandate to regulate financial conglomerates which do not have a straight forward holding structure.** By law the FSC/FSS are tasked with supervision of groups with a clearly defined head – a financial holding company. However, other financial groups – some of them systematically important – are not regulated on a group level, hence the authorities cannot assess and regulate risks emerging from the operations of their nonfinancial parts nor comprehensively supervise activities of their financial institutions. For a complete picture of supervisory analyses, the authorities must be mandated to reach a wider group with their information requests.

**59. A set of regulatory measures incentivizing groups to streamline their group structures should be developed and the FSC/FSS's mandate expanded.** The FSC/FSS should also supervise financial conglomerates without a straight forward holding structure. A prudential framework for these “non-holding financial groups”, which is currently considered by the FSC, should be developed. Information disclosure of the group's ownership structure would be an important upgrade. Group structures that do not impede effective supervision, recovery and resolution should be required. The supervisory authorities should have discretionary powers when designating heads of financial conglomerates to ensure that potentially systemic groups are under regulatory purview.

**60. As an integrated supervisor, the FSC/FSS is well positioned to carry out strong, group-wide supervision.** The current supervisory approach for financial groups is organized around legal entities, with a relatively small team of “group-level” supervisors. Given the systemic importance of

these groups and that growth is being driven largely by non-bank activities, the authorities will need to continue to develop and implement more group-wide supervision practices. The authorities should further elaborate their supervisory approaches to capture additional dimensions of group organizations' risks. Multilayer analyses of conglomerate maps, which captures the relationships between the group structure, the quality of capital and risks' dynamics within the groups, including for the cases of crisis situations, would significantly elevate supervisory outcomes.

### **Anti-Money Laundering/Combating the Financing of Terrorism (AML/CFT)**

**61. Korea's AML/CFT regime is currently being assessed by the Financial Action Task Force and Asia/Pacific Group (APG) on Money Laundering.** This assessment will establish Korea's level of compliance with the AML/CFT standard (the FATF 40 recommendations) and the effectiveness of AML/CFT measures. The onsite assessment took place in June/July 2019 and the draft report is scheduled for the adoption by the APG plenary in July 2020.

## **CRISIS MANAGEMENT, RESOLUTION, SAFETY NETS AND FINANCIAL INTEGRITY**

**62. Korea has a well-established financial safety net.** It includes a special resolution regime for financial institutions, an ELA facility at the central bank, a deposit insurance system, a policy-holder protection scheme for insurance products and an investor protection scheme for household holdings in investment and trust funds. Korea also has several legacy funds (such as the Bank Recapitalization Fund and the Financial Stabilization Fund) that were established to assist the financial industry during past crises and whose existence should be reassessed given their potentially distortionary and moral hazard effects.

**63. The resolution regime has many elements found in the *Key Attributes* but there is scope for improvements.** The Act on Structural Improvement of the Financial Industry (ASIFI) provides the special resolution regime for financial sector entities, including banks, insurance companies, and FHCs, among others. The regime incorporates transfer powers for assets and liabilities, and powers to establish temporary bridge institutions. Since the 2013 FSAP, operational arrangements were strengthened, including as regards the preparation of crisis manuals and simulation exercises. The planned amendments to ASIFI would also introduce a power to impose a temporary stay on the exercise of early termination rights and formalize requirements for recovery and resolution plans (RRPs). The authorities should consider additional legal amendments to introduce statutory bail-in powers and ensure that resolution can be triggered sufficiently early and well before insolvency—i.e., when a financial firm is not viable or unlikely to be viable.

**64. Key challenges include preparing to deal with failure of a financial group and ensuring orderly resolution of D-SIBs without recourse to public solvency support.** In the medium term, RRP exercises should incorporate the intra-group dimension, given the relevance of financial groups in Korea. Moreover, it is critical that resolution strategies be developed, as a priority for D-SIBs, that

deliver on financial stability objectives without reverting to public bail-outs.<sup>25</sup> Finally, there is a need to enhance mechanisms for providing liquidity in resolution; under current arrangements, all funding for firms in resolution is met from the deposit insurance fund, but this is unlikely to be sustainable in a D-SIB resolution where the firm will need to have continued access to BoK in resolution, including the payment system and intraday credit. The BoK should be able to provide liquidity, subject to safeguards, to an institution whose current solvency may be in doubt, but which is considered systemic and viable in the context of a realistic, time-bound resolution plan which will shortly be implemented. The resolution and/or supervisory authority should make a positive determination of viability. It should then be up to the central bank to decide on liquidity provision, which should be backed by an indemnity from the government.

**65. Important steps have been taken to replenish the Deposit Insurance Fund (DIF).**<sup>26</sup> An explicitly assured and irrevocable line of credit is available—the KDIC can borrow from the government or the BoK under the Depositor Protection Act. For the 2013 Mutual savings banks failures, the KDIC drew resources from the government’s Public Capital Management Fund to support funding for the resolution of saving banks.

**66. Domestic cooperation in crisis management relies on existing arrangements and has not been formalized.** The respective roles of Ministry of Economics and Finance (MOEF), BoK, FSC and FSS, and KDIC are clear in their respective statutes. Cooperation in crisis management is facilitated informally through the MEFM, which is formally responsible for coordinating assessments of systemic risks and financial policy interventions. There would be advantages to formalizing these arrangements via an apex group separate from the MEFM, or a new MEFM crisis management subgroup (with a pure coordination function, with decision making remaining under the member agencies) that would include the KDIC. This could anchor the work on interagency coordination work on crisis preparedness and crisis management and ensure the readiness of the system to swiftly respond to an event. The group could also oversee the crisis simulation exercises to test and enhance contingency plans and crisis management arrangements.

**67. Considering the structure of the Korean system and its evolution the recovery and resolution framework should be applied to domestic systematically important groups.** The complexity of financial conglomerates should be reflected in the application of the recovery and resolution framework. Also, despite the increasing strategic importance of the overseas activity of Korean banks and the significant share of foreign banks in the Korean system, little thought has been given to managing the failure of cross-border firms.

<sup>25</sup> To support progress in this area, consideration should be given to introducing requirements for loss-absorbing capacity in resolution (bail-inable debt) in D-SIBs. The authorities should also conduct regular resolvability assessments for D-SIBs and enhance their powers to require changes to these banks’ structure and operations to improve resolvability.

<sup>26</sup> With continued asset recoveries and premia reassessments, the KDIC succeeded in turning the DIF into a positive balance of KRW 500 billion in late 2017, and KRW 2.5 trillion at end-2018.



## Appendix I. Risk Assessment Matrix

Risk	Overall Level of Concern	
	Relative Likelihood	Expected Impact if Materialized
<b>Sharp rise in risk premia</b>	<b>High</b> Despite renewed policy easing by the Fed and ECB, global recession fears could push up risk and term premia, strengthen the U.S. dollar, Yen and the euro vis-à-vis other Asian currencies, and correct market valuations. Adjustments could be disruptive if there are policy surprises.	<b>Medium</b> Less favorable borrowing conditions could weigh on private sector and public sector balance sheets, with implications for growth. Valuation losses on financial institutions' assets, reduced value of collateral, and lower recovery in default cases, which could be amplified through exposures to high spread EA countries. Negative impact on FX liquidity of financial institutions.
<b>Rising protectionism and retreat from multilateralism</b>	<b>High</b> A fraying consensus about the benefits of globalization lead to protectionism and economic isolationism, resulting in reduced global and regional policy collaboration with negative consequences for trade, capital and labor flows, sentiment, and growth.	<b>High</b> A rise in trade protectionism could significantly weaken Korea export growth, trigger capital outflows and depreciation pressures, and lead to higher equity market volatility, given that Korea is an open economy with large export-orientated corporations.
<b>Weaker-than-expected global growth</b>	<b>High</b> Should a sharp economic slowdown occur in China, this would entail weak domestic demand, which in turn would lower commodity prices, roil global financial markets, and reduce global growth.	<b>High</b> China is Korea's largest trading partner, it makes Korea vulnerable to a slowdown in China. Second-round effects could also be significant, as China slowdown would impact global growth and market sentiment. Moreover, Korea could be subject to financial contagion as Korean financial assets and the Won are often used as "proxy trades" for Chinese and other smaller regional asset markets reflecting their higher market liquidity.
<b>Surge in external competitive pressures</b>	<b>Medium</b> Fierce competition from firms in China, India, and other EMs may displace goods made in Korea by several large NFCs (large corporations), such as autos, semi-conductors, electronic devices, etc.	<b>High</b> Major Korean nonfinancial corporates to face pressure. Spillovers through intra-firm corporate investment network. Rising unemployment and sustained slowdown in macro activity. Increase in the government's contingent liabilities through exposure of policy banks.
<b>Sharp domestic house price correction</b>	<b>Medium</b> An economic slowdown with rising unemployment and higher funding costs trigger mortgage defaults and negative feedback loops that weigh on the housing market given high leverage and stretched valuations	<b>High</b> Deteriorating asset quality, particularly related to mortgage lending and real estate financing and contagion to other markets that fund mortgage lending. Increase in the government's contingent liabilities through claims on mortgage insurance.



# Appendix II. Implementation of 2013 FSAP Recommendations—Preliminary Assessment

Key Recommendations	Implementation Status D—Done / LD—Largely Done / PD—Partly Done / NA—No Action
<b>Overall Financial Sector Oversight and Coordination</b>	
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.	<b>PD</b> The authorities have maintained a multi-agency framework in which responsibility for systemic oversight is a shared, and decisions are principally taken by the FSC. There are no plans to establish a macroprudential council. The BOK's risk assessments and policy directions are disseminated through their FSR, published minutes of the monetary policy board's Financial Stability Meetings, and summaries of the Macroeconomic and Finance Meetings.
Strengthen the independence of the FSC and FSS and increase transparency of the allocation of decision-making responsibilities among the two authorities.	<b>PD</b> The FSC/FSS has implemented the principles on division of tasks in enforcement. The decision-making process is steered by a committee composed by internal and external members, delegated by the FSC/FSS. The coordination is framed by the MOU. Although the FSC/FSS has taken steps to foster operational independence of supervision, there is still room for further improvement, specifically in these areas (i) establishing pre-conditions for the implementation of long-term strategy, (ii) clarifying budgetary arrangements, (iii) fostering regulatory processes, (iv) further streamlining of enforcement processes and elaborating enforcement policies, (v) clarifying the position of supervision vis-à-vis the goals of the Government.
Enhance enforcement effectiveness by broadening the range of administrative and civil penalties and increasing the number of administrative fines and civil penalties.	<b>PD</b> Eleven laws governing the financial sector were amended, which include an expanded scope of imposing monetary penalties and fines as well as the higher levies (went into effect on 19 October 2017).
<b>Financial Stability Analysis, Stress Tests, and Financial Supervision</b>	
Enhance coordination among agencies involved in stress testing (FSS and BOK).	<b>D</b> A working group that joins BOK and FSS staff was set up in 2015. Since then, the FSS and BOK regularly meet with this group to discuss and agree on scenarios for solvency and liquidity stress testing and compare results from their respective model frameworks.
FSS should carry out a comprehensive validation of banks' stress testing exercise.	<b>LD</b> An internal assessment of the FSS' and BOK' bank stress test methodologies is conducted on a regular basis. The bottom-up stress test exercises coordinated by the FSS are evaluated based on the top-down stress test results on the side of the FSS. [selected additional information pending]
Disclose to the public the results of the stress tests conducted by the authorities.	<b>D</b> The BOK conducts macro stress tests on a regular basis and publishes the results through its Financial Stability Report.

Key Recommendations	Implementation Status D—Done / LD—Largely Done / PD—Partly Done / NA—No Action
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.	<b>PD</b> Since the 2013 FSAP the FSC has implemented regulations for Basel II capital requirements at the FHC level. Pillar 2 principles have been included in FHC regulations since 2016. The supervision process for Pillar 2/ICAAP at FHCs is still a work in progress. The FSC can request banks and FHCs to hold capital above regulatory minima based on weaknesses in risk management and ICAAP.
Apply regulatory framework consistent with that for banks to all NBDIs, with larger entities also subjected to stricter supervision.	<b>PD</b> Prudential regulatory standards for Mutual Savings Banks (MSB) and Mutual Credit Cooperatives (MCC) have been strengthened in the areas of asset classification standards and provisioning standards. Standards in these two key areas for banks, MBSs and MCCs are now equivalent.
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.	Update will be provided to the Board on progress made and the findings of the ongoing FATF mutual evaluation.
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.	<b>LD</b> The Act on External Audit of Stock Companies, the regulation covering external audit, was amended in October 2017. The amendment included reinforcing appointment of external audit standards for financial institutions to make them equivalent to listed companies. Requirements include evaluation standards for the independence and expertise of external auditors. In addition, publicly traded financial institutions must appoint a qualified external auditor approved by the FSC.
Enhance risk-sensitivity of supervision via more flexible and frequent examinations that also provide enough coverage of the smaller supervised entities and enhancement to the judgmental component of the assessments.	<b>PD</b> For banking supervision, the FSS has moved to include greater use of thematic/targeted reviews in its supervision process. The determination of what reviews to carry out and at which firms comes out of a risk-focusing process. The supervision process broadly continues to be largely based on assessments of compliance with rules and regulations, rather than the use of a more principles-based approach. This approach notwithstanding, assessments incorporated in the supervisory ratings of the firms have significant qualitative elements which require subjective judgments by the examiners and other supervisors.

#### Crisis Preparedness and Crisis Management Framework

Key Recommendations	Implementation Status D—Done / LD—Largely Done / PD—Partly Done / NA—No Action
Establish a dedicated apex committee for leading and coordinating crisis preparedness and management work; undertake periodic crisis simulation exercises.	<b>PD</b> As part of the introduction of RRP, the authorities plan to establish an RRP Assessment Committee to act as a focal point for coordination of resolution planning among authorities but its broader coordination role for contingency planning as risks to financial stability increase is still to be defined.
Replenish the deficit in deposit insurance fund; assure KDIC back-up funding.	<b>LD</b> The DIF has been returned to surplus though there are still sizeable deficits in some accounts (e.g. for MSBs). Arrangements for back-up funding for DIF remain loose.
Address potential moral hazard risks by enhancing banks' risk management; and ensuring that government support is not assured or open-ended.	<b>PD</b> The legal power to bridge banks in resolution at holding level in principle could be used to affect a bail-in and avoid public solvency support but this is not currently feasible or credible given the lack of gone concern loss absorbency requirements.
<b>Systemic Liquidity Management and Financial Market Infrastructures (FMIs)</b>	
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.	<b>LD</b> A contingency plan has been developed for ELA but it needs to be more closely integrated with the approach to funding in resolution. Information-sharing arrangements for FMIs exist between BOK and FSS but enforcement powers for BOK have not been strengthened.
Reform the credit risk and management framework for the securities market and increase the number of KRX staff managing companywide and CCP-related matters.	<b>PD</b> An exchange margin scheme to address price volatility has been adopted. The calculation method for margin assessment ratio has been restructured with conditions on qualified collateral and collateral concentration limit. The cap for Joint Compensation Fund (JCF) has been repealed with the amount set based on the risk exposure calculated by stress test. When necessary, additional intraday margins on the clearing members are imposed to reduce settlement risks. Scheme to manage credit risks has been put in place, which levies additional margins for credit risk if net risk margin exceeds credit risk limit (three times the net capital) of each member. The Risk Management Committee for Clearing and Settlement was expanded and restructured to the Deliberation Committee (a pool of members) to increase its independence. A Working-level Committee for CCP Risk Management was formed to strengthen CCP risk management.

## Appendix III. Banking Sector Stress Testing Matrix (STeM)

Domain		Framework
		TD by FSAP Team
<b>Banking Sector: Solvency Stress Test</b>		
Institutional perimeter, horizon and main data inputs	Institutions in-scope	24 banks in total. Composed of 19 banks and five groups of aggregate ("consolidated") banks: four nation-wide commercial banks, two foreign subsidiaries, two internet-only banks, six regional banks, five specialized ("policy") banks. Five groups of aggregate ("consolidated") banks: Credit Unions (929 underlying entities), Mutual Savings Banks (79 entities), Agricultural Cooperative Banks (1,122), Fisheries Cooperative Banks (90), Forestry Cooperative Banks (137).
	Banking system coverage	About 95 percent of the banking system as of 2018Q4 in terms of total assets, with "banking system" being defined as all institutions listed above plus Community Credit Cooperatives (5 percent). The latter are excluded due to insufficient data availability. <sup>27</sup> "Banking system" excludes foreign bank branches for what concerns the solvency stress test scope. Banks are either stand-alone entities or subsidiaries of higher-ranking FHCs.
	Cut-off date and scenario horizon	Cut-off date 2018Q4. Scenario horizon five years. Banks' solvency position will be reported as of their "low-point" along the scenario horizon
	Scope of banks' operations	Emphasis on banks' domestic, Korean exposures as foreign exposures are deemed to be sufficiently small (as of 2018Q4, the above-defined bank sample's foreign exposures in terms of loans and security holdings outside Korea amounted to 5.4 percent).
	Main data sources	Regular supervisory reporting + ad-hoc data request to all banks + public data sources (e.g., Bloomberg, public disclosures of banks through annual and financial reports, etc.)
Stress test methodology	Credit risk – accounting	Compatible with K-IFRS 1109 (Korean version of IFRS 9). Satellite models for PDs and employing a "hybrid" methodology that combines scenario-conditional PD forecasts with a Z-factor methodology to project bank-portfolio-specific transition flow matrices. Structural LGD model for real estate collateralized portfolios.
	Credit risk - regulatory risk weight treatment	Risk weights for STA portfolios constant, risk weights for IRB portfolios conditional on scenarios through link to point-in-time default rates consistent with weighted average of two (S1 and S2's) default rates from the transition matrices. Smoothing factor to be employed for that link to reflect a through-the-cycle rationale of regulatory risk parameters (modeled through Basel risk weight formulas).
	Credit risk – provisioning	Both regulatory provisioning rules as well as accounting provisioning principles to be employed in parallel (results will be presented separately and in conjunction).

<sup>27</sup> The coverage as described here would amount to 89 percent of total banking system assets when foreign bank branches were part of the aggregate banking system.

Domain		Framework
		TD by FSAP Team
	Interest rate risk	Wholesale funding stress consistent with scenario. Pass-through to asset side captured through cross-bank portfolio-specific panel models. Model suite considered: net interest margin-based, vs. individual models on interest income and expense rates separately.
	Feedback from interest rate risk to credit risk	Accounted for through incorporation of interest rates (those that loan contracts are linked to), in the Z-factor models for credit risk. Reversely, interest income a function of credit risk, as only performing loans generate interest income by assumption.
	Feedback from banks' solvency to funding conditions	Accounted for through incorporation of banks' capital adequacy metrics in their funding cost satellite models (lagged at quarterly frequency, i.e. sufficiently simultaneously at lower than quarterly frequency).
	Market risk (other than interest rate risk)	Trading book equity positions revalued in line with equity market price trajectories in scenario. Bond holdings in the trading book revalued in line with maturity-corresponding bond yield (and implied price) paths from the scenario.
	Other P&L	Satellite models for net fee and commission income.
	Balance sheet dynamics	Two cases: static balance sheet (sum of performing and nonperforming banking book assets stays constant, no write offs nor asset sales), vs. dynamic balance sheet (gross loan book can move consistent with the scenario). Under dynamic balance sheet scenario, corporate and retail loan book may grow at different rates. Write-offs and asset sales will be allowed and optionally dis-allowed under the dynamic balance sheet scenario. Asset sales are important and sizable for Korean banks, given their continuous NPL selling to the NPL market.
	Tax assumptions	Statutory tax rates.
	Dividend payout assumptions	Dividend payout ratios were kept constant at their ratios (defined relative to net income after tax) as observed at the bank-level at end-2018. Net income after tax turning negative implies zero dividends by assumption.
	Capital ratio thresholds	Basel III min capital requirements for CET1 and total capital (T1+T2) ratios including CCB, and incl. capital surcharge for D-SIBs of 1 percent (Kookmin Bank, Shinhan, KEB Hana, Woori, Jeju Bank, NongHyup Bank). For D-SIBs, the CET1/RWA and total capital/RWA thresholds stand at 5.5 and 9 percent; for non-D-SIBs other than ODIs, they are 4.5 and 8 percent, all inclusive of the 2.5 percent CCB. Mutual Savings Banks subject to total capital ratio threshold only. All other mutual credit cooperatives (credit unions and cooperatives) subject to risk-unweighted net worth ratio constraint at their respective minima as stipulated through regulation. CCB allowed to be depleted under adverse scenario.

Domain		Framework
		TD by FSAP Team
Macrofinancial scenario	Adverse scenario narrative	Developed along G-RAM and Korea-specific structural features and vulnerabilities. Sudden spread of trade protectionism; material drop in activity in China; material drop in Korea's exports; broad-based world-wide sell-off in equity markets, reflecting general fall in investors' risk appetite; significant capital outflows from Korea coupled with strong depreciation of its currency; potential defaults of export-oriented and FX-indebted non-financial firm conglomerates; cascade effects through Korea's strongly interconnected supply chain; rising unemployment rate; depressed confidence, hence drag on consumption and investment (expectation channel); spillover to housing and mortgage market through less demand and rising unemployment.
	Number of scenarios	Two scenarios: One baseline (WEO) and one adverse scenario.
	Quantification / methodology	Regime-switching structural VAR model based on Korean data (1990Q1-2018Q4), to simulate structurally identified external demand shock (sign constraints); conditional on recession regime identified by the model, to thereby capture dependencies across macro-financial variables as observed throughout crisis/recession times (stronger dependence generally speaking); shock scenario profile scaled such that 1-year ahead real GDP fall matches 5 percent GaR.
	Macro-financial feedback effects	Accounted for by allowing macro-financial feedback at the scenario generation stage in the regime-switching SVAR (banking system credit endogenous, two-way feedback with GDP and other variables).
	Scenario variables	Real GDP, nominal GDP, unemployment rate, CPI inflation, CPI core inflation, residential property prices, commercial property prices, equity prices, USD-KRW exchange rate, long-term interest rate (benchmark sovereign bond yield), short-term money market interest rate, MSCI World Equity Index, gross banking system credit, corporate bond spread, real and nominal GDP components.
	Sensitivity analysis	Sensitivity analysis to be conducted with respect to house prices, to thereby account for the centrality and peculiarity of the housing market in Korea (leasehold rent system, insurance in relation to leasehold loans by state-run institutions, etc.)
Banking Sector: Liquidity Test		
Institutional perimeter	Banking system coverage	18 banks are included, six nation-wide commercial banks, two internet-only banks (KRW only), six regional banks, and four specialized ("policy") banks. In addition, foreign bank branches are included (KRW only).
	Market share	About 90 percent of the banking system as of 2018Q4 in terms of total assets, with 'banking system' being defined as all institutions listed above. Banks are either stand-alone entities or subsidiaries of higher-ranking FHCs.
	Cut-off date	Cut-off date 2018Q4.

Domain		Framework
		TD by FSAP Team
Methodology and scenarios	Methodology	The exercise assesses banks' ability to use counterbalancing capacity withstand net cash outflows, accounting for both contractual and behavioral flows. Assumptions of asset price haircuts are based on the macrofinancial scenario used for the bank solvency stress test. The assumed retail and wholesale funding run-off rates consider Korean specific liquidity factors based on the analysis of corporates and households and are conservative to account for liquidity shortages that could occur in other parts of the financial system but that are not included in the stress test due to lack of data. Furthermore, the calibration of run-off estimates uses international experience to account for structural factors that have changed the characteristics of the financial system. Capital shortfalls are measured as percentage of counterbalancing capacity.
	Satellite models for macrofinancial linkages	Asset haircuts modeled in the macro financial scenarios.
	Stress test horizon	The stress test horizon is 30 days. The funding gap calculations uses horizons of between 1 month and 10 years.
	Scenario analysis	Four scenarios are considered: (i) asset price falls, (ii) a run on retail deposits, with higher run-off rates for retail deposits; (iii) a run on wholesale funding, with higher run-off rates for corporate deposits and other wholesale funding; and (iv) an "extreme" scenario with combination of runs on retail deposits and wholesale funding (scenario ii and iii). For the cash-flow analysis, a series of scenarios consistent with the solvency stress test and the adverse macro-financial scenario are considered, with a range from mild to severe liquidity conditions. Capital shortfalls are calculated for twenty different gradually more severe scenarios, where the least severe assume the run-off rates used in LCR calculations and the most severe assumes the run-off rates in the "extreme" scenario (iv).
	Buffer assumptions	Funding liquidity risk is reflected in funding run-off rates and asset roll-over rates, the latter providing cash inflows related to non-renewal of maturing assets. Market liquidity risk is reflected in asset haircuts, which could be influenced by market movements, fire sales and collateral supply constraints.
	Other behavioral assumptions	Liquidity from the central bank's emergency lending assistance (ELA) is not considered.
Regulatory and market-based standards and parameters	Calibration of risk parameters	Stress funding run-off rates, asset roll-over rates, and asset haircuts are calibrated based on empirical evidence and relevant international experiences.
	Regulatory/accounting and market-based standards	An LCR above 100 percent or a non-negative cash balance for the cash-flow analysis, is required to pass, where the balance reflects net cash outflows and counterbalancing capacity.
Reporting format for results	Output presentation	For all currency, KRW and FX, changes in the system-wide liquidity position, including important drivers for cash outflows, cash inflows and counterbalancing capacity. Distribution of banks' and bank categories liquidity positions. Amount of liquidity shortfalls.

## Appendix IV. Insurance Sector Stress Testing Matrix (STeM)

Top-Down by IMF		
Insurance Sector: Solvency Risk		
1. Institutional perimeter	Institutions included	<ul style="list-style-type: none"> <li>• Seven life insurers, and six non-life insurers.</li> </ul>
	Market share	<ul style="list-style-type: none"> <li>• Life: 73 percent (balance sheet assets).</li> <li>• Non-life: 76 percent (balance sheet assets).</li> </ul>
	Data	<ul style="list-style-type: none"> <li>• Regulatory reporting.</li> </ul>
	Reference date	<ul style="list-style-type: none"> <li>• December 31, 2018.</li> </ul>
2. Channels of risk propagation	Methodology	<ul style="list-style-type: none"> <li>• Investment assets: market value changes of available-for-sale securities after price shocks, increase in the default rate for corporate and mortgage loan exposures.</li> <li>• Insurance liabilities: unaffected by change in interest rates as discount rates are based on historic cost accounting.</li> <li>• Sensitivity analysis: effect on available capital and solvency position.</li> </ul>
	Time horizon	<ul style="list-style-type: none"> <li>• Instantaneous shock.</li> </ul>
3. Tail shocks	Scenario analysis	<ul style="list-style-type: none"> <li>• Adverse scenario:               <ul style="list-style-type: none"> <li>• Short-term KRW sovereign bond yield -20 basis points, long-term KRW sovereign bond yield +250 basis points;</li> <li>• Stock prices -39.0 percent (Korea), -35.0 percent (other advanced economies), mutual funds -12.5 percent;</li> <li>• Korean corporate bond spreads between +120 basis points (AAA) and +400 basis points (BB and lower), foreign corporate bond spreads between +70 basis points (AAA) and +300 basis points (BB and lower);</li> <li>• Haircut on unsecured loans -1.5 percent, haircut on sub-standard loans -30 percent;</li> <li>• 37 percent appreciation of KRW against USD.</li> </ul> </li> </ul>
	Sensitivity analysis	<ul style="list-style-type: none"> <li>• Variations of short- and long-term sovereign bond yields.</li> </ul>
4. Risks and buffers	Risks/factors assessed	<ul style="list-style-type: none"> <li>• Market risks: interest rates, share prices, property prices, credit spreads.</li> <li>• Summation of risks, no diversification effects.</li> </ul>
	Buffers	<ul style="list-style-type: none"> <li>• Accounting designation (23 percent of assets in the general account held to maturity).</li> </ul>
	Behavioral adjustments	<ul style="list-style-type: none"> <li>• None.</li> </ul>
5. Regulatory standards and parameters	Regulatory/accounting standards	<ul style="list-style-type: none"> <li>• Korean Risk-Based Capital (RBC).</li> <li>• National GAAP.</li> </ul>
6. Reporting format for results	Output presentation	<ul style="list-style-type: none"> <li>• Impact on solvency ratios.</li> <li>• Contribution of individual shocks.</li> <li>• Dispersion measures of solvency ratios and net income.</li> </ul>