



## IMF POLICY PAPER

September 2017

### INCREASING RESILIENCE TO LARGE AND VOLATILE CAPITAL FLOWS: THE ROLE OF MACROPRUDENTIAL POLICIES—CASE STUDIES

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- A **Press Release** summarizing the views of the Executive Board as expressed during its June 28, 2017 consideration of the staff report.
- The **Staff Report**, prepared by IMF staff and completed on June 2, 2017 for the Executive Board's consideration on June 28, 2017.

The documents listed below have been or will be separately released.

- Increasing Resilience to Large and Volatile Capital Flows—The Role of Macroprudential Policies—Case Studies.

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## INCREASING RESILIENCE TO LARGE AND VOLATILE CAPITAL FLOWS: THE ROLE OF MACROPRUDENTIAL POLICIES—CASE STUDIES

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### CONTENTS

Glossary	5
<b>CAMBODIA</b>	<b>6</b>
A. Economic and Policy Context	6
B. Capital Flow Developments	7
C. Impact of Capital Flows on Systemic Risk	8
D. What Prudential Tools Have the Authorities Introduced to Mitigate Risks?	9
E. Effectiveness of Prudential Measures	11
<b>FIGURES</b>	
1a. Cambodia—Gross Capital Inflows by Component	8
1b. Cambodia—Net Capital Flows by Component	8
<b>TABLE</b>	
1. Cambodia—Macroprudential Measures Since 2008	11
References	13
<b>COLOMBIA</b>	<b>14</b>
A. Economic and Policy Context	14
B. Capital Flow Developments	15
C. Impact of Capital Flows on Systemic Risk	16
D. Policy Measures to Address Systemic Risk	18
E. Effectiveness	21

**FIGURES**

1a. Colombia—Net Capital Flows by Component	16
1b. Colombia—Gross Capital Inflows by Component	16

**TABLE**

1. Colombia—Measures Adopted	21
References	22

**CROATIA** **23**

A. Economic and Policy Context	23
B. Capital Flow Developments	24
C. Impact of Capital Flows on Systemic Risk	25
D. Macroprudential Measures	26
E. Effectiveness	29

**FIGURES**

1a. Croatia—Net Capital Flows by Component	25
1b. Croatia—Gross Capital Inflows by Component	25

**TABLES**

1a. Croatia—Main Macroprudential Measures—Pre-GFC	29
1b. Croatia—Main Macroprudential Measures—Post-GFC	30
References	31

**ICELAND** **32**

A. Experience Ahead of the Crisis	32
B. Crisis Management and Liberalization	34
C. A Revised Prudential Framework	36

**FIGURES**

1. Iceland—Capital Flows – Composition and International Comparison	33
2. Iceland—Transmission Channels Between Capital Flows and Systemic Risk	35
3. Iceland—Post-Crisis Recovery	36

**TABLE**

1. Iceland—Measures Introduced Since 2010	37
References	39

<b>KOREA</b>	<b>40</b>
A. Experience of the Benefits and Risks Associated with Capital Flows	40
B. Transmission Channels Between Capital Flows and Systemic Risk	42
C. Macroprudential Policy Reforms	43
D. Enhanced Resilience to Global Liquidity Shocks	45
<b>FIGURES</b>	
1. Korea—Income Levels, Capital Flows, and Capital Account Openness 1980-2016	40
2. Korea—Capital Flows Reversals, Liquidity Shortages, and Currency Depreciations	41
3. Korea—Economic Growth and External Position	42
4. Korea—Gross Capital Flows	42
5. Korea—Cross-Border Banking Flows and Domestic Credit	43
7. Korea—Effectiveness of Macroprudential Policy	46
<b>TABLE</b>	
1. Korea—Main Measures Introduced Since 2010	46
References	47
<b>PERU</b>	<b>49</b>
A. Economic and Policy Context	49
B. Capital Flows	50
C. Capital Flows and Systemic Risk	52
D. Macroprudential Measures and Their Effects	53
E. Effectiveness	56
<b>FIGURES</b>	
1. Peru—Capital Flows and Credit	51
2. Peru—Reserves, Exchange Rate, and Debt	52
<b>TABLE</b>	
1. Peru—Measures Since 2008	55
References	57
<b>SWEDEN</b>	<b>58</b>
A. Economic and Policy Context	58
B. The Rise of Risks and Vulnerabilities	60
C. Authorities' Response—Macroprudential Measures	62
D. Effectiveness of the Measures	63

**FIGURES**

1. Sweden—Capital Flows, External Position _____	59
2. Sweden—Assets and Liabilities of Monetary Financial Institutions (MFI), by Currency _____	61

**TABLE**

1. Sweden—Macroprudential Measures Since 2010 _____	62
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**TURKEY \_\_\_\_\_ 65**

A. Economic and Policy Context _____	65
B. Key Developments in Capital Inflows and Outflows Over the Cycle _____	66
C. Transmission of Capital Flows to Systemic Risk _____	68
D. Macroprudential Measures and their Effectiveness _____	69

**TABLES**

1. Turkey—Macroprudential Measures Since 2010 _____	70
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## Glossary

BIS	Bank for International Settlements
CBRT	Central Bank of the Republic of Turkey
CEE	Central and Eastern Europe
CFM	Capital Flow Management Measure
CFM/MPM	A measure that is both a CFM and an MPM
DC	Domestic currency
DTI	Debt-to-income
EU	European Union
FC	Foreign currency
FCLR	Foreign currency liquidity requirement
FDI	Foreign Direct Investment
FSAP	Financial Sector Assessment Program
FSC	Financial Stability Council
FX	Foreign Exchange
GFC	Global financial crisis
HNB	Croatian National Bank
IV	The Liberalization and Management of Capital Flows: An Institutional View
LCR	Liquidity coverage ratio
LTD	Loan-to-deposit
LTI	Loan-to-income
LTV	Loan-to-value
MFI	Microfinance institutions
MPM	Macroprudential measure
MPPs	Macroprudential policies
MRRs	Marginal reserve requirements
NBC	National Bank of Cambodia
NFCs	Non-financial corporates
NIIP	Net international investment position
NPLs	Nonperforming loans
NSFR	Net stable funding ratio
ROC	Reserve option coefficient
ROM	Reserve option mechanism
ROR	Reserve option ratio
RRRs	Reserve requirements ratios
SIIs	Systematically important credit institutions
SRB	Systemic risk buffer
SSRB	Structural systemic risk capital buffer
TDSR	Total debt servicing ratio
URRs	Unremunerated reserve requirements

## CAMBODIA<sup>1</sup>

*Credit growth has remained strong, despite some recent moderation, and has been funded by foreign borrowing, with a significant share channeled into the real estate sector. The authorities have taken some measures to develop macroprudential frameworks in the face of capacity and data constraints. Ongoing challenges are to build the resilience of the financial sector, especially to potential liquidity shocks, and where possible limit the pro-cyclical build-up of risks.*

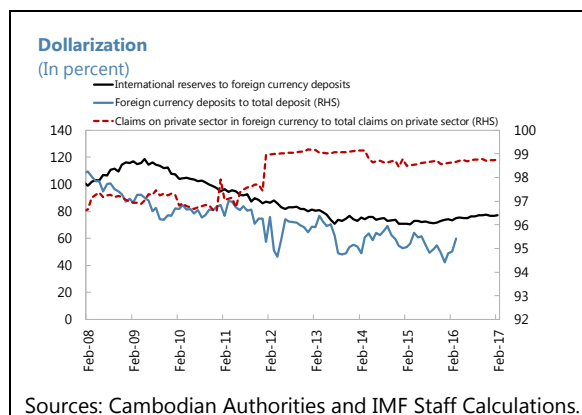
### A. Economic and Policy Context

#### 1. Cambodia is a fast-growing market-oriented economy with an open capital account.

Over the past two decades, real GDP growth has averaged around 8 percent as the country has integrated into the global economy, attaining lower-middle income status in 2016. The country embarked on market-oriented reforms after the 1991 peace settlement, and has progressively become a more open economy. Significant foreign direct investment inflows (FDI), including into the financial sector and reflecting a liberal foreign investment regime,<sup>2</sup> combined with large aid flows, have helped finance significant current account deficits.

#### 2. High dollarization constrains monetary policy options.

Some 95 percent of bank deposits are in foreign currency. As a result, the authorities have limited monetary policy independence in the context of a de facto “other managed” exchange rate regime, aiming at keeping the riel broadly stable against the U.S. dollar. The coverage of foreign currency deposits by foreign exchange reserves has been relatively low, potentially limiting the effectiveness of the National Bank of Cambodia (NBC) as a lender-of-last resort.



#### 3. Against this backdrop, Cambodia has experienced a very rapid financial deepening by cross-country standards.

The credit-to-GDP ratio reached 69 percent by end-2016, exceeding the median emerging market level and is now double the median for low-income countries (LICs). Rapid credit growth has been driven by fundamental demand factors such as strong population growth, and large housing and consumption needs. Supply factors such as the entry of new banks, including foreign banks, capital inflows, and heightening banking competition have also fueled strong growth.

<sup>1</sup> Prepared by Patrick Gitton (SPR).

<sup>2</sup> Under legislation from 1994, all economic sectors are open to foreign investment with 100 percent foreign ownership permitted in most sectors.

**4. The rapid pace of credit growth, its relatively long duration, and tilt towards real estate has increased systemic financial risks.** Strong credit growth commenced in 2003–04, was briefly interrupted in 2009, and reached 30 percent year on year on average between 2010 and 2016. Although credit growth moderated to near 20 percent in early 2017, the credit gap remains large and is estimated to exceed 10 percent of GDP<sup>3</sup>. Real estate, construction and mortgages have been the fastest growing segments of lending, with growth rates exceeding 50 percent in recent years, before slowing in 2016. Lending to the construction, real estate and mortgage sector accounted for 21.5 percent of the total credit stock at end-2016.

**5. Microfinance institutions (MFIs) are growing rapidly but financial inclusion remains low.** The MFI assets-to-GDP ratio expanded from 6 percent to 19 percent between 2011 and 2016. Credit from MFIs has been growing even faster than bank credit. Financial inclusion has nevertheless remained low, especially in rural areas.

## B. Capital Flow Developments

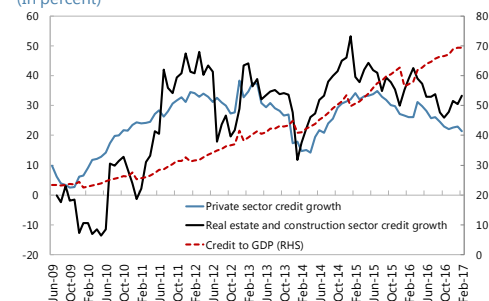
**6. Cambodia's current account deficits are funded largely by FDI inflows.** Net capital inflows rose rapidly in 2007, to close to 14 percent of GDP in early 2008, reflecting a surge in other investment inflows which subsequently reversed at the onset of the global financial crisis. Net inflows then resumed gradual growth, reaching nearly 13 percent of GDP in 2016. A portion of FDI inflows reflects purchases of residential property by investors from China and Singapore. The country has little direct exposure to international capital markets, and debt portfolio and equity inflows are negligible.

**7. Other investment inflows likely involve significant private bank and non-bank funding.** As a result, BIS reported cross-border claims on Cambodian banks have grown from 3½ percent of GDP in 2009 to around 18 percent by 2016, while commercial banks' NFA turned negative for the first time in mid-2015, with foreign liabilities exceeding foreign assets by just over 5 percent of GDP

<sup>3</sup> Credit-to-GDP gap is considered a leading indicator for financial sector stress or crises or a sharp growth slowdown. The credit gap discussed here is based on the HP filter, and is at the lower bound of the range of estimates (see IMF Country Report No 16/340).

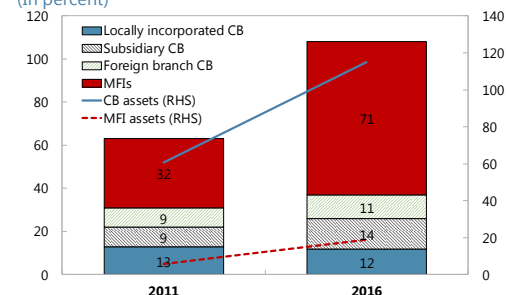
**Private Credit Growth**

(In percent)



**Cambodia: Number of Institutions and Assets to GDP**

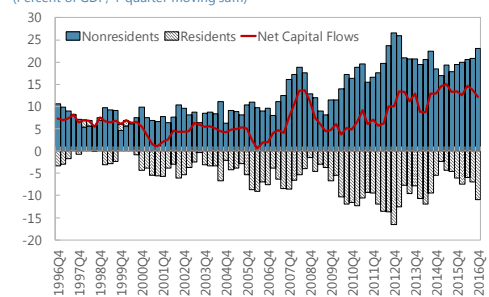
(In percent)



Sources: National Bank of Cambodia, Annual Supervision Report 2011-16, and IMF Staff Calculations.

**Capital Flows to Cambodia**

(Percent of GDP, 4-quarter moving sum)



Source: IMF.

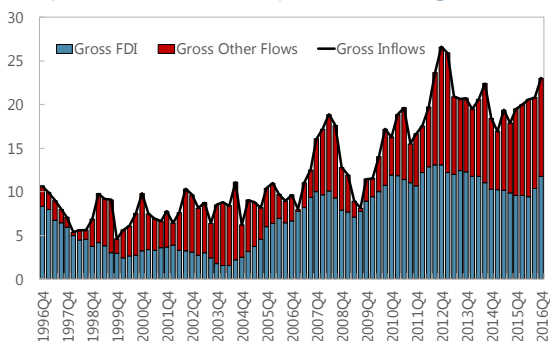


as of end-2016. Although the external data have improved, they may not yet capture the full extent of private capital flows, including foreign financing for the construction and real estate sectors.

### C. Impact of Capital Flows on Systemic Risk

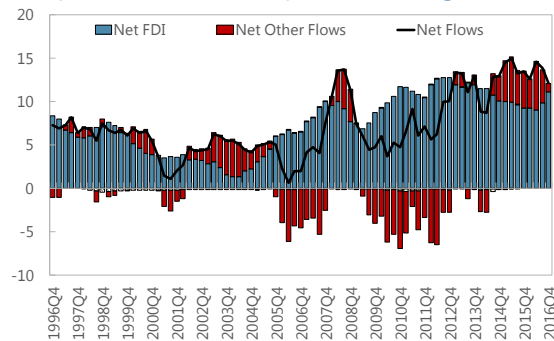
**Figure 1a. Cambodia—Gross Capital Inflows by Component**

(percent of GDP, 4-quarter moving sum)



**Figure 1b. Cambodia—Net Capital Flows by Component**

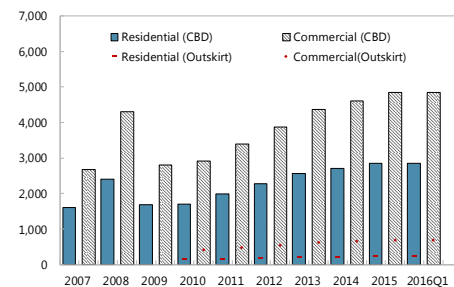
(percent of GDP, 4-quarter moving sum)



Source: IMF.

**8. Foreign banks in Cambodia have played a major role in capital inflows and the associated credit boom.**<sup>4</sup> In late 2007–early 2008, strong foreign inflows and growth in deposits contributed to private sector credit growth that peaked at over 100 percent year-on-year in mid-2008. During the global financial crisis, bank deposit growth briefly turned negative (month-on-month), tightening liquidity. At the same time, banks faced greater credit risks exacerbated by lower real estate prices. Liquidity conditions began improving in early 2009, following policy action (Table 1) and banks' own drive to attract foreign currency deposits through higher deposit interest rates.

**Average Land Market Price, 2007–16**  
(\$/sqm)

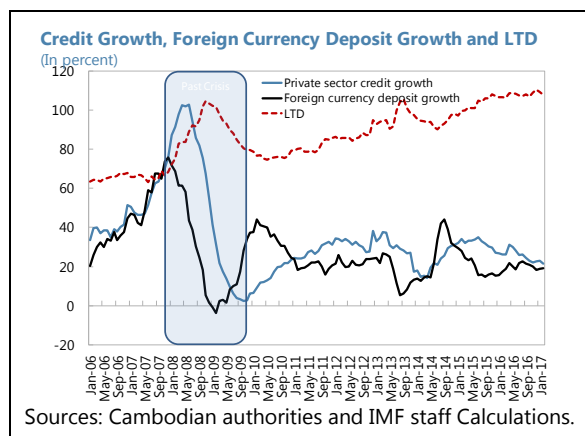


Sources: Bonna Realty Group and IMF Staff Calculations.

**9. Banks continued to rely heavily on non-core funding and the average loan-to-deposit (LTD) ratio continued its upward trend.** The average LTD reached over 100 percent at end-2016 from 79 percent at end-2010. Some 23 banks (from a total of 52 commercial and specialized banks) had LTD ratios over 100 percent, and 11 banks over 200 percent. Banks with a ratio above 150 percent were all subsidiaries or branches of foreign banks. However, foreign banks generally source 20 to 25 percent of their financing from their parents and this *de facto* stable source of funding helps mitigate funding risks.

<sup>4</sup> Some 30 of the 37 commercial banks and 9 of the 15 specialized banks are currently foreign-owned, mostly subsidiaries from other Asian countries (China, Vietnam, Korea, Malaysia, and Thailand).

**10. The rapid expansion of the real estate sector, funded in part by external borrowing, has led to a build-up of macro-financial stability risks.**<sup>5</sup> Rapid construction risks an eventual oversupply in the real estate market, which could precipitate a disorderly adjustment (with the risks particularly pronounced in the middle-range condominium segment, which has been mostly driven by foreign investors),<sup>6</sup> adversely affecting the banking sector via a spike in NPLs, potentially putting a drag on credit growth and economic activity (see Article IV 2016).



The critical link between capital flows and real estate projects was illustrated in 2009, when a reversal of flows led to the collapse of major construction projects, particularly in Phnom Penh, contributing to a severe if temporary economic slowdown.

**11. Microfinance institutions (MFIs) contribute to domestic interconnectedness.** Large deposit-taking MFIs are playing a systemic role: credit stock and flows from MFIs account for about respectively 20 and 25 percent of banking system totals. MFIs exhibit LTD ratios of more than 200 percent even though those allowed to take deposits can collect only term deposits but not demand deposits.<sup>7</sup> They are predominantly funded through foreign borrowing<sup>8</sup>, although domestic banks also fund MFIs, increasing interconnectedness. A number of deposit-taking MFIs are larger than mid-sized commercial banks while subject to looser capital and reserve requirements than banks, including lower reserve requirements on deposits, and no reserve requirements on external borrowing.

## D. What Prudential Tools Have the Authorities Introduced to Mitigate Risks?

**12. The authorities have sought to address the risks stemming from significant capital inflows and credit growth through a range of macroprudential measures:**

<sup>5</sup> There are no official housing data, which complicates the analysis of the link between housing and credit booms, and there are also limited data on household balance sheets and leverage. Figures from a real estate agency suggests that Phnom Penh's land price for residential and office space increased 26 percent and 19 percent, respectively, year-on-year in 2015, which was the highest growth rate among Asian cities.

<sup>6</sup> FDI in real estate mainly comes from China (60 percent) and Singapore (30 percent).

<sup>7</sup> There are seven microfinance deposit-taking institutions out of 71 MFIs.

<sup>8</sup> MFIs' funding largely comes from their parents, and from international or bilateral development financial institutions, which the authorities consider to be a stable form of funding.

- *Liquidity tools.* Reserve requirements have been the main instrument used to contain excess liquidity fueled by external funding, and to moderate the pace of credit growth.<sup>9</sup> In 2008, the NBC doubled the reserve requirement on foreign currency bank deposits to 16 percent amid large sustained capital inflows, although this was subsequently relaxed to 12 percent in early 2009 during the global financial crisis. As inflows resumed, the authorities raised bank reserve requirements for foreign currency deposits again by a slight 50 basis points to 12.5 percent in September 2012. To address risks associated with growing non-core funding sources, banks' external borrowings were included in the reserve requirement base in March 2015.<sup>10</sup> Reserve requirement rates are now 8 percent for local currency liabilities (unremunerated) and 12.5 percent (of which 4.5 percent is remunerated) for foreign currency liabilities (including external borrowing).
- *Broad-based capital tool.* Regulatory increases in minimum capital requirements have aimed at further strengthening the resilience of the financial sector.<sup>11</sup>
- *Sectoral asset-side tool.* A lending cap of 15 percent was imposed on the property sector of banks' total loan portfolios in 2008.

**13. The NBC has recently taken further steps to enhance the resilience of the financial system.** Liquidity regulations have been strengthened by introducing a Basel-III compliant liquidity coverage ratio in September 2016 with the aim of building buffers against liquidity shocks and helping to dent credit momentum. In October 2016, the NBC established liquidity-providing collateralized operations. These open market operations aim at boosting local currency liquidity and could help if the overall liquidity position were to reverse. A draft regulation envisages capital conservation buffers and countercyclical buffers (in line with Basel III). The NBC has also been working on revising regulations on asset classification and provisioning, and on a prompt corrective action framework.

**14. The authorities have also aimed to contain risks pertaining to real-financial linkages which could increase procyclicality.** In addition to a lending cap on the property sector imposed in 2008, the authorities have recently tightened licensing and supervision on real estate developers, and expanded the coverage of stamp duty on real estate transactions (without differentiating by residency). A new regulation effective April 2017 caps the interest rate on all MFI loans at 18 percent,

<sup>9</sup> The efficiency of other liquidity management tools has proved more limited. The NBC issues monthly Negotiable Certificate of Deposits (NCD) to absorb banks' excess reserves in foreign currency, and operates an overdraft (unsecured) lending facility.

<sup>10</sup> External borrowings were excluded from the banks' reserves requirement base shortly after the reserve requirement framework was established in February 2009. However, in March 2015, external borrowings were reinstated amid large sustained capital inflows. While this was aimed at mitigating financial stability risks related to excessive credit expansion, it makes banks' external borrowing more costly, and limits capital inflows. Therefore, staff assesses that the inclusion of external borrowing in the banks' reserve requirement was a capital flow management measure (CFM) under the Fund's institutional view on capital flows.

<sup>11</sup> The National Bank of Cambodia (NBC) raised banks' minimum capital requirements in March 2016—the first such increase since 2008, from US\$37.5 to US\$75 million. Banks have until March 2018 to comply. The system-wide bank capital adequacy ratio rose from 21 percent to 22.3 percent in 2016. Minimum capital requirements for deposit-taking MFIs were raised from \$2.5 million to \$30 million.

regardless of loan maturities. This reflects the authorities' concerns about excessive debt accumulation in rural areas.

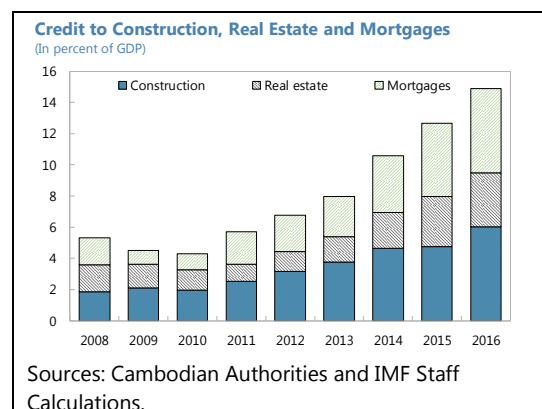
**Table 1. Cambodia—Macroprudential Measures Since 2008**

Measure	Implementation
<b>Broad-based capital tools</b>	
Minimum capital requirement increase	September-08
Minimum capital requirement increase	March-16/March-18
<b>Sectoral asset-side tools</b>	
Cap on bank lending to the real estate sector, 15 percent of loan portfolio	June-08
<b>Liquidity tools</b>	
Reserve requirements: exclusion of external borrowing	March-09
Reserve requirements: increase for FC deposits from 8 to 16 percent	June-08
Emergency overdraft facility	January-09
Reserve requirements: decrease for FC deposits from 16 to 12 percent	February-09
Reserve requirements: increase for FC deposits from 12 to 12.5 percent	September-12
Reserve requirements: inclusion of foreign borrowing	March-15
Liquidity coverage ratio	September-16/January-20

Source: IMF Staff Reports.

## E. Effectiveness of Prudential Measures

**15. The banking sector appears well capitalized, supporting resilience if capital flows recede and the lending boom slows.** Overall capital adequacy stands above 22 percent against a regulatory requirement of 15 percent. As is common in lending booms, the system-wide NPL ratio is low at below 2.5 percent, although a lack of detailed guidance on the treatment of restructured loans<sup>12</sup> and high returns on equity and assets suggest that NPLs may be higher than officially stated.



**16. However, credit growth has remained high, the real estate sector buoyant, and banks exposed to liquidity risk.** While credit growth moderated from 26 percent in 2015 to 21 percent by end-2016, this remains high. The average loan-to-deposit ratio has also been increasing owing to funding from overseas parents to foreign branches and subsidiaries. Growth in mortgages and credit to the real-estate sector has slowed from respectively 41 and 52 percent (year on year) in 2015 to 28 and 21 percent respectively in 2016. In this context, activity in the real estate sector has nevertheless remained buoyant, reflecting both demand and supply factors, and the financial sector has remained exposed to liquidity risks, with a relatively low ratio of liquid assets to short-term liabilities (about 24 percent at end-2016). The increase in reserve requirements appears to have had a limited medium-term effect on credit growth and did not contain increased reliance on short-term external borrowing.

<sup>12</sup> A draft regulation on impaired loans is being prepared to improve transparency in this area.

**17. The Article IV consultations in 2015 and 2016 recommended additional measures to build resilience and help engineer a soft landing of the credit cycle.** While supervisory capacity has improved since the 2010 FSAP recommendations, gaps in financial supervision and regulation have remained. A critical challenge highlighted was to close the regulatory gap stemming from the fact that MFIs are competing with banks for the same funding base and are subject to similar credit, liquidity and FX risks as banks, but subject to looser regulations. Article IV consultations recommended an expanded range of micro and macroprudential tools.<sup>13</sup> These include sectoral tools such as higher risk weights, concentration limits, and LTV/DTI limits on real estate lending; and liquidity tools such as limits on LTD ratios to strengthen internal sources of funding and serve as a brake on excessive credit growth.

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<sup>13</sup> See IMF Country Report No. 15/307 and No. 16/340 for a comprehensive set of recommendations.

## References

International Monetary Fund, 2015, "Cambodia: 2015 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Cambodia," IMF Country Report No. 15/307 (Washington, DC: International Monetary Fund).

\_\_\_\_\_, 2016, "Cambodia: 2016 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Cambodia," IMF Country Report No. 16/340 (Washington, DC: International Monetary Fund).

## COLOMBIA<sup>1</sup>

*After being very significant in the 1990s and mid-2000s, systemic financial risks associated with capital flows have moderated in Colombia in recent years, despite a significant capital inflow surge and an increase in the share of portfolio flows in total capital flows. Such increased resilience to capital flows reflects sound macroeconomic policies, including a flexible exchange rate regime, and a broad range of macroprudential measures.*

### A. Economic and Policy Context

#### 1. Colombia has gone through a period of economic reform and macroeconomic strengthening in the past two decades.

Following a financial crisis in the late 1990s, Colombia adopted wide ranging macroeconomic and structural reforms. These included the adoption of a flexible exchange rate regime, an inflation targeting framework, a comprehensive reform of public finances, and a strengthening of financial supervision and regulation. These reforms, together with an improvement in domestic security conditions, helped boost economic performance, and the strong policy framework has also facilitated adjustment to external shocks.

#### 2. The macroeconomic policy framework currently relies on the following key elements:

- **An inflation-targeting monetary policy framework**, adopted in 1999, which helped anchor inflation expectations, brought inflation down from 26 percent in the first half of the 1990s to single digits in recent years, and supported a strong response following a large depreciation in 2015.<sup>2</sup>
- **A flexible exchange rate regime**, which combined with limited currency mismatches among banks and corporates, has served as a shock absorber to terms of trade or financial account shocks.<sup>3</sup>
- **A fiscal framework based on a structural balance rule.** The fiscal responsibility and transparency law of 2003 improved the institutional framework. Since 2012, the authorities have managed fiscal policy guided by a structural balance-fiscal rule, which envisages significant fiscal consolidation over the medium term.
- **Strong financial supervision and regulation.** The authorities have made substantial progress in financial regulation and supervision over the years, including by implementing a risk-based supervisory framework, reforming regulations on derivatives, establishing countercyclical

<sup>1</sup> Prepared by Pablo Morra (SPR).

<sup>2</sup> The central bank's inflation target is 3 percent +/- 1 percent.

<sup>3</sup> Starting in 2010, in periods of large inflows, the central bank conducted pre-announced daily FX purchases, whose size was reviewed and recalibrated periodically. When the decline in oil prices hit the economy and the peso depreciated sharply, the authorities interrupted the FX purchase program. In October 2015, in the context of continuing depreciating pressure, the central bank launched an FX sale program to prevent disorderly market conditions and ease FX liquidity pressures if necessary. The program ended in May 2016.

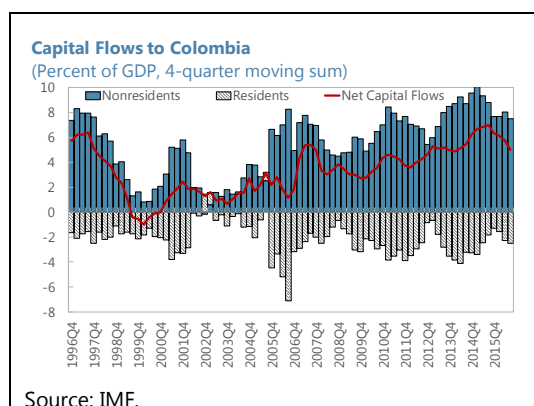
provisions, and enhancing regulations on liquidity risk. Work is ongoing on the adoption of Basel III capital standards and new legislation on conglomerates that will provide additional tools to manage risks.

**3. The authorities responded effectively to shocks in recent years.** A strong policy framework, a sound financial system, moderate public debt, and resilient corporate and household balance sheets helped facilitate adjustment and maintain macroeconomic stability when the global financial crisis hit the economy in 2008, slowing economic growth. The large drop in the terms of trade experienced since 2014 slowed economic growth, and widened the current deficit. In addition, currency depreciation, together with domestic shocks, pushed inflation above the target range, while inflation expectations remained broadly anchored. However, timely policy tightening helped set inflation on a gradual convergence path towards the target range and contain fiscal deterioration, while exchange rate flexibility facilitated external adjustment. The current account deficit declined from 6.4 percent of GDP in 2015 to 4.4 percent of GDP in 2016, with further narrowing expected to take place in 2017.

**4. External financing needs have grown, and while balance sheets remain strong, pockets of vulnerability have emerged in the corporate sector.** Gross external financing requirements have increased sharply since 2013 due to higher current account deficits and short term corporate debt. The external accounts have also become more reliant on portfolio debt flows, which despite ongoing external adjustment, imply greater vulnerability to changes in market sentiment. Balance sheets remain strong, with gross public sector debt (50 percent of GDP at end-2016) in line with average emerging market levels, and modest levels of corporate debt (46 percent of GDP) and household debt (20 percent of GDP) by international standards. Corporate balance sheets have worsened somewhat in recent years, with vulnerabilities having emerged in certain sectors, such as agriculture, mining, and transport. The financial system appears to be sound and broadly resilient to shocks.

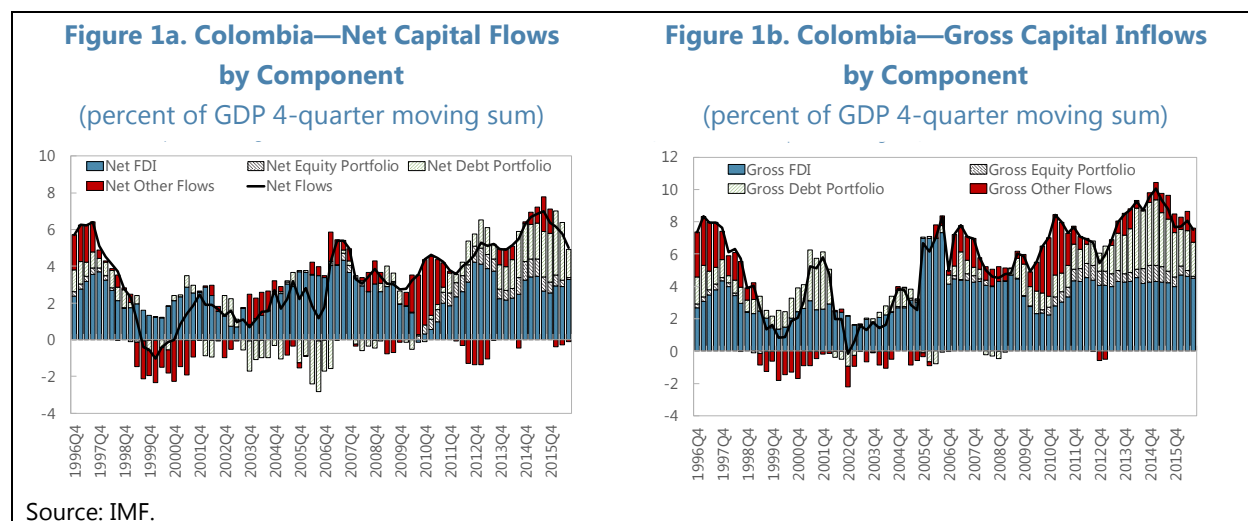
## B. Capital Flow Developments

**Colombia experienced capital inflow surges in the mid-1990s, the mid-2000s, and in 2012–15.** Net capital inflows rose rapidly in the mid-1990s, peaking at 6½ percent of GDP in 1997, and then declined sharply with net outflows by late 1999–early 2000 amid a financial crisis. Net inflows rose rapidly again in 2006–07, peaking at 5½ percent of GDP by mid-2007. They subsequently declined during the global financial crisis of 2008–09, but remained in positive territory. Colombia saw another increase in net capital inflows during 2012–15, but the rise was less pronounced than in the previous two episodes. After reaching an all-time high level of 7 percent of GDP in mid-2015, net inflows declined in subsequent quarters as portfolio inflows subsided.





**5. The share of portfolio flows in total capital flows has increased since 2013.** Portfolio flows, in particular debt flows, have been boosted by lower taxation and the inclusion of Colombia in international bond indices. As a result, portfolio flows have become almost as important as FDI as a source of financing of the current account deficit, which could expose Colombia to higher capital flow volatility.



## C. Impact of Capital Flows on Systemic Risk

**6. In the past, credit has been highly correlated with capital flows.** Villar et al. (2005) estimated a correlation coefficient of 62 percent between capital flows and total credit to the private sector, including foreign credit for the period through 2003, with the correlation being strongest in the 1990s, and a correlation coefficient of 31 percent if foreign credit is excluded.<sup>4</sup> (See Carrasquilla et al. (2000), Tenjo & López (2002), and Villar et al. (2005)) However, the relationship between capital flows and credit seems to have weakened in recent years.

**7. A surge in capital inflows in the 1990s triggered strong growth in credit and domestic asset prices that ended in a severe financial crisis in the late 1990s.** The boom was concentrated in the mortgage and consumer sectors, resulting in a significant increase in real estate prices and household debt. Weaknesses in financial supervision and regulation during this period—and regulatory forbearance in the case of the public banks—may have contributed to the credit boom and buildup of vulnerabilities.<sup>5</sup>

**8. When a series of external shocks hit the economy in the late 1990s, reducing capital inflows and economic growth, the financial system came under severe stress.** The nonperforming loan ratio jumped from 8 to 16 percent between 1997 and 1999, and by 2000 20 percent of all mortgages were non-performing. While the financial system had a low

<sup>4</sup> The estimates correspond to the period 1975 to 2003.

<sup>5</sup> IMF (2001), "Banking Stress in the Late 1990s," Selected Issues Paper.

direct exposure to exchange rate risk, banks had indirect exchange rate exposures because of unhedged borrowers, particularly corporates affected by the peso depreciation. The economic downturn and contraction in credit accelerated the decline in real estate prices, with a negative feedback loop to the financial system. The crisis led to a deep contraction in output, and its resolution required a comprehensive policy response that included measures to provide mortgage debt relief and facilitate restructuring and recapitalization of private banks, and resolution of public banks.

**9. Drawing lessons from the financial crisis, the authorities implemented a broad range of reforms and measures, including the adoption of MPMs.** The crisis triggered a reformulation of the macroeconomic policy framework. It also raised awareness of the need to strengthen financial supervision and regulation, closely monitor episodes of excessive growth in credit and asset prices (including those fueled by capital inflows), pay attention to currency mismatches, and increase coordination between government agencies in charge of macroeconomic and financial stability. All these lessons led to the establishment of a comprehensive set of measures including macroprudential measures (MPMs) (see next section).

**10. The first test for the new policy framework came in 2006–08.** Colombia once again experienced a capital inflow surge that fueled strong credit growth and a rise in housing prices. The credit boom also had important domestic drivers, as lower returns from government bond holdings induced banks to expand lending aggressively. It was also accompanied by an increase in credit risk, a widening of the current account deficit, and higher non-tradable inflation. The authorities responded by hiking interest rates. But given delays in monetary policy transmission and rising risks to macroeconomic and financial stability, they also frontloaded the implementation of a new system of credit risk control, introduced marginal reserve requirements (MRRs) on deposits, and imposed unremunerated reserve requirements (URRs) on capital inflows. Credit growth subsequently slowed during the global financial crisis of 2008–09, which led to the elimination of the MRRs and the reduction of the URRs to zero (see next section).

**11. In more recent years, the rise in capital inflows did not lead to systemic financial risks.** After the global financial crisis, capital inflows recovered, reaching an all-time high level of 7 percent of GDP by mid-2015. The risks associated with subsequent increases in credit growth were managed through macroeconomic policies (tighter monetary policy in 2012–14 and exchange rate flexibility) and existing MPMs. Credit and asset prices increased, but at a more moderate pace than during previous capital inflow surges, and their evolution was not assessed to pose systemic financial risks. Lower concentration of banks' holdings of public debt in banks' assets, in contrast with 2006–08, also contributed to contain credit growth. During this period, the authorities did not resort to capital flow management measures (CFMs). However, they stated that, if capital inflows were to endanger financial stability, they would consider reintroducing tools used in previous capital inflow surges, possibly including CFMs.

**12. While not directly linked with capital inflows, house price developments increased systemic risk in recent years.** House prices grew significantly in recent years, partly driven by continued strong growth in mortgage credit. Staff estimated that real estate prices are currently

about 13 percent above the level implied by fundamentals (see Staff Report for the 2017 Article IV Consultation). Risks stemming from house prices are, however, mitigated by low loan-to-value ratios (currently well below the 70 percent regulatory ratio) and the small share of mortgage lending in banks' total credit portfolios (13 percent on average).

#### D. Policy Measures to Address Systemic Risk

**13. Colombia has had longstanding measures to limit systemic financial risks.** These include limits on foreign currency loans, interbank exposures, and concentration, introduced in 1993. The limits on foreign currency loans aim at addressing currency and liquidity mismatches by permitting credit institutions to borrow externally only to on-lend locally in foreign currency, and at tenors of equal or shorter maturity of such related funding. The limit on interbank exposures establishes that no intermediary can lend an amount greater than 30 percent of its capital to a particular financial institution. The concentration limits address credit concentration risks, and establish that no intermediary can lend an amount greater than 10 percent of its capital to a particular individual, provided that the only guarantee is the debtor's own capital. Credit institutions are required to report the concentration of their loan portfolios quarterly.

**14. After the crisis of the late 1990s, the authorities strengthened their macroprudential framework.** Some of the measures introduced or tightened included: (i) limits on loan-to-value (LTV) and debt service to income (DTI) ratios for mortgage loans; (ii) changes in provisioning and collateral requirements for consumer credit; and (iii) limits on net open foreign exchange positions, with a requirement to match the maturity structure of net foreign exchange positions.

**15. Loan-to-value (LTV) and debt-to-income (DTI) limits on mortgages were introduced in 1999.** The LTV and DTI limits were set at 70 percent of the home value and 30 percent of the disposable income of the borrower, respectively. They were put in place with the objective of reducing households' leverage (which was very high in the late 1990s), containing credit risk, and limiting the exposure of financial institutions to house price changes.

**16. New measures were put in place in 2007, amid a capital inflow surge and rapid credit growth.** Measures introduced during that period included marginal reserve requirements (MRRs) on deposits, an unremunerated reserve requirement (URRs) on certain capital inflows, a countercyclical loan provisioning scheme, and tighter limits on foreign exchange exposures. While the MRRs and URRs were eventually eliminated as capital inflows declined and systemic financial risks eased, the other measures were maintained, and became part of the permanent macroprudential framework.

**17. The central bank introduced marginal reserve requirements (MRRs) on domestic deposits in 2007 in an effort to curtail rapid credit growth.** The authorities felt that credit dynamics were being driven by a supply shift amid a large increase in capital inflows. In turn, new loan vintages involved higher credit risks. To complement the existing set of reserve requirements, MRRs were introduced on CDs, checking and savings accounts with a view to contain private sector leverage and safeguard the credit risk of the financial system, preventing a deterioration in the credit quality of new vintages of loans. When the global financial crisis hit in 2008, reserve

requirements were lowered to provide liquidity to the system, and the MRRs established in 2007 were eliminated in late 2008 as credit growth slowed.

**18. The MRRs on domestic deposits were complemented with URRs on short-term foreign borrowing and portfolio inflows.** Colombia had used URRs on capital inflows before,<sup>6</sup> and reactivated them in 2007, amid a large increase in capital inflows. A URR of 40 percent with a holding period of six months was imposed on foreign borrowing and portfolio inflows of all maturities.<sup>7</sup> The URRs were loosened in December 2007, tightened back in May 2008, and loosened again in September 2008.<sup>8</sup> As the global financial environment worsened, the URR rate was set to zero in late 2008.

**19. MRRs and URRs have not been used again.** The use of the MRRs and URRs responded to the set of circumstances and risks faced by the financial system and the economy in 2006–08, which did not recur during the capital inflow surge of 2012–15. While the authorities are committed to an open capital account, they do not rule out using these instruments again in case of need for a temporary period of time (as was the case in 2007–08) should systemic financial risks arise.

**20. Countercyclical provisioning for commercial loans was adopted in 2007, and extended in 2008 to consumer loans.** The objective was to establish a countercyclical buffer through loan loss provision requirements. The system allows each bank to create an additional buffer of loan loss reserves in good times to cushion a rise in specific provisioning costs during a subsequent downturn. Banks can measure the credit risk of the loans using either the regulatory reference model or approved proprietary models. The regulatory model establishes three types of tax-deductible provisions: individual, countercyclical, and general provisions.<sup>9</sup>

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<sup>6</sup> In 1993, as capital inflows were liberalized, Colombia introduced a URR of 47 percent on short-term (less than 18-month maturity) foreign loans that were not trade financing to dampen short-term financial inflows. The deposit had to be kept during 12 months or redeemed with a discount. The reserve requirement rate, its holding period, and the term of the foreign loans subject to reserve requirements were actively managed during 1993–2000. The URR was set to zero (but not eliminated) in April 2000.

<sup>7</sup> Early withdrawals of funds were allowed, but with sizable penalties, ranging from 9.4 percent of the reserve requirement (for immediate withdrawals) to 1.6 percent (if held for five months).

<sup>8</sup> In December 2007, the penalties for early withdrawal of funds were reduced and the initial public offerings of equities were exempted from the URR. The URR on portfolio inflows was raised from 40 to 50 percent in May 2008, and in June the penalty for early withdrawal of deposits was raised. In September 2008, purchases of equities were exempted from the URR.

<sup>9</sup> Countercyclical provisions cover credit risk from changes in the borrower's creditworthiness due to changes in the economic cycle. In the regulatory reference model, individual provisions are calculated based on expected losses under a regulatory baseline scenario. When growth is rapid, countercyclical provisions are calculated as the difference between expected losses in a more adverse scenario and the baseline scenario. During periods of slow growth, countercyclical provisions are not required. Banks can use countercyclical provisions to compensate for some of the increase in individual provisions during an economic downturn. See Fernandez de Lis and Garcia Herrero (2010).

**21. The authorities also took measures to limit foreign exchange exposure, including through derivatives.**<sup>10</sup> Limits on open FX positions had been in place since the early 1990s, and had been tightened in the early 2000s. In 2007, the central bank added a separate ceiling on gross foreign exchange open positions in derivatives to the existing overall limit on the net foreign exchange open position. It set a limit on banks' gross currency derivative positions of 500 percent of capital on both the short and long sides.

**22. There were also measures to strengthen liquidity risk management.** In 2009, the authorities introduced the liquidity risk management system ("Sistema de Administración de Riesgo de Liquidez," or SARL in Spanish). The system applies to credit institutions, financial cooperatives, trust companies, and mutual fund and equity fund managers. It aims at identifying, measuring, controlling, and monitoring liquidity risk. Taking advantage of SARL, the central bank's financial stability report presents a liquidity risk indicator along with additional stress test scenarios.

**23. The expansion in regulation and supervision widened information availability.** Greater information availability allowed the authorities to improve their vigilance of systemic risks in the financial system, and also to apply a battery of stress tests to the financial system. The authorities also monitor the health of balance sheets in the non-financial corporate sector to try to detect any build-up of vulnerabilities that could raise macroeconomic and financial stability risks.

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<sup>10</sup> Most Latin American countries impose some restrictions on banks' FX positions. These vary considerably, with wide differences in the relative treatment of short and long positions.

**Table 1. Colombia—Measures Adopted**

<b>Measure</b>	<b>Implementation</b>
Limits on foreign exchange exposure	1991, tightened in 2004 and 2007
Limits on foreign currency loans	1993
Limit on interbank exposures	1993
Limit on credit concentration	1993
Maximum LTV ratio on mortgages, 70 percent	1999
Maximum DTI ratio on mortgages, 30 percent	1999
Marginal reserve requirements on deposits	2007; eliminated in 2008
Unremunerated reserve requirements on capital inflows	2007; set to zero in 2008
Countercyclical provisioning	2007
Liquidity risk management system	2009

Sources: IMF Staff Reports, Selected Issues Papers, and Working Papers.

## E. Effectiveness

**24. The financial system appears to be sound and broadly resilient to shocks, supported by the MPM framework.** As of end-2016, capital adequacy was strong (regulatory capital to risk-weighted assets of 17.5 percent), liquidity was ample (liquid assets cover 18 percent of total assets and 40 percent of short-term liabilities), nonperforming loans were low (3.1 percent of gross loans) and more than fully provisioned, and the financial system was profitable. Loans have conservative loan-to-value ratios, of around 55 percent, well below the regulatory cap established at 70 percent by law. In addition, official stress tests suggest that existing countercyclical provisions would help banks withstand large macro-financial shocks.

**25. The effectiveness of the MPMs is an area of continuing study.** MPMs were implemented together with a notable strengthening of the macroeconomic policy framework, making it difficult to identify the individual effects of the MPMs. Some measures seem to have been effective in taming credit growth. Gomez, Lizarazo, Mendoza and Murcia (2016) find that dynamic provisions and the reserve requirements had a negative effect on credit growth, with the effects depending on bank-specific characteristics. Their results also suggest that the aggregate macroprudential policy stance has worked as an effective stabilizer of credit cycles, with preliminary evidence of reduced bank risk-taking.

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## CROATIA<sup>1</sup>

*Like many countries in Central and Eastern Europe (CEE), Croatia experienced strong capital inflows in the run-up to the global financial crisis (GFC). During this period, the Croatian National Bank (HNB) introduced macroprudential measures to achieve two objectives: (i) contain systemic risks by averting excessive credit growth, in a context of limited room for maneuver with regards to monetary policy, and (ii) limit the FX exposure of the banking sector and ensure sufficient capital and liquidity buffers. While policy leakages eroded the effectiveness of macroprudential measures in slowing overall credit growth, the measures contributed to improving the resilience of the financial sector. Indeed, the banking sector has fared the recession well, and it remained stable, well capitalized and profitable during the GFC and the six-year recession that followed.*

### A. Economic and Policy Context

1. **Like many countries in its region, Croatia experienced very rapid economic growth in the run-up to the global financial crisis (GFC) accompanied by a build-up of external and financial imbalances.** Strong capital inflows, partly channeled through Croatia's largely foreign-owned banking sector, underpinned robust credit and economic growth. In part due to poor competitiveness, the current account deficit widened to 9 percent of GDP in 2008, and the net international investment position (NIIP) deteriorated to over 75 percent of GDP. Corporate and household debt reached around 110 percent of GDP, while general government debt was below 40 percent of GDP.
2. **Capital inflows occurred in a context of a heavily euroized banking system and a quasi-fixed exchange rate.** The euroization of deposits, which was a heritage from Yugoslavia, created a large funding base in euros that induced banks also to lend in euro or via euro-indexed loans, leading to indirect FX credit risk. The risk was somewhat mitigated by the HNB's policy of maintaining the exchange rate stable vis-à-vis the euro but created the classic policy dilemma - ensuring some room to maneuver for monetary policy under a quasi-fixed exchange rate in a context of a high degree of capital mobility. With monetary policy constrained, the HNB applied macroprudential policies to help to contain systemic financial risks including those arising from rapid domestic credit growth.
3. **Croatia's post-crisis recovery has been materially slower than its peers, although the financial system has remained stable.** The recession lasted six years, with real GDP falling by more than 12 percent and the unemployment rate doubling to 17 percent by 2014 (ILO measure). Meanwhile, the banking sector has, on average, remained well capitalized and liquid, notwithstanding a significant ramp-up in non-performing loans.

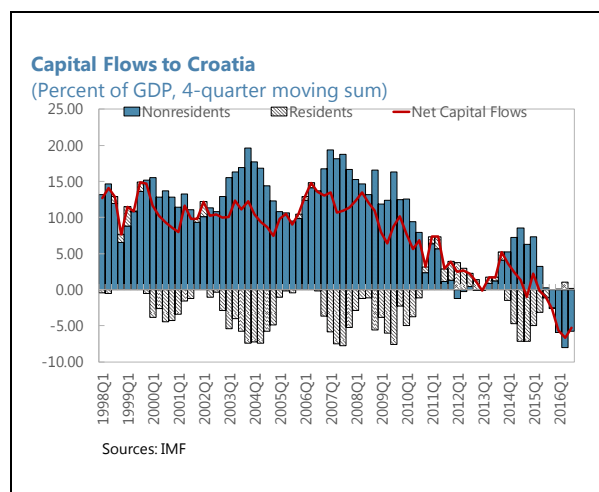
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<sup>1</sup> Prepared by Gabor Pula (SPR).



## B. Capital Flow Developments

**4. As elsewhere in the region, Croatia’s economic transformation attracted large capital inflows, although portfolio flows remained modest.** A broad set of factors triggered capital inflows from the early 2000s through 2007, both regional and country specific. Beyond the global search for yield, the major push factor was a systematic extension of credit to CEEs by large euro area banks in anticipation of the first wave of the EU membership, a trend that also benefited Croatia (even though its accession occurred later, in 2013). Pull factors included the large pent-up demand for credit, also common across the region, namely, for housing and car loans, and the improved health of the banking sector following a restructuring process to remove bad assets.

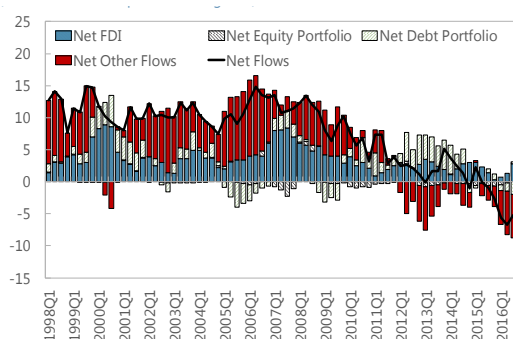


**5. The largely foreign-owned banking system was an important channel for much of these inflows.** The euro area banks acquired a dominant share of the Croatian banking system after the 1998 banking crisis, and the parent banks provided large-scale wholesale funding—mainly in euros—to their subsidiaries until global conditions started to deteriorate in 2007. The availability of this funding complemented significant domestic financing in FX. After the HNB put in place macroprudential measures to discourage FX lending by domestic banks in 2005–06, some non-financial corporates (NFCs) started to borrow directly from the parent banks abroad.

**6. The small share of volatile capital flow components dampened the risk of exchange rate depreciation.** The high share of FDI, the long maturity of public and private external debt, and limited foreign involvement in the stock market implied little hot money inflows, and helped support exchange rate stability. While the banking sector was vulnerable to funding shocks, the fact that cross-border lending mainly occurred via parent funding (rather than at arms-length) tended to dampen liquidity risks.

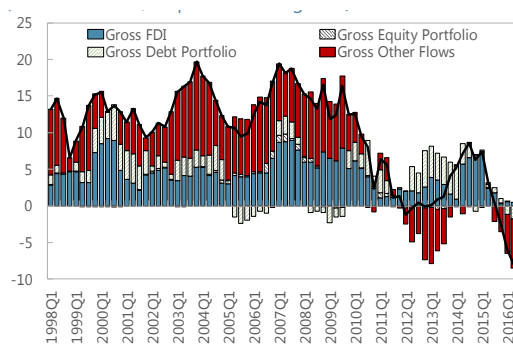
**7. Capital flows moderated significantly after the GFC, and more recently there have been capital outflows.** Continued external borrowing by the Croatian government was offset by deleveraging of banks and other domestic sectors. Direct cross-border lending by NFCs started to decline in 2010 and weakening credit demand prompted Croatian banks to reduce external credit lines. Overall net capital inflows, which ran at an annual rate of around 10 percent of GDP in 2000–10, fell below 5 percent of GDP after the GFC and turned negative in 2014–15.

**Figure 1a. Net Capital Flows by Component**  
(percent of GDP, 4-quarter moving sum)



Source: IMF

**Figure 1b. Gross Capital Inflows by Component**  
(percent of GDP, 4-quarter moving sum)



## C. Impact of Capital Flows on Systemic Risk

**8. Capital inflows contributed to the accumulation of systemic risk via a number of channels including a credit boom.** The flows helped drive the domestic credit boom directly via extensive cross-border lending to the banking sector.<sup>2</sup> Historical data indicate a strong relationship between capital inflows (both net and gross), particularly other investment flows, and changes in credit in the past 15 years. Annual credit growth reached 30 percent in the early 2000s and after a temporary slowdown in 2004–05, accelerated again to 20 percent by 2007. The credit boom was driven by borrowing of both corporate and household sectors.

**9. The credit boom was accompanied by a surge in asset prices.** Residential real estate prices increased by nearly 50 percent in 2003–06,<sup>3</sup> with faster growth rates in the capital city, Zagreb, and the coastal areas. With increased collateral values, mortgage lending boomed, and loans provided to the household sector by banks increased more than fivefold between 2000 and 2008, demonstrating the strong effect of the financial accelerator at work.

**10. The surge in banks' wholesale FX funding and resultant on-lending in FX led to indirect credit risk, mitigated by the extent of exchange rate stability.** Drawing on the funding from their parents (as well as domestic funding in FX), foreign-owned banks provided FX or FX-indexed loans to corporate and household borrowers. Although many such borrowers lacked FX income, demand

<sup>2</sup> While the credit boom and other systemic risks were of concern to the Croatian authorities, the home country supervisors generally paid little attention to this development because balance sheets in Croatia were small relative to that of the parent bank. The lending was also profitable for the parent banks, many of which were dedicated to gaining market share in the CEE region.

<sup>3</sup> Index of average prices per square meter (Kunovac et al (2008)).

for FX loans remained steady, fueled by significant interest rate differentials and expectations that sustained capital inflows would prevent depreciation of the exchange rate. As a result, foreign exchange and FX-indexed loans amounted to 85 percent of total loans in 2000 and the ratio remains elevated at around 60 percent of total loans.

**11. Until the mid-2000s, a significant share of domestic lending loans was provided in (or indexed to) the euro.** Banks started to offer Swiss franc-indexed loans beginning in 2004, which grew rapidly until the crisis, reflecting a roughly 100–150 basis points interest rate differential. The share of Swiss franc denominated and indexed loans remained at 10.2 percent of the stock of FX loans until end-2015, when the authorities' forced conversion program, which converted Swiss franc loans to floating rate euro loans, was implemented.

**12. The reversal of capital flows following the GFC and the economic downturn contributed to a significant slowdown in credit growth and decline in asset prices.** In 2010, credit growth stabilized at single digit rates as continued borrowing by the government compensated for the gradual deleveraging of the household sector. From 2012, however, private sector deleveraging accelerated and credit growth turned negative. The stock market valuation dropped by more than 50 percent in 2008 and has not yet fully recovered, while property prices have also declined since the GFC and remain 20 percent below their pre-crisis level.

**13. The share of FX-indexed loans has started to decline in 2013 due to both demand and regulatory changes.** Lending in kuna has risen gradually since 2013, with an acceleration in 2016. The drivers of this trend include enhanced household demand for kuna loans driven by lower interest rates; greater consumer awareness of the risks of borrowing in FX in light of the experience with Swiss franc-indexed loans; regulatory changes, which prompted the banks to expand the supply of kuna loans; and stronger competition among banks to grant new loans in the context of still subdued lending activity<sup>4</sup> (Ljubaj and Petrovic (2016)).

## D. Macprudential Measures

**14. Macprudential policies were implemented in Croatia to avert a damaging credit boom, and ensure the banking system remained resilient to potential losses associated with large FX exposures (Kraft and Galac (2011))<sup>5</sup>.** Both of these challenges were related to the high degree of euroization in the Croatian banking sector. On one hand, the widespread indexation of principal value of loans to the euro meant that Croatian banks were exposed to indirect credit risk

<sup>4</sup> To address the increasing debt servicing burden of unhedged households indebted in Swiss franc, in 2015 the authorities required banks to retroactively convert Swiss franc denominated or indexed loans to variable rate euro loans, resulting in a cost to banks at around 2 percent of GDP. The conversion of Swiss franc loans to variable rate euro loans had no direct impact on the share of kuna borrowing. While households with Swiss franc loans reduced their debt and substantial uncertainty was removed, currency risk has been substituted by interest risk (See Article IV Consultation 2016, Annex 1).

<sup>5</sup> In addition to the measures discussed in this section, the authorities also implemented a general increase in the capital adequacy requirement ratio, limits on the currency mismatch in banks' balance sheets, and introduced higher capital requirements for fast-growing banks.

due to lending in FX to unhedged borrowers. The HNB's policy of maintaining exchange rate stability not only preserved cost competitiveness, but also helped to cushion indirect credit risk in the banking sector. On the other hand, deposit euroization implied that the HNB's ability to act as lender-of-last resort in a deposit run was limited. While high reserve requirements on bank deposits in both domestic and foreign currency provided limited self-insurance, further prudential measures were necessary, which forced individual banks to build liquidity and capital buffers and contain further accumulation of FX exposures.

**15. The HNB's approach to macroprudential policy before the GFC had several features.**

First, a number of instruments were used simultaneously to achieve its two objectives, which had reinforcement effects, but also made calibration a more complex task. Secondly, reflecting the difficulties in calibration, the HNB took an adaptive approach, recalibrating measures during their use, as the authorities gauged the thresholds of non-linear impacts and sought to close loopholes to minimize leakages (Kraft and Galac (2011)). The regulatory authorities closely monitored compliance and modified regulations to help close leakages. Third, the HNB assessed the benefits and costs of each instrument, adopting more distortionary measures (e.g. credit growth reserve—see below) only in periods of elevated systemic risks.

**16. In order to directly limit credit growth, starting in 2003 the HNB introduced the credit growth reserve, a measure imposing costs on banks if they expanded credit rapidly**

(see Table 1). When it was first introduced, it implied that if credit (defined as the sum of certain balance sheet items) grew by more than 4 percent in a given quarter, that the bank would be required to purchase special low-yielding HNB bills—in an amount equivalent to 200 percent of the excess credit growth. Credit growth slowed after the measure was introduced, although there was some circumvention as banks reduced their securities holdings or redirected credit via leasing or direct lending from banks' foreign parents, and the measure was withdrawn in 2004.<sup>6</sup> It was re-introduced in 2007 with provisions that helped close these loopholes, and also re-calibrated: while the credit growth threshold was lowered to 3 percent per quarter, the volume of HNB bills was lowered to 50 percent of the excess (later raised again to 75 percent).

**17. A marginal reserve requirement (MRR), targeted at banks' foreign funding, was introduced to help slow capital inflows.**

In 2004, it was initially applied only to the increase in banks' foreign liabilities, and set at a rate of 24 percent. Later it was extended to include funds received from leasing companies, off-balance sheet items related to the selling of credit risk and issued debt securities, and the rate was increased in steps to 55 percent by 2006. This measure targeted foreign borrowing, which was a crucial source of long-term funding to enable banks to extend mortgages or finance corporate investment projects. As such, the HNB believed that the measure would be effective by sharply reducing the profitability of such lending activities.

**18. In 2006, the HNB also increased the risk weights on FX lending to better align capital requirements with risk profiles, thereby helping build resilience.**

<sup>6</sup> Although the circumvention may have undermined the authorities' objective to slow credit-intensive growth, in practice it meant that much of the risky lending at the peak of the boom ended up on foreign balance sheets.

unhedged and hedged borrowers carried the same interest rates as banks broadly assumed that the exchange rate would remain stable, and generally neglected the FX credit risks. This measure was largely effective (together with the MRR cycle reaching its peak) in contributing to curbing the increase in the FX lending (Kraft and Galac (2011)).

**19. The foreign currency liquidity requirement (FCLR) prompted banks to hold higher FX liquidity as a form of self-insurance against the flight of FX deposits.** The measure required banks to hold liquid foreign assets with a maturity of no more than 3 months to cover the reserve requirement.<sup>7</sup> In 2003 the foreign currency liquidity requirement was reduced from 53 percent to 35 percent, but its base was expanded to include foreign currency long-term liabilities, which resulted in a net tightening of the measure. The FCLR was lowered in numerous steps to 17 percent and never increased, thus it is difficult to claim that it was used as a countercyclical measure (Kraft and Galac (2011)).

**20. Since the GFC capital flows have abated, and the authorities have made significant changes to their macroprudential toolkit.** The HNB relaxed the macro-prudential policy settings via several measures. In the aftermath of the failure of Lehman, several large foreign-owned banks experienced substantial deposit withdrawals. To allow banks to meet depositors' requests, while also permitting the parent banks to support their subsidiaries, the HNB removed the *MRR* entirely in October 2008. The introduction of Basel II in 2009 mandated the HNB to abandon the *differentiated risk weight instrument*. The *FCLR* was lowered in numerous steps starting in 2006, while the prolonged weakness of credit growth made the *credit growth reserve* obsolete.

**21. The authorities have overhauled their macroprudential policy framework in recent years** (see Table 1). In the context of preparations for the adoption of Basel III, the HNB introduced new elements to its toolkit in 2014 and 2015, including the countercyclical capital buffer (at 0 percent), the capital buffer for systematically important credit institutions (SIIs) and the structural systemic risk capital buffer (HNB 2017).

## E. Effectiveness

**22. The measures were most effective at inducing banks to maintain sufficient liquidity and capital, and allowed banks to enter the crisis period with adequate buffers.** As regards the impact on the growth and composition of credit, credit growth was slowed but not reversed, and the share of lending in FX declined only temporarily. While the combination of *MRR* and *higher risk weights on unhedged FX* borrowing helped lower the share of banks' FX lending in total loans, it

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<sup>7</sup> The numerator of the ratio, foreign exchange assets, included foreign currency cash and checks, foreign exchange transaction accounts, foreign exchange held with the central bank, foreign exchange deposits with a remaining maturity of less than 3 months, debt instruments issued by foreign banks and governments that are available for sale, and debt instruments issued by foreign banks and governments that are held to maturity but have a remaining maturity of less than 3 months. The denominator of the ratio includes foreign exchange deposits received, foreign exchange debt instruments issued by the bank, foreign exchange and indexed loans received, foreign exchange and indexed hybrid instruments, and any other financial obligations denominated in foreign exchange.

came at the cost of higher direct NFC external borrowing<sup>8</sup>. Thus, due to policy leakages, the measures had a lesser effect on total private credit (including direct borrowing offshore).

**Table 1a. Main Macprudential Measures**

**Pre-GFC**

Credit ceiling	Penalty rate of 200% on annual credit growth > 16%	2003Q1
	Credit ceiling lifted	2004Q1
	Penalty rate of 50% reimposed on annual credit growth > 12%	2007Q1
	Penalty rate increased to 75%	2008Q1
	Credit ceiling lifted	2009Q4
Marginal reserve requirement (MRR)	MRR introduced on foreign liabilities at 24%	2004Q3
	MRR increased to 30% and based broadened during the year in several steps	2005Q1
	MRR increased to 40%	2005Q2
	MRR increased to 55%	2005Q4
	MRR abolished	2008Q4
Risk weights on FX borrowing	FX risk weight increased from 50% to 75% (for mortgages) and from 100% to 125% (for others)	2006Q2
	Abandoning the risk weight with the introduction of Basel II	2009
Foreign currency liquidity requirement (FCLR)	FCLR rate reduced from 53% to 35%, but base expanded to include foreign currency long-term liabilities (net tightening)	2003Q1
	FCLR rate lowered from 35% to 32%	2005Q1
	FCLR tightened, base extended to foreign currency indexed liabilities	2006Q4
	FCLR rate lowered in a number of steps to 17%	2008Q2, 2009Q1, 2011Q1

Sources : Dimova et al (2016)

<sup>8</sup> This finding is not specific to Croatia. For example, Dumčić (2017) finds that in using macroprudential tools, CEE countries seem to have been more successful in slowing credit growth to the household sector than to non-financial corporations, which could also turn to financial institutions not affected by restrictive credit growth measures, or to banks abroad.

**Table 1b. Main Macroprudential Measures****Post-GFC**

Countercyclical capital  
buffer (CCB)

CCB rate set at 0%

2016 January

Capital buffer for  
systematically important  
credit institutions (O-SIIs)

Identification of nine O-SIIs with corresponding buffer rates

2016 February

Structural systemic risk  
capital buffer (SSRB)

Two SSRB rates (1.5% and 3%) applied to two subgroups of  
banks

2014 May

Source: HNB (2017)

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## ICELAND<sup>1</sup>

*Iceland's experience in the run-up to the financial crisis in 2008 is an example of how strong the interactions between capital flows and systemic risk can be. At the same time, the country's experience illustrates the use of a comprehensive suite of policies to address a crisis, including capital flow management measures (CFMs) to contain disruptive outflows. Eight years later, the country has re-liberalized and is entering an era of renewed financial openness, equipped with a new macroprudential framework to safeguard financial stability, even as important work remains to be done to strengthen microprudential oversight arrangements including the regulatory architecture.*

### A. Experience Ahead of the Crisis

**1. Iceland, a small, high-income, and resource-rich country, has maintained a flexible exchange rate regime since 2001.** At that time, the country adopted an inflation-targeting regime, judging that the former exchange rate peg had become increasingly difficult to defend. This was a shared experience with most of its Nordic neighbors, which similarly experienced boom-bust cycles following external and financial liberalization, leading them to abandon their pegs (Jonung, 2009; Honkapohja, 2012). The move toward exchange rate flexibility facilitated adjustment in the Icelandic economy. Stability was short-lived, however, and was soon followed by the build-up of macrofinancial imbalances.

**2. The country's experience during the run-up to the 2008 crisis is an example of strong interactions between capital flows and systemic risk.** Capital flows grew fast, reaching extraordinary levels by international comparison after the financial liberalization process was finalized in 2003 (Figure 1). The Icelandic banks, with strong credit ratings on the back of a highly rated sovereign, transformed into large and complex international financial institutions, relying on extensive international funding to finance aggressive asset expansion overseas. The explosive growth of foreign funding occurred through both bond issuance and, as the expansion progressed, retail deposit taking abroad. Banks' foreign liabilities skyrocketed to over six times GDP by September 2008, with their aggregate net foreign liability position exceeding 100 percent of GDP (Figure 2a). Although the central focus of the action was abroad, the banks also fueled a substantial domestic credit and asset price bubble. Household and non-financial corporate debt doubled between 2003 and 2008, to together exceed 300 percent of GDP in 2008, while asset prices also rose rapidly over the period (Figures 2b and 2c). By 2008, over half of Iceland's non-financial corporate debt was denominated in foreign currencies.

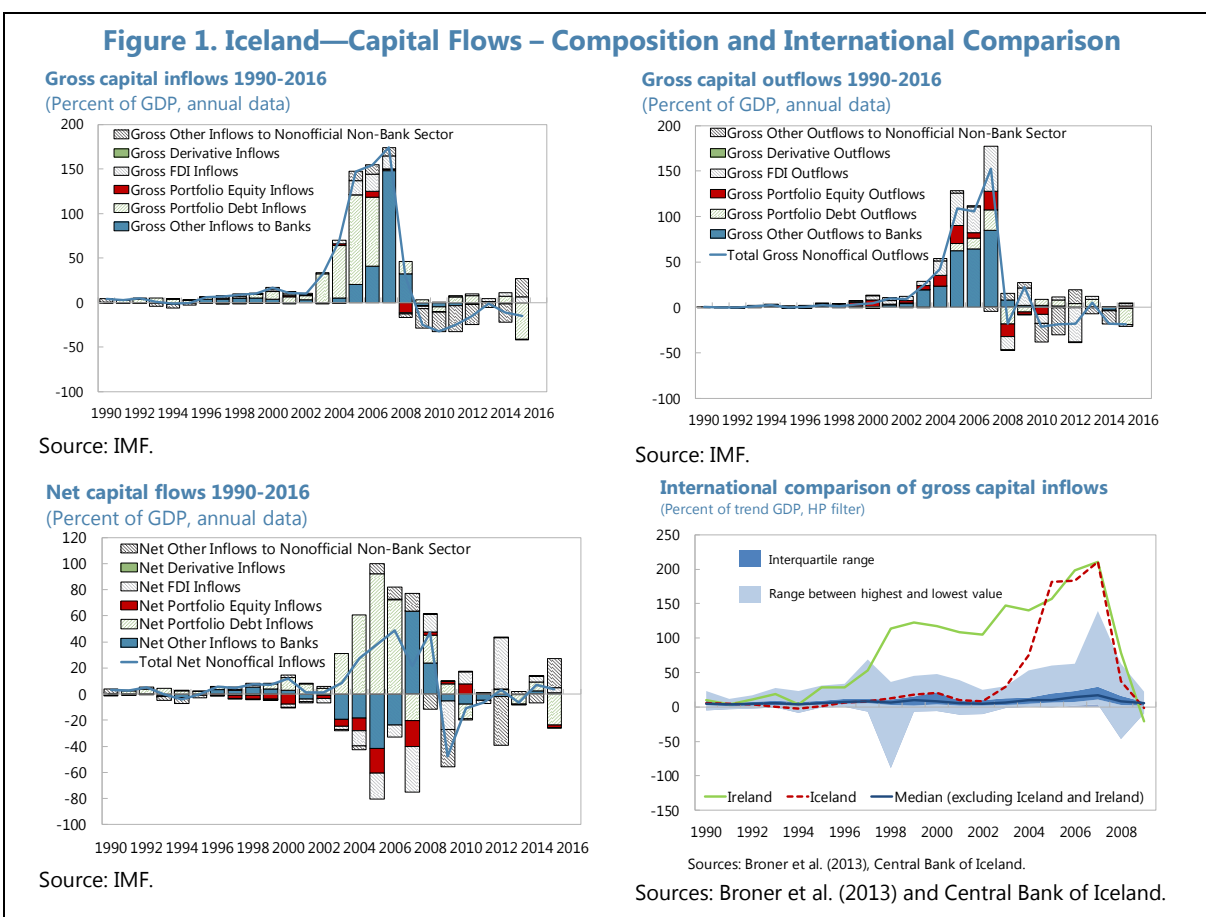
**3. Domestic policies proved unable to tame the imbalances.** As in many other jurisdictions at the time, financial regulation was lax, and monetary policy became overburdened.<sup>2</sup> For a while,

<sup>1</sup> Prepared by Thorvardur Tjoervi Olafsson (MCM).

<sup>2</sup> See also Baldursson and Portes (2013).

and following a typical pattern, rising asset prices and an appreciating exchange rate held the rise in leverage at bay (Figure 2d) and masked the increasing currency mismatches, making the balance sheet expansion appear more sustainable than it actually was, fueling further expansion. Monetary tightening tended to attract further inflows, while the fiscal position, boosted by strong financial cycle revenue effects, provided further assurance for the prevailing low risk perception (Figure 2e).<sup>3</sup> These features drove a strong upswing in the Icelandic financial cycle, with global factors (including through capital inflows) playing a reinforcing role (Figure 2f).

**4. The upswing was followed by a banking and currency crisis of extraordinary proportions in 2008** (IMF, 2008). As global financial conditions abruptly tightened, underlying mismatches in oversized Icelandic balance sheets emerged, risk aversion increased, and funding evaporated. The three largest commercial banks (representing over 90 percent of banking system assets, equivalent to about 9½ times GDP at the peak) collapsed in the space of one week in early October 2008 (Einarsson et al., 2015, 2016).



<sup>3</sup> Investor concerns arose in 2006 resulting in the Icelandic banks losing their access to European bond markets, but banks reacted by turning to U.S. funding markets and actively gathering deposits outside Iceland.

## B. Crisis Management and Liberalization

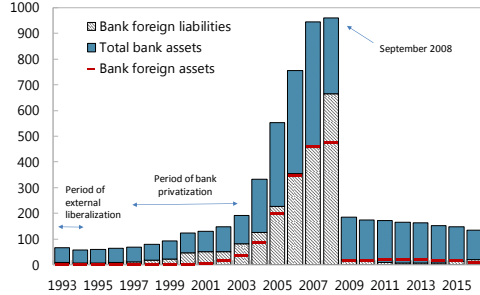
**5. The authorities responded by passing emergency laws and subsequently requesting a Stand-By Arrangement from the IMF.** The emergency laws provided, among other things, far-reaching powers to the Financial Supervisory Authority to intervene and take over failing financial institutions. To restore confidence and stabilize the economy, the Icelandic authorities requested a two-year Stand-By Arrangement from the Fund. The program had three main objectives: (i) to restore confidence and stabilize the exchange rate through strong macroeconomic policies; (ii) to safeguard medium-term fiscal sustainability; and (iii) to develop a comprehensive bank restructuring strategy (IMF, 2008).

**6. CFMs on outflows played an important role in the crisis response** (IMF, 2012a). The primary objective of the CFMs was to maintain the stability of the króna and prevent the depletion of reserves (IMF, 2012a). When the banks collapsed, the exchange rate had already depreciated by over 50 percent, and further depreciation risked spreading insolvencies among highly indebted households and firms (Ólafsson and Vignisdóttir, 2012). The outflow CFMs also supported asset prices by disincentivizing fire sales related to the overhang of legacy pre-crisis exposures and allowing for a more accommodative monetary policy than would otherwise have been possible. That in turn facilitated balance sheet repair and bank restructuring (Central Bank of Iceland, 2016a), while also bolstering bank interest margins. However, the CFMs also entailed, in particular as their duration lengthened, burdensome regulations, transparency concerns, elevated risk premia, and residents' inability to tap opportunities for outward FDI (IMF, 2016a).

**7. Iceland eventually recovered from the crisis.** Initially, the country was one of the worst hit economies in the global crisis. However, the economy returned to growth in mid-2010 and the recovery gained momentum despite subdued credit developments (Figure 3, left panel). Financial sector reforms played an important role in supporting the recovery. The bank resolution strategy eventually generated recoveries well in excess of up-front outlays, balance sheets of households and corporates were repaired, and an external macroeconomic adjustment, increasingly powered by tourism, resulted in the country running sustained current account surpluses and moving into a positive net IIP position.

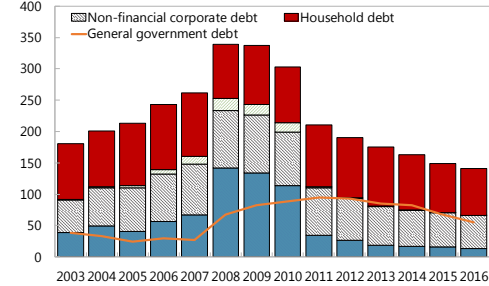
**Figure 2. Iceland—Transmission Channels Between Capital Flows and Systemic Risk**

**Bank balance sheets**  
(Percent of GDP)



Sources Einarsson et al. (2016), Central Bank of Iceland and Financial Supervisory Authority in Iceland, IMF.

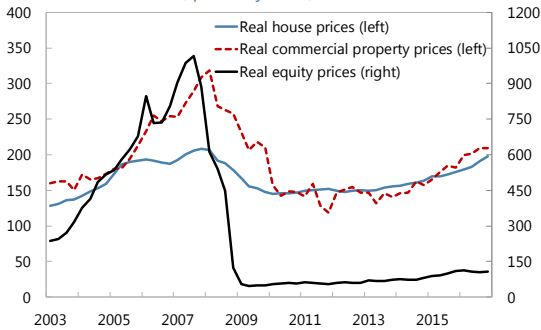
**Household, non-financial corporate, and government debt**  
(Percent of GDP, light bars are foreign currency-denominated debt)



Source: Central Bank of Iceland, IMF.

**Asset prices**

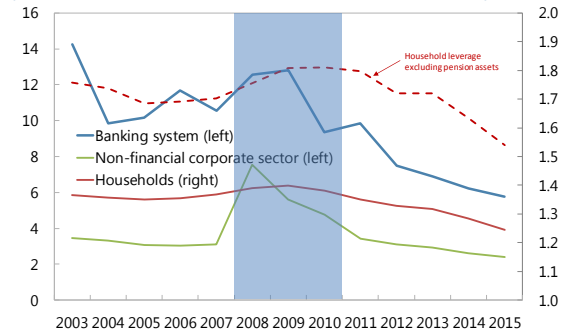
Index, 1995 = 100 (quarterly data)



Source: Central Bank of Iceland, IMF.

**Leverage**

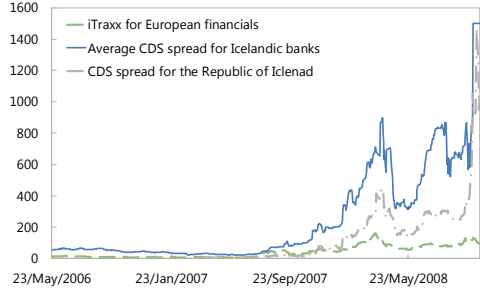
(Shaded area: the 2008–2010 financial crisis in Iceland)



Source:

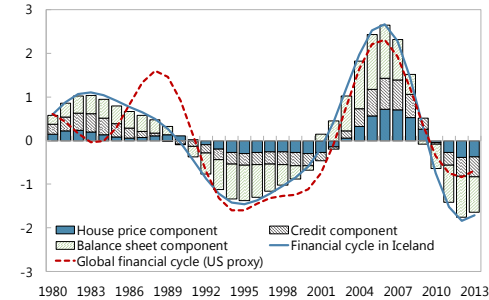
**Risk perception**

(CDS spreads as proxy)



Source: Central Bank of Iceland, IMF.

**Financial cycle in Iceland and the global cycle**

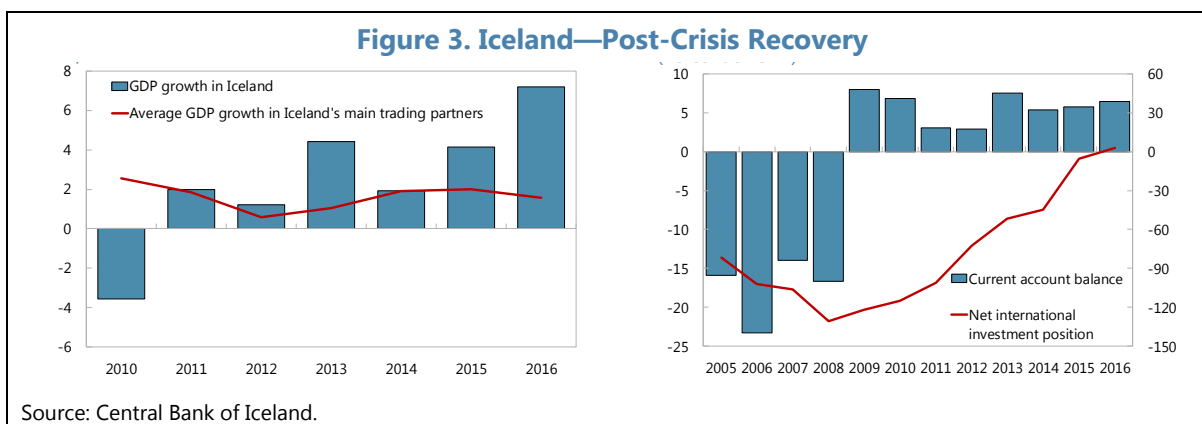


Sources: Einarsson et al. (2016).

**8. The duration of CFMs on outflows was far longer than initially envisaged.** Instead of being lifted within a couple years, they remained in place for more than eight years. Against the backdrop of continuous circumvention pressures due to the trapped investments, CFMs were tightened in the early years to ensure their effectiveness, a process that also involved exchange restrictions (IMF, 2012a). The large overhang from pre-crisis investments (in particular in króna-denominated eurobonds) trapped by the CFMs (40 percent of GDP in 2009) and foreign claims on the failed banks' estates represented challenges for designing a liberalization strategy, presenting risks of sharp capital outflows and balance of payment pressures. Although the first liberalization strategy was adopted in 2009, CFMs on outflows were finally lifted over a roughly two-year period following the presentation of an updated strategy in June 2015.

**9. The IMF’s *Institutional View* on capital flow liberalization and management was considered in the design of the authorities’ liberalization plan** (IMF, 2012b). In October 2016 and January 2017, the authorities took major steps to ease outflow CFMs. These were followed in March 2017 with the lifting of almost all outflow controls other than those on the remaining offshore króna assets (a legacy from the crisis), facilitated by an exit agreement with the largest offshore króna holders. In parallel, the authorities adopted a new macroprudential framework. Important and necessary reforms of microprudential oversight, however, remained pending, with the Fund continuing to advocate for a decisive reform of the regulatory architecture.

**10. During the process of outflow liberalization, a CFM on inflows was introduced.** The measure was imposed in June 2016 in the form of a 40 percent special reserve requirement on selected debt inflows (with a 12-month holding period at an interest rate of nil). Although no inflow surge was observed at the time the measure was imposed, the authorities’ stated objective was to curb incentives for a new carry trade, and prevent prospective capital inflows from hampering monetary policy transmission to long-term interest rates. In line with the IMF’s *Institutional View*, absent an inflow surge, the Fund staff saw no compelling reason to activate the CFM in 2016 (IMF, 2016b). In the 2017 Article IV Consultation, Fund staff advised that the inflow CFM be rolled back, arguing based on the *Institutional View* that macroeconomic policies should play a leading role in managing challenges associated with capital flows, backed by decisive steps to ensure strong microprudential oversight, with an overlay of macroprudential measures to limit systemic risk.



### C. A Revised Prudential Framework

**11. As noted, in preparing for liberalization, the authorities introduced a macroprudential framework.** A formal macroprudential framework was set up in 2014 with the establishment of a Financial Stability Council (FSC), supported by a Systemic Risk Committee. The FSC has since articulated a macroprudential policy to safeguard financial stability, which includes a special emphasis on mitigating potential risks associated with excessive (procyclical) capital flows (FSC, 2015).

**12. New macroprudential measures include capital buffers and currency-based liquidity- and funding ratios.** The liquidity coverage ratio (LCR) and net stable funding ratio (NSFR) were

introduced in December 2013 and December 2014, respectively.<sup>4</sup> They are currency-based to address risks of foreign currency mismatches and those resulting from limited lender of last resort capacity in foreign exchange. Capital buffers were added in 2016 and 2017 in line with the CRD IV/CRR, with the countercyclical buffer set at 1 percent with effect from March 1, 2017 (rising to 1.25 percent in November 2017) because a financial cycle upswing is assessed to be underway. The legal basis for implementing prudential tools on residential mortgage lending, including maximum loan-to-value and debt service to income ratios, was also recently introduced, against a backdrop of rapidly rising house prices.

**Table 1. Iceland—Measures Introduced Since 2010<sup>1/</sup>**

Measure		Implementation
LCR in total	The LCR framework was implemented on December 1, 2013 and effective from then, the minimum LCR was set at 0.6, increasing to 0.7 on January 1, 2014, to 0.8 on January 1, 2015, 0.9 on January 1, 2016, and 1.0 on January 1, 2017. In addition to the 30-day liquidity ratio, the ratio for the next three months is calculated, and its developments monitored during the assessment of the credit undertaking's liquidity risk.	December 2013
LCR in foreign currency	As announced on December 1, 2013, and effective on December 1, 2013, the minimum LCR in foreign currencies was set at 1.0. In addition to the 30-day foreign currency liquidity ratio, the ratio for the next three months is calculated, and its developments monitored during the assessment of the credit undertaking's foreign currency liquidity risk.	December 2013
NSFR in foreign currency	The NSFR framework was implemented on December 1, 2014, with, commercial banks' minimum one-year funding ratio in foreign currency set at 0.8. Effective from January 1, 2016, the ratio was increased to 0.9, and to 1.0 on January 1, 2017. In addition to the one-year funding ratio in foreign currency, the funding ratio in Icelandic krónur and the total funding ratio is calculated, as well as the funding ratio in foreign currencies based on a three-year premium. The CBI considers these ratios in its assessment of risks in commercial banks' funding.	December 2014
Capital conservation buffer	The capital conservation buffer was introduced on July 2, 2015 and became effective on January 1, 2016, being subject to a maximum of 1 percent until 1 June 2016 and 1.75 percent from then until January 2, 2017. From then onwards, it is 2.5 percent.	January 2016
Capital buffer on other systematically important institutions (O-SII buffer)	The O-SII buffer was introduced on July 2, 2015 and became effective on April 1, 2016 at a 2 percent rate for the three largest commercial banks.	April 2016
Systemic risk buffer (SRB)	The SRB was introduced on July 2, 2015 and became effective on April 1, 2016 at 3 percent for credit institutions and 1 percent for less significant credit institutions. As announced March 1, 2016, and effective from January 1, 2017, the SRB rate increased to 1.5 percent from 1.0 percent for less significant institutions, and effective from January 1, 2018, to 2 percent from 1.5 percent, and effective from January 1, 2019, to 3 percent from 2 percent.	April 2016
Countercyclical capital buffer	The countercyclical capital buffer was implemented on March 1, 2016 and effective March 1, 2017, the rate was set at 1 percent. As announced November 1, 2016, and effective November 1, 2017, the rate will be increased to 1.25 percent.	March 2017

<sup>1/</sup> Limits on net open FX positions and size of single exposures were among existing measures which are still in place.

<sup>4</sup> The LCR entails that credit institutions must hold sufficient high-quality liquid assets to cover potential liquidity needs over a thirty-day period under stressed conditions. The one-year NSFR aims to limit the extent to which banks can rely on unstable, short-term foreign currency funding to finance long-term foreign currency loans.

**13. Although important progress has been made so far, strengthening financial oversight remains a top priority to bolster the effectiveness of the prudential framework as the country progresses on its path toward fuller financial openness.** The 2017 Article IV found that the reforms implemented in recent years go some way toward safeguarding financial stability in an environment of freer movement of capital, yet need to be complemented by continued strong macroeconomic policies and decisive steps to strengthen microprudential regulation and supervision. Iceland scored poorly in its 2014 assessment of observance of the Basel Committee’s Core Principles for Effective Banking Supervision. IMF staff have urged deep reforms, noting that strong microprudential oversight is a basic building block for which macroprudential rules are a supplement not a substitute—especially in a system with only three main banks. The Financial Supervisory Authority’s lack of explicit and broad powers to issue binding rules is a remaining concern, as is its funding dependence on the parliamentary appropriations process (IMF, 2017). The country’s own experience should also serve as a reminder of how rapidly things can change, placing a premium on completing the unfinished reform priorities.

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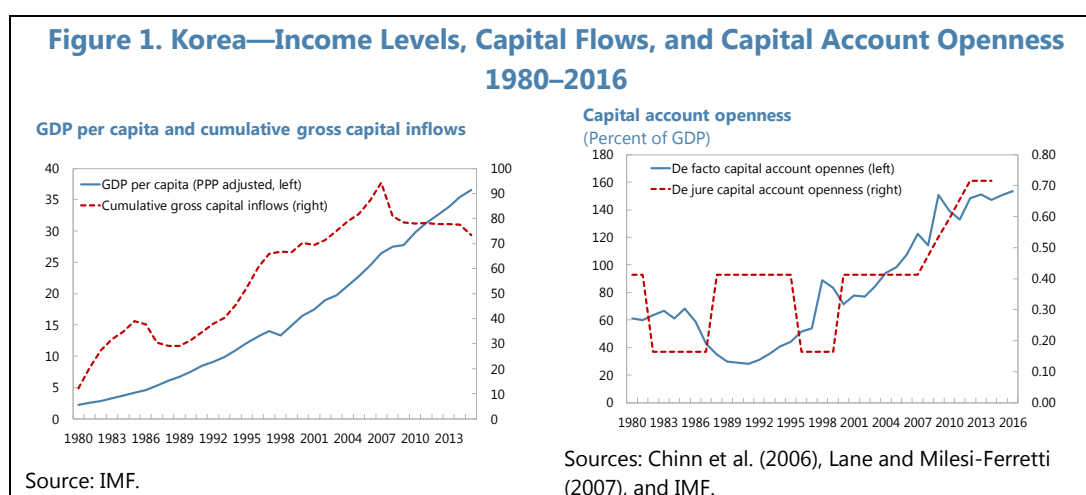


## KOREA<sup>1,2</sup>

Capital flow reversals during the recent global financial crisis and the Asian crisis in the late 1990s, gave rise to foreign currency liquidity shortages in Korea, resulting in a threat to financial stability. This took place despite a relatively strong net international investment position (NIIP), low gross external debt, and prudent macroeconomic policy stance. Moreover, during the run-up to the 2008 global crisis, Korea had sustained current account surpluses and rapidly rising foreign reserves. However, in both instances, the apparently strong external position belied underlying balance sheet weaknesses, including currency and maturity mismatches. This motivated the authorities to adopt macroprudential policies with the aim of inducing more resilience to shocks and reducing risks from procyclical capital flows. By and large, the policy framework seems to be effective.

### A. Experience of the Benefits and Risks Associated with Capital Flows

**1. Korea has a remarkable track record of economic performance and has reaped the benefits of financial and economic integration with the world economy.** The country attained over 7 percent average annual economic growth for nearly fifty years and during that period capital inflows provided valuable funding for the build-up of export-oriented manufacturing firms, whose goods have become known around the world (IMF, 2016). As a result, Korea is the world's 11<sup>th</sup> largest economy and 6<sup>th</sup> largest exporter. For close to twenty years, Korea has managed an inflation targeting framework within a floating exchange rate regime and gradually more open capital account, and a large and an increasingly diversified financial sector (IMF, 2014b, Figure 1).

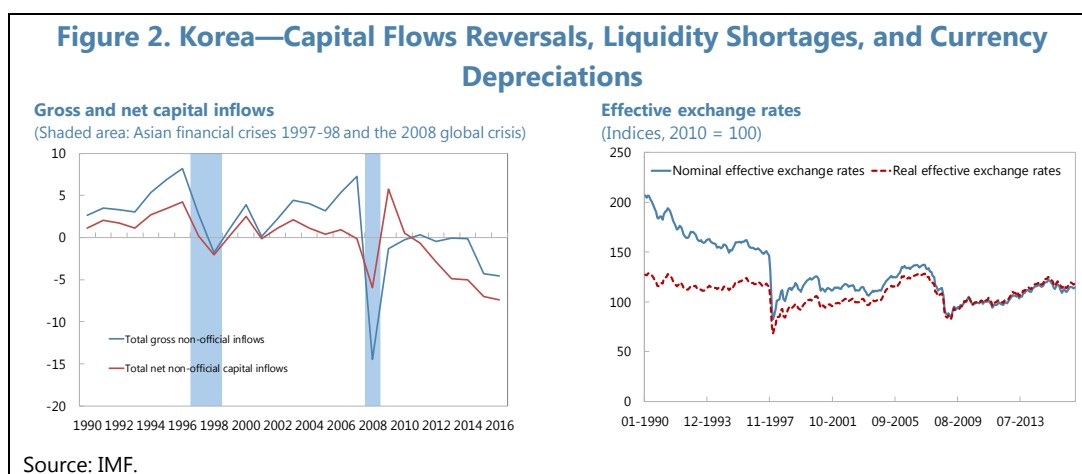


**2. However, Korea has also experienced the risks associated with capital flows as the country has undergone two episodes of foreign currency liquidity shortages.** When a financial crisis erupted in Thailand in July 1997, contagion spread to other countries. Capital inflows to Asian

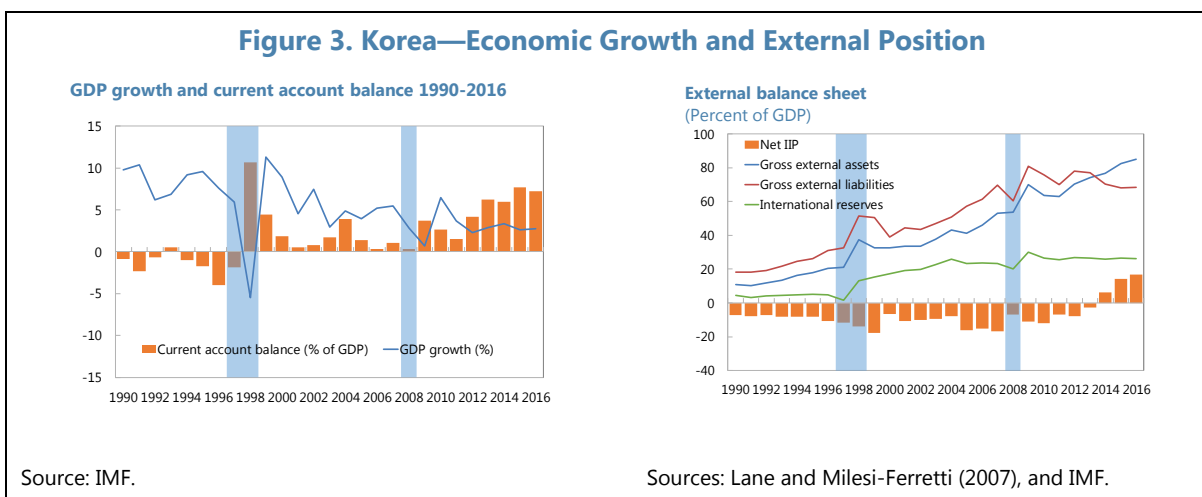
<sup>1</sup> Prepared by Thorvardur Tjoervi Olafsson (MCM).

<sup>2</sup> Macroprudential policy in Korea has been discussed in several IMF policy papers (IMF 2011, 2012a, b, 2013a, b).

countries turned to outflows, exposing balance sheet vulnerabilities, and a severe currency and systemic banking crisis erupted in Korea in November. Similarly, when the recent global crisis spread from key financial centers in advanced economies, Korea again experienced foreign currency liquidity shortages as funding was withdrawn and markets seized up. Policy intervention was needed to prevent a return of a systemic crisis. The intervention, including swap lines from major central banks, proved successful, although the country was on the verge of a currency crisis (IMF, 2012b, 2014b, Olafsson and Petursson, 2011).

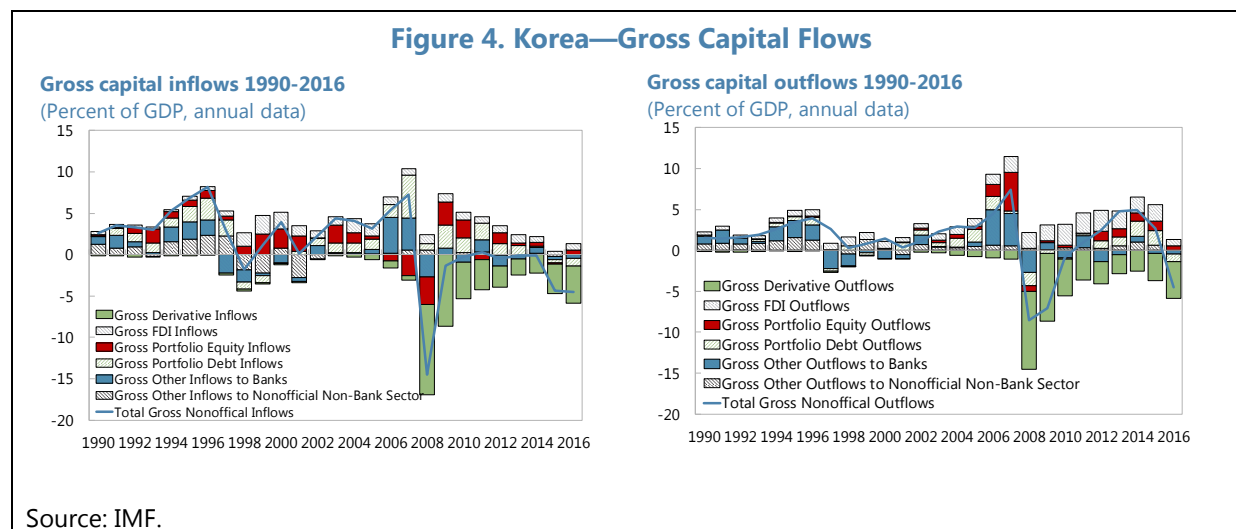


**3. In the run-up to both distress episodes, Korea had a relatively strong NIIP, low gross external debt, and a favorable fiscal position (Figure 3).** A year before the Asian crisis erupted, gross external liabilities amounted to 31 percent of GDP, the NIIP was negative by 10 percent of GDP, and government debt was roughly 8 percent of GDP. The current account deficit had, though, increased somewhat. During the run-up to the 2008 crisis, however, the country ran sustained surpluses and its foreign reserves were rising. Hence, this experience illustrates that systemic risk can build-up in the context of apparent macroeconomic stability and aggregate external balance sheet strength.



## B. Transmission Channels Between Capital Flows and Systemic Risk

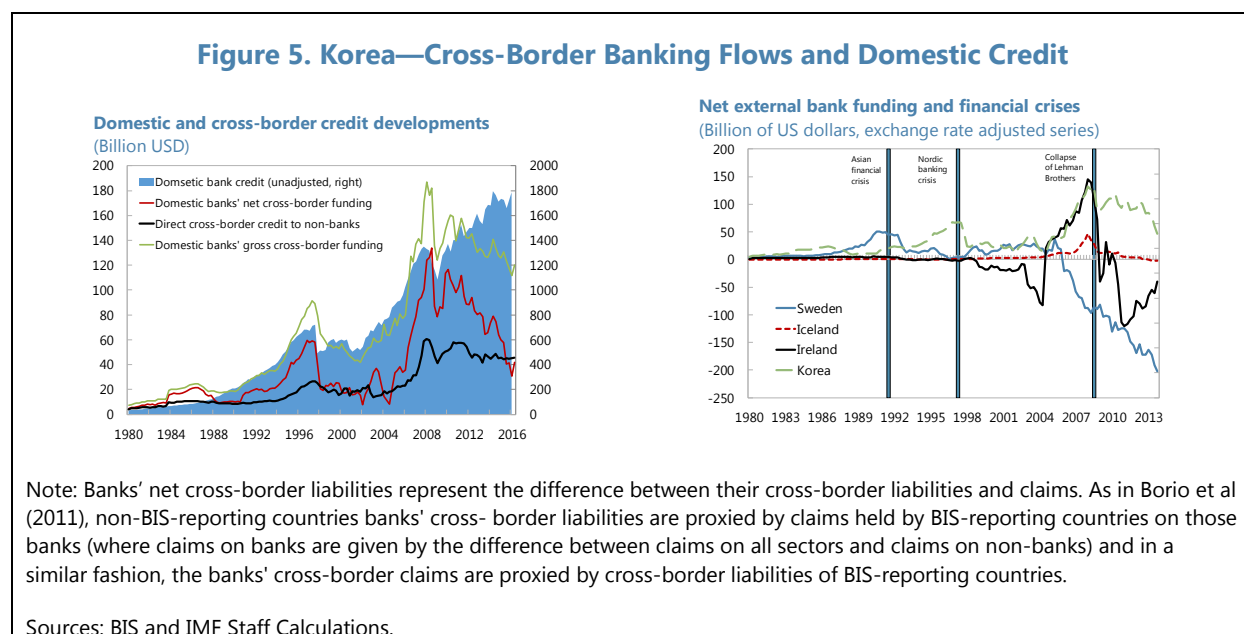
**4. Gross debt inflows to Korean banks increased considerably during the run-up to the 2008 global crisis** (Figure 4). During this tranquil era, banks in Korea relied on foreign currency wholesale markets to fund their extension of credit and hedging to domestic businesses. In general, gross inflows are associated with varying levels of risk, depending on the type of flows, the use of the financing, and the resilience of domestic financial markets and balance sheets to the potential volatility of such flows. In the case of Korea, it was the reliance on continued access to cross-border wholesale funding markets that was particularly risky.



**5. As global liquidity conditions turned, wholesale funding markets seized up, and a foreign currency liquidity shortage emerged (again).** Domestic banks and foreign banks' branches were unable to roll over their maturing short-term FX liabilities, the won depreciated sharply, and the CDS premium on Korean government bonds rose considerably. The authorities'

responses included substantial liquidity support in both won and US dollar. But to understand how a country like Korea, running sustained current account surpluses, can be vulnerable to loss of foreign funding, it is necessary to look beyond net flows at the size and composition of gross flows. It was this composition, and its counterparts in surges and then shortages of funding liquidity, ample and then fragile market liquidity, and expanding and then overextended sectoral balance sheets, that played a pivotal role in posing financial stability risks.

**6. Cross-border banking flows and domestic credit extension have tended to co-move over the financial cycle.** The volatility of cross-border banking flows is broadly captured by BIS banking statistics, which show how Korean banks' reliance on foreign funding and their credit extension to households and firms tended to co-move, and how in the run-up to the two crisis episodes banks seemed to increasingly turn to external funding (in excess of what they needed to fund their external assets) (IMF, 2012b, 2013b). Similar developments have taken place in the run up to other well-known crisis episodes (Figure 5) (see also Hahm et al., 2013, Einarsson et al., 2016).



## C. Macroprudential Policy Reforms

**7. The initial policy reforms after the global financial crisis aimed at strengthening supervision at the institutional and system-wide level, in particular of FX risks.** The authorities had macroprudential measures in place prior to the 2008 global crisis. A maximum loan-to-value (LTV) ratio on mortgages had been implemented from September 2002 and was complemented with a maximum debt-to-income (DTI) ratio from August 2005.<sup>3</sup> FX liquidity and financing ratios had

<sup>3</sup> These measures have been recalibrated on several occasions to address risks related to elevated household debt, which remains a concern and further measures may be needed (see a previous Korean case studies in IMF, 2012b and the Korea Financial System Stability Assessment in IMF 2014b). The main focus of this case study is on measures to

(Continued)

also been in place, but had failed to ensure resilience against liquidity shocks. This reflected, for instance, that the ratios did not discriminate between foreign assets in terms of liquidity, with foreign government bonds and unlisted foreign stocks being treated in the same manner. Thus, the global financial crisis revealed vulnerabilities in Korean banks' funding structures. The authorities therefore took steps to reduce this source of systemic liquidity risk by strengthening liquidity coverage and financing ratios in 2009 and introduced minimum financial institutions' holdings of safe foreign currency assets and new risk management standards for derivative trading (Financial Services Commission and Financial Supervisory Service, 2009).

**8. In 2010, the authorities announced further measures, including both price- and quantity-based prudential measures, designed to deter reliance on wholesale funding and enhance resilience.** Although net external bank funding declined in the immediate aftermath of the global financial crisis, external borrowing resumed in 2010. In mid-2010, the authorities announced a cap on banks' foreign exchange derivative positions relative to their capital. These positions had previously not been capped, and had been responsible for some of the pre-crisis rise in short-term external debt, as US dollar forwards provided to exporters were hedged by borrowing in US dollars. In December 2010, the authorities announced the introduction of a macroprudential levy on banks' non-deposit foreign currency liabilities (Ministry of Finance, 2010a, b) and in June 2012 a 100 percent maximum loan-to-deposit (LTD) ratio became effective. Both measures deter reliance on wholesale funding.<sup>4</sup> The levy is a price-based measure, which was explicitly introduced in a pre-emptive and precautionary manner, to reduce both banks' reliance on unstable funding and carry trade flows into Korea going forward (Ministry of Finance 2010b).<sup>5</sup> The levy became effective in August 2011. It ranged from 2 to 20 basis points on funding up to five years (with a higher levy being applied on short-term liabilities) until July 2015, when it became a single rate of 10 basis points on non-deposit FX liabilities with remaining maturity of less than one year. The levy is collected in foreign currency and the proceeds can be used for liquidity provision in crisis-situations.

**9. Additional liquidity measures have been introduced more recently, supported by IMF staff** (IMF, 2016). An 80 percent minimum LCR ratio for commercial banks became effective in January 2015 and will be raised by 5 percentage points a year to reach 100 percent in 2019 (Financial Services Commission, 2014). A foreign currency LCR was adopted in 2015 as a monitoring tool, and banks were advised to maintain a ratio of at least 40 percent in 2015 and 50 percent in

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mitigate risks from capital flow volatility. Nevertheless, housing and external funding risks may interact with changes in external funding availability reinforcing the domestic house price cycle.

<sup>4</sup> The authorities announced their intention to introduce the 100 percent LTD ratio already in December 2009 when the median ratio for Korean banks was close to 120 percent, which was assessed to be excessive. Originally, the plan was to introduce the measure with a four-year phase-in period, but the authorities moved the effective date to June 2012 in June 2011 (Kim, 2014).

<sup>5</sup> The levy is an MPM because it limits banks' reliance on short-term FX funding and the exposure of the financial sector to systemic liquidity risk associated with a sudden stop in capital flows. Although the measure does not discriminate on the basis of residency, given the circumstances, including the announced objective, it was at the time assessed to be designed to limit capital flows (IMF, 2015), and is therefore also a CFM.

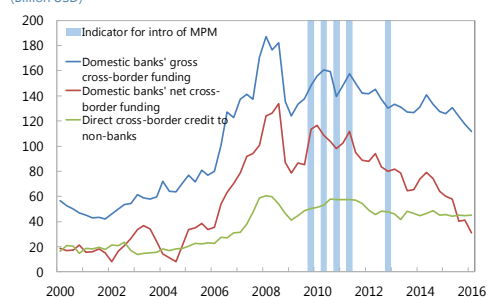
2016. A binding 60 percent minimum ratio became effective in 2017 and is expected to be raised gradually to reach 80 percent in 2019 (Financial Services Commission, 2016).

## D. Enhanced Resilience to Global Liquidity Shocks

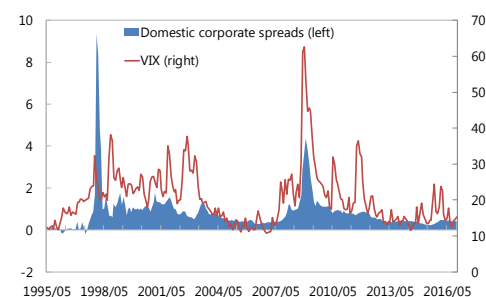
**10. By and large, the revised policy framework seems to have been effective.** The IMF 2014 Financial System Stability Assessment concluded that “Korea has been effective in articulating and applying macroprudential policies ... [and] [b]anks’ liquidity profiles have improved markedly, reflecting lower FX liquidity mismatches and less reliance on wholesale funding” (IMF 2014b, p. 7 and 12). The 2015 Article found that these measures continued to be useful,<sup>6</sup> and the 2016 Article IV assessed that the measures taken had been successful in increasing financial sector resilience by limiting exposure to liquidity risk, reducing maturity mismatches caused by short-term FX borrowing, and more generally lengthening the maturity of the financial sector’s FX borrowing. Kim and Lee (2017) also find that FX-related macroprudential policies have been effective, with the cap on foreign exchange derivative position reducing foreign bank branches’ short-term FX borrowings, and the levy limiting domestic banks’ FX borrowings. Figure 7 indicates that recent episodes of capital flow reversals and tighter global liquidity have not been associated with liquidity crises (IMF, 2014b). Recently, the pressure of capital inflows has declined as the interest differential has narrowed. The authorities announced a relaxation of some of these measures, including raising the cap on banks’ derivative positions and allowing for a lower bank levy in case of sudden capital outflows. IMF staff has supported that easing but also emphasized appropriate structural and fiscal policies to rebalance the country’s external position, which was substantially stronger in 2015 than that implied by medium-term fundamentals and desirable policies (IMF, 2016).

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<sup>6</sup> The 2015 Article IV report notes with regard to measures to contain liquidity and foreign exchange vulnerabilities: “The costs and benefits of these measures will need to be assessed on an ongoing basis, and they should not substitute for any warranted macroeconomic adjustment. At present, we regard them as effective regulatory tools available for containing risks to systemic financial stability related to the financial sector’s foreign exchange transactions and balance sheet positions. In current circumstances their removal would increase the risk of a rebuilding of banks’ liquidity and maturity mismatches related to short-term foreign exchange borrowing and hedging activities.”

**Figure 7. Korea—Effectiveness of Macroprudential Policy**
**Cross-border credit developments for Korea**  
(Billion USD)


Sources: BIS and IMF Staff Calculations.

**VIX and Korean interest rate spreads**


Sources: Federal Reserve Bank of St. Louis and Bank of Korea.

Note: Banks' net cross-border liabilities represent the difference between their cross-border liabilities and claims. As in Borio et al (2011), non-BIS-reporting countries banks' cross-border liabilities are proxied by claims held by BIS-reporting countries on those banks (where claims on banks are given by the difference between claims on all sectors and claims on non-banks) and in a similar fashion, the banks' cross-border claims are proxied by cross-border liabilities of BIS-reporting countries. Direct cross-border credit to domestic non-banks represents cross-border claims held by the rest of the world on non-banks in each country (including on the government and domestic non-banking financial institutions). Domestic banks' gross cross-border liabilities captures the banks' overall reliance on bank funding from abroad.

**Table 1. Korea—Main Measures Introduced Since 2010**

Measure	Description
Cap on banks' foreign exchange derivative positions	Became effective in October 2010 and set at 50 percent of capital for domestic banks and 250 percent for local foreign bank branches. The cap on domestic banks (local foreign bank branches) was lowered to 40 percent (200 percent) in July 2011, and to 30 percent (150 percent) in January 2013, before being raised to 40 percent (200 percent) in July 2016.
Macroeconomic levy on non-deposit foreign currency liabilities	Became effective in August 2011 and set at 2-20 basis points on non-deposit FX liabilities with up to five year maturity (with a higher rate on shorter maturities). In July 2015, the levy became a single rate of 10 basis points on non-deposit FX liabilities with remaining maturity of less than one year.
Maximum loan-to-deposit ratio on won-denominated loans and deposits	Became effective in June 2012. In December 2014, policy loans were excluded from total loans and covered bonds with a five-year maturity or longer included in the total amount of deposits.
Liquidity coverage ratio (LCR) in total	Became effective in January 2015. The minimum ratio of high quality liquid assets (HQLA) to net cash outflows for a 30-day stress period was set at 80 percent. The ratio will be raised by 5 percentage points per year until reaching 100 percent in 2019.
LCR in foreign currency	Became effective in January 2017. The minimum ratio was set at 60 percent and will be raised by 10 percentage points per year to reach 80 percent in 2019.

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## PERU<sup>1</sup>

*Peru is a case of active use of macroprudential measures to reduce credit dollarization, and limit the buildup of systemic risks—including risks associated with large capital flows. These measures have strengthened the resilience of the financial sector. Loan dollarization fell from approximately 80 to 30 percent in little more than a decade, which was achieved without impairing the provision of credit or growth.*

### A. Economic and Policy Context

**1. Peru has a robust economy with strong macroeconomic fundamentals.** Output growth averaged over six percent in the decade through 2015, the highest among large Latin American economies, notwithstanding some deceleration recently as metal prices declined.<sup>2</sup> This was accompanied by a sharp fall in the unemployment rate, which reached historic lows (close to 5 percent) in 2013, and the poverty rate, which nearly halved between 2004 and 2015 (to about 20 percent). Inequality, although still high, has been on a downward path since 2006 (IMF, 2014, 2016).

**2. These achievements have been underpinned by prudent fiscal and monetary policy frameworks.** Fiscal rules—approved in 1999 and revised in 2013—set a structural deficit target not exceeding 1 percent of GDP (converted to a headline rule in 2017), and a public debt ceiling of 30 percent of GDP (IMF, 2014, p.24). Inflation targeting was adopted in 2002 based on a target band of 1 to 3 percent. Public debt fell from 44 to 20 percent of GDP between 2004 and 2012, and has remained below 25 percent thereafter, while inflation has averaged less than 3 percent since 2002 (albeit with some volatility).

**3. In the context of a flexible exchange rate regime, the central bank has intervened to contain excessive exchange rate volatility and to ‘lean against the wind’ in the presence of large inflows and outflows.**<sup>3</sup> Net international reserves reached just over US\$60 billion in early 2016 (or around 300 percent of the Reserve Adequacy metric—IMF, 2016). The authorities’ intervention strategy has been broadly symmetric, including intervening when faced by significant outflows.

**4. High dollarization is a legacy from hyperinflation in the late 1980s.** At the peak, more than 80 percent of all loans and deposits in Peru were denominated in foreign currency (Catao and Terrones, 2016, Castillo et al, 2016, Everaert, 2016). Loan dollarization is associated with foreign-

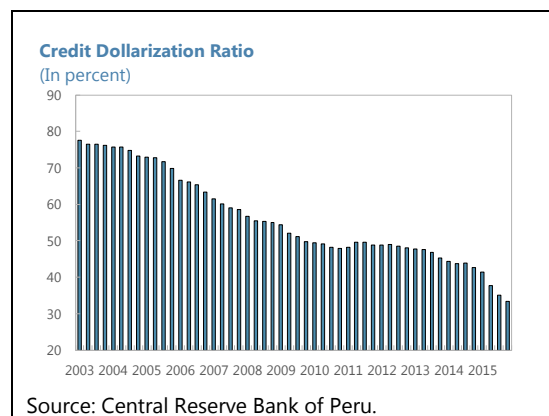
<sup>1</sup> Prepared by Shakill Hassan (SPR).

<sup>2</sup> Copper ore and gold together represent more than 30 percent of Peru’s exports, with other commodities accounting for much of the rest. Peru’s copper mining operations have among the lowest costs among the metal’s main exporters.

<sup>3</sup> See IMF Article IV Consultation 2015. The authorities have characterized this as non-fundamental volatility (Rossini and Quispe, 2017), referring to the component of short to medium-term exchange rate volatility which cannot be easily attributed to changes in macro fundamentals (Bacchetta and Van Wincoop, 2006).

currency induced credit risks (when domestic borrowers are un-hedged), and weakened the transmission of policy interest rates to domestic demand. Deposit dollarization has also constrained the central bank's capacity to act as lender of last resort by limiting its ability to provide funding in the event of foreign currency liquidity pressures.

**5. Strengthening of policy frameworks supported significant de-dollarization from the early 2000s.** Peru's successful financial de-dollarization is the result of both macro stability (especially low inflation) and macroprudential policies. The share of loans denominated in foreign currency fell from approximately 80 to 30 percent of total loans between 2003 and 2016. Currency mismatches in non-financial corporate balance sheets declined, thereby loosening the relationship between exchange rate volatility and credit risk. Deposits in foreign currency fell, but to a lesser extent, reaching close to 40 percent.



## B. Capital Flows

**6. Peru has run large current account deficits in recent years, financed primarily by foreign direct investment (FDI).** FDI flows have been stable, slowing somewhat in 2014-15 before a rebound in 2016, and were largely unaffected by the global financial crisis.<sup>4</sup>

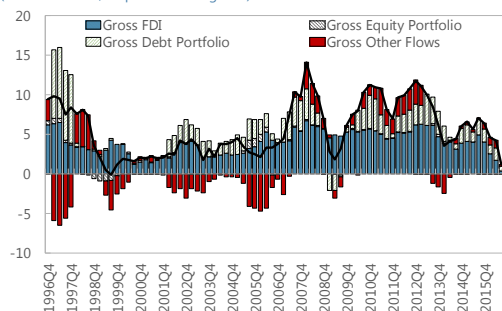
**7. The country has also experienced several capital inflow surges—in the mid- to late 1990s, in the run up to the GFC as well as thereafter—in the form of portfolio and other investment inflows.** Net and gross flows picked up in 2010-13, then stepped down to lower levels in 2014-16. Surge episodes in Peru were largely synchronized with favorable global financing conditions (periods of low global risk aversion and/or high global liquidity). Domestic pull factors in Peru included improved policy fundamentals, robust economic growth, favorable interest-rate differentials, and currency stability. International bond issuance by non-financial Peruvian firms increased from 0.1 to 5 percent of GDP between 2009 and 2014 (Rossini and Quispe, 2015.) BIS data on foreign bank claims on Peruvian institutions illustrate the need to monitor borrowing from abroad.<sup>5</sup> (See also IMF, 2016, p.28.).

<sup>4</sup> FDI inflows to Peru are tied to the commodity cycle. About 70 percent of all FDI goes into the extractive industry sector (Ross and Tashu, 2015).

<sup>5</sup> Our use of claims of all BIS reporting countries on all sectors, and bank and non-bank sectors, in all currencies, as a proxy for total direct cross-border credit follows Miranda-Agrippino and Rey, 2013.

**Figure 1. Peru—Capital Flows and Credit****Gross Capital Inflows by Component**

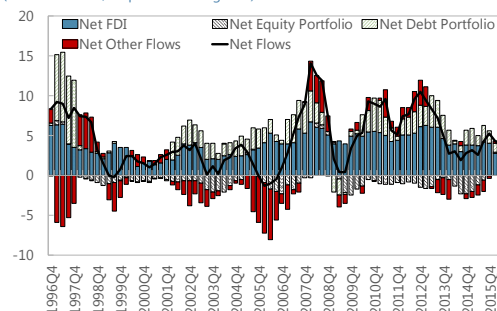
(Percent of GDP, 4-quarter moving sum)



Source: IMF.

**Net Capital Flows by Component**

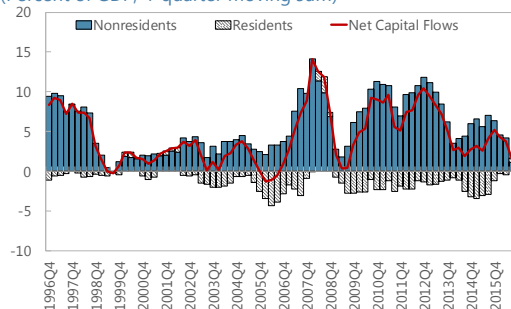
(Percent of GDP, 4-quarter moving sum)



Source: IMF.

**Capital Flows to Peru**

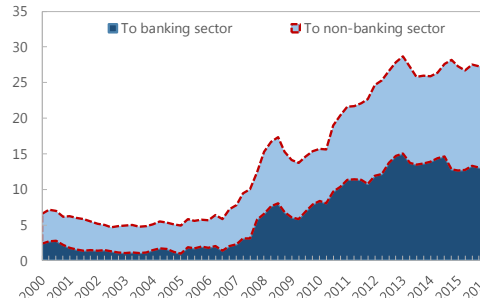
(Percent of GDP, 4-quarter moving sum)



Source: IMF.

**Direct Cross-Border Credit**

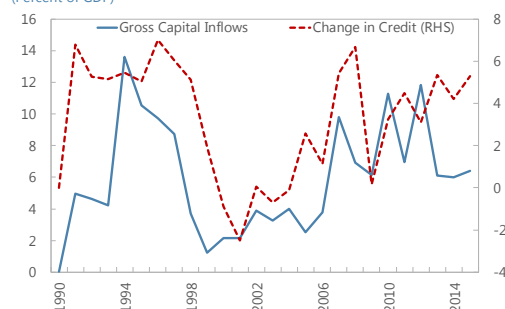
(Claims on all sectors of non-residential banks, all currencies and instruments, bn USD)



Source: BIS.

**Gross Capital Inflows vs Changes in Credit**

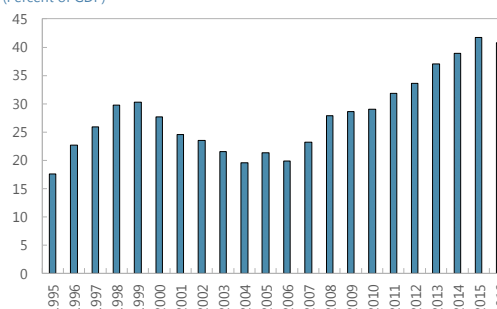
(Percent of GDP)



Source: IMF.

**Private Sector Credit**

(Percent of GDP)

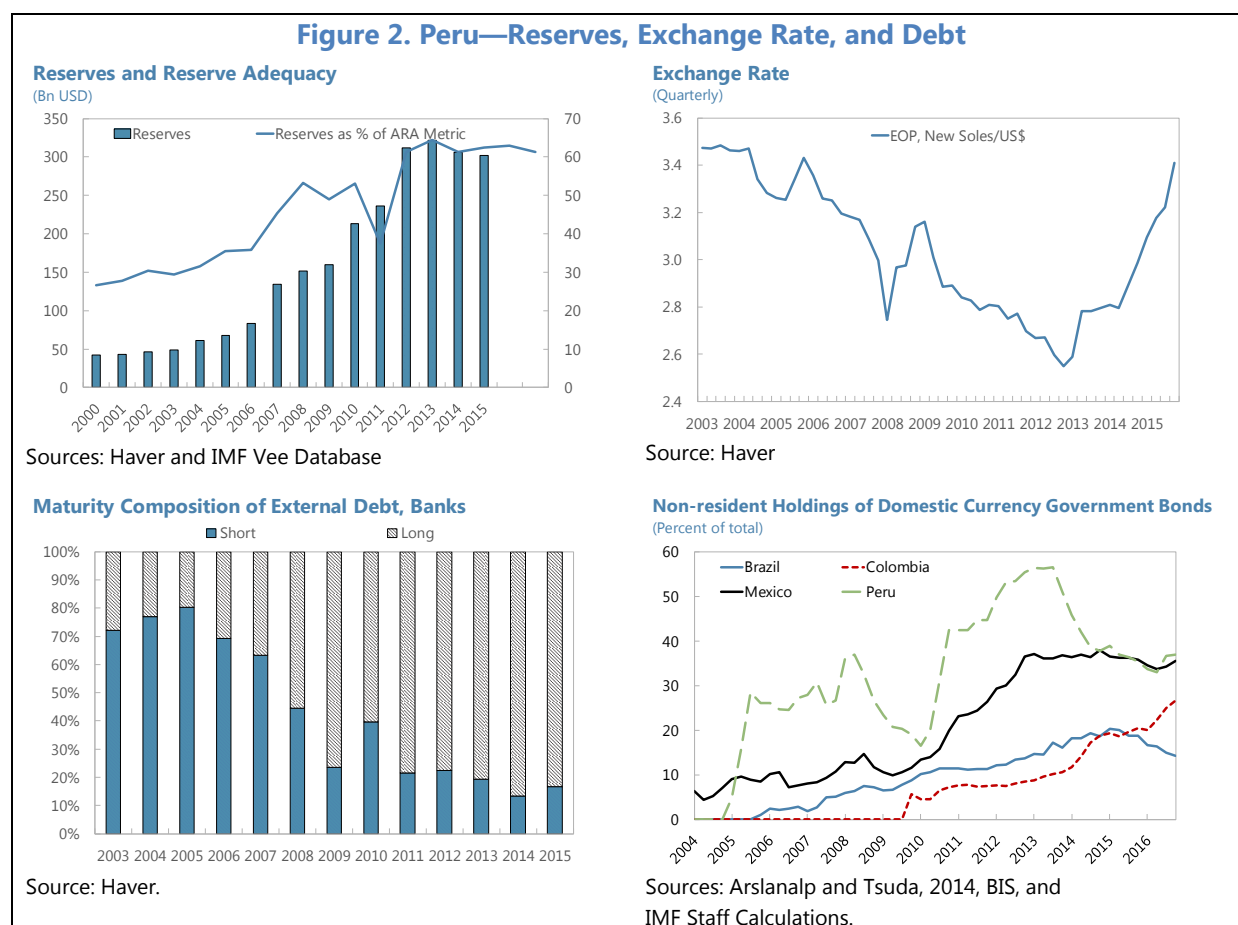


Source: IMF.

**8. Recently, foreign debt inflows have increased.** A combination of a yield pick-up and low short-term exchange rate volatility have been the key drivers.<sup>6</sup> These have included foreign-funded purchases of sol-denominated bonds, cross-border banking flows, and deposits in Peruvian banks. Non-resident holdings of sol-denominated bonds, as a proportion of total domestic debt, has been among the highest as a share of the total among emerging markets, and around twice the Latin American average (IMF, 2016). While the stock of public debt is comparatively low, the high share of non-resident holdings of domestic currency bonds implies that changes in risk appetite may cause relatively large changes in domestic bond yields.

<sup>6</sup> Indications of carry-trade activity in (or targeting) Peru are documented for example in BIS (2015).

**9. Credit growth has remained broadly correlated with capital inflows, particularly gross debt inflows.** After dropping every year between 1999 and 2004, credit-to-GDP rose steadily between 2006 and 2015 (but more gradually than in the late 1990s), from just under 20 percent to over 40 percent, before stabilizing. The strength of credit seems to be driven by the increased availability of bank funding in the form of deposits as capital inflows are recycled. However, the maturity structure of banks' external liabilities has progressively—and very significantly—lengthened over the past 10 years.



## C. Capital Flows and Systemic Risk

**10. A capital inflow surge in the 1990s led to a build-up in systemic risks that materialized in 1998.** A lending boom saw the ratio of credit to GDP increase almost twofold between 1995 and 1998. Inflows of predominantly short-term debt led to a build-up of banks' non-core liabilities which financed domestic credit. The loan-to-deposit ratio peaked at close to 1.4; from about 0.8 in the early to mid-1990s (see Rossini and Quispe, 2015, p.275). After Russia defaulted in 1998 and global financing conditions tightened, Peruvian banks found it hard to rollover external liabilities, leading to bank closures. A long contraction in credit and deep recession ensued.

**11. Capital inflows exerted upward pressure on the exchange rate.** Nominal exchange rate movements, influenced by capital flows, have affected systemic risk against a backdrop of dollarized balance sheets. Steady nominal appreciation for much of the period between the early 2000s and 2012 reduced the domestic currency cost of servicing foreign-currency liabilities, raising the foreign value of Peruvian assets (collateral). (Shin, 2012, Bruno and Shin, 2015, Miranda-Agrippino and Rey, 2015.) Peru's history of financial dollarization makes this channel of transmission particularly relevant. Although a housing bubble is not evident, property prices in Lima have risen significantly, and mortgage lending (in domestic and foreign currency) nearly doubled between 2007 and 2012 to 4.4 percent of GDP (IMF, 2013, 2016).

#### D. Macroprudential Measures and Their Effects

**12. The authorities have relied on a combination of macroeconomic policy, foreign exchange intervention, and macro-prudential tools to contain systemic risks including those exacerbated by capital flows.** Macro-prudential policies are implemented by both the central bank (Banco Central de Reserva del Peru) and the Superintendence of Banks (SBS). The central bank's instruments target liquidity risks and excessive credit growth. The SBS aims to protect the financial system's capacity to absorb losses.

**13. The authorities have deployed macro-prudential measures to achieve their intermediate objectives.** These include reducing the procyclicality of credit growth, controlling currency mismatch in domestic balance sheets, and reducing exchange rate credit risk due to loan dollarization. All these features have tended to become more pronounced with capital inflows. The current macroprudential toolkit includes capital- and liquidity-based measures; and asset-based instruments. Before the global financial crisis, the authorities also used reserve requirements for non-resident deposits in domestic currency—a capital flow management measure—to curb a sudden large increase in short-term foreign liabilities in the banking sector.

**14. Dynamic provisioning—a tool to build resilience during credit booms—was introduced in 2008.**<sup>7</sup> This capital-based tool—introduced after a period of exceptionally fast growth in credit, which reached 39 percent in October 2008 (Cabello, Lupu, and Minaya, 2017)—helps build buffers while also reducing the amplification of the credit cycle due to cyclical variation in loan-loss provisioning. Dynamic provisioning in Peru is activated when a function of average GDP growth rises above a numerical threshold, and deactivated when it falls below the threshold, with the provisioning rate dependent on the credit risk associated with particular types of borrower and loan type.<sup>8</sup>

<sup>7</sup> Other capital-based tools include counter-cyclical capital buffers (since 2008), capital buffers on foreign currency loans (since 2012); and capital buffers according to individual, sectoral and regional concentrations. Peru also has in force, since 2012, a liquidity coverage ratio which is similar in scope to the Basel III LCR; and, in place since the 1990s, ratios of liquid assets to short-term liabilities, which are set at a lower rate for domestic currency.

<sup>8</sup> The dynamic provisioning tool had existed in the regulatory toolkit since 2003, and was activated only in December 2008. It was deactivated in September 2009, re-activated in October 2010, and deactivated once more in November

**15. The authorities have also introduced measures to build resilience in the face of still significant FX exposures on and off banks' balance sheets.** In 2013, higher capital requirements were imposed for FX-denominated mortgages (and motor vehicle loans) if the loan-to-value ratio exceeds 80 percent. Limits on banks' net foreign exchange derivative positions (maximum of 20 percent of capital) have been in force since 2012; and an additional reserve requirement on short positions in foreign currency derivatives since 2015.<sup>9</sup> Daily and weekly limits on pension funds' foreign currency transactions, in spot and derivative markets, were implemented in 2010 as a measure to limit interconnectedness in the financial sector.

**16. Reserve requirements have been applied to curb credit growth and to address the liquidity risks from FX deposits and credit risks associated with FX loans since 2008.** Reserve requirements on foreign currency liabilities—which are set higher than those on domestic currency deposits—have been raised as systemic risk rose during inflow surges and relaxed during inflow reversals, helping to restrain foreign currency credit. Since 2013, banks have faced additional reserve requirements conditional on the rate of growth in total foreign currency credit—a measure directly targeting the exchange rate credit risk from loan dollarization—and, since 2015, on target reductions in the stock of foreign currency loans.<sup>10</sup>

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2014. The provision ranges from 0.3 to 1.5 percent of loan value. For empirical evidence on the effectiveness of dynamic provisioning in dampening the credit cycle in Peru, see Cabello, Lupu, and Minaya, 2017.

<sup>9</sup> IMF, 2011, Castillo, Vega, Serrano, and Burga, 2016, Rossini and Quispe, 2017.

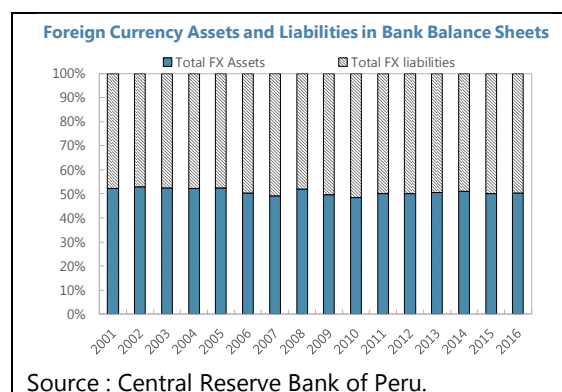
<sup>10</sup> Frequent changes to reserve requirements (and foreign exchange intervention) also complement the policy interest rate to achieve monetary policy objectives, as the economy remains dollarized.

**Table 1. Peru—Measures Since 2008**

Measure	Implementation
<b>Broad-based capital tools</b>	
Dynamic provisioning	2008
Counter-cyclical capital buffer	2008
<b>Sectoral capital and asset-side tools</b>	
Capital buffers according to sectoral concentrations and interest-rate risk	2011
Capital buffer for FC loans	2012
Additional capital buffer triggered by LTV at 90 percent for DC mortgages	2012
Additional capital buffer triggered by LTV at 80 percent for FC mortgages	2012
<b>Liquidity-related tools</b>	
Reserve requirement on non-resident deposits in DC, 120 percent	2008
Limits on pension funds' FC spot and derivative transactions	2010
Higher reserve requirements on FC liabilities and external debt	2012
FC long positions capped at 50 percent of capital	2012
FC short positions capped at 10 percent of capital	2012
Maximum of 20 percent of capital in net FC derivative positions	2012
Additional reserve requirements conditional on FC loan growth	2013
Liquidity coverage ratio, 80 percent (rising to 100 percent by 2019)	2014
Additional reserve requirement conditional on FC loan balance reduction	2015
Additional reserve requirements on short positions in FC derivatives	2015
<i>Notes.</i> FC: foreign currency. DC: domestic currency. LTV: loan-to-value ratio. CFM: capital flow measure.	
Sources : IMF, 2011, Rossini and Quispe, 2017.	

**17. Asymmetric de-dollarization has risk management implications, which the authorities have sought to address.** The faster rate of de-dollarization of loans relative to deposits has the potential to leave currency mismatches on banks' balance sheets, and increased the incentive for banks to increase non-core sol liabilities to fund new domestic currency loans. In response, the authorities introduced:

- *Repos for credit substitution*, which provide soles to fund the substitution of foreign by domestic currency loans. Banks purchase foreign currency from the central bank, and simultaneously place the funds as collateral to borrow the equivalent amount in soles. This allows the bank to extend a loan in domestic currency (replacing a foreign currency loan in its portfolio) without changing its foreign currency exposure.



- *Repos for credit expansion* allow banks to use their foreign currency reserve requirements—up to 10 percent of liabilities subject to that reserve requirement—as collateral to obtain long-term sol



funding from the central bank. (IMF, 2015, p.17, Castillo, Vega, Serrano, and Burga, 2016.) These instruments allowed the currency redenomination of loan portfolios without an increase in currency mismatch in bank balance sheets, despite the limited deposit de-dollarization.

**18. In periods of very strong inflows, the authorities have also imposed reserve requirements on domestic currency deposits by foreign entities.** A special reserve requirement for non-resident deposits in domestic currency targets foreign liabilities in the banking sector.<sup>11</sup> This capital flow management measure was used temporarily in 2008; and reinstated in 2010 in response to spikes in short-term non-resident deposits. Returns from dollar-funded carry trades, investing in sol-denominated securities, were particularly high in 2007–08 and 2009–10. The measure was dialed down in 2014, to a level close to the reserve requirement for other deposits in domestic currency.

## E. Effectiveness

**19. Banks are well-capitalized and profitable.** The system-wide CAR has been approximately 14 percent since 2012, and return on equity has been over 20 percent (IMF, 2016.) Banks' loan portfolios have remained well-diversified.<sup>12</sup>

**20. The financial system has been resilient to capital inflows, although it is hard to disentangle the effect of macroprudential measures from other reforms.**<sup>13</sup> In contrast to 1998, when contagion from Russia triggered a financial crisis, there were no bank failures or a deceleration in credit growth in Peru following the global financial crisis in 2007, and associated plunge in commodity prices. More recently, banks remained profitable and credit continued to grow at a robust pace, despite the fall in commodity (metals) prices in 2011 and associated deterioration in Peru's terms of trade.

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<sup>11</sup> The measure consists of an additional reserve requirement of up to 120 percent for short-term liabilities with foreign financial entities.

<sup>12</sup> Non-performing loans, both for domestic and foreign currency loans, were 2.9 percent of total in 2015.

<sup>13</sup> For empirical studies attempting to assess the effects of macroprudential policies in Peru see for example Castillo et al., 2016, Cabello, Lupu and Minaya, 2017.

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## SWEDEN<sup>1</sup>

*Swedish household debt and house prices have grown rapidly since the late 1990s on the back of a robust economy, low inflation and interest rates, and wholesale funding including in foreign currency. Since the global financial crisis the authorities have responded with macroprudential measures on credit supply, loan origination, and banks' resilience to shocks in foreign funding. Macroprudential measures on mortgages have ensured households have buffers against house price declines, yet their debt has risen relative to income, with recent Article IV consultations and the FSAP calling for additional measures. The LCR in EUR and USD boosted banks' buffers in foreign currency, but, the recent FSAP recommended to also monitor banks' foreign exchange liquidity over 3 months to mitigate more lasting shocks to funding.*

### A. Economic and Policy Context

**1. Since the crisis in the early 1990s,<sup>2</sup> Sweden has maintained current account surpluses amidst large gross flows** (Figure 1). Until the global financial crisis, sustained current account surpluses have been strengthening Sweden's net international investment position. Gross assets and liabilities have almost tripled in the last 25 years, increasing the Swedish economy's financial integration and interconnectedness with the rest of the world.

**2. For much of the period since the mid-1990s, the Swedish economy enjoyed robust GDP growth, low interest rates, and price stability.** The annual GDP growth averaged 2.6 percent in the period from 1996 to 2016; the unemployment rate halved, and inflation was 1.4 percent on average. After an initial rebound from the global financial crisis in 2010, Swedish economic activity was stagnant until mid-2013, in part due to the weak global recovery. A widening output gap contributed to core HICP inflation of only 0.5 percent in 2013–14, and inflation expectations slumped in late 2014. The Riksbank defended the 2 percent inflation target through a combination of negative interest rates, government bond purchases, and forward guidance from early 2015. Growth accelerated to 4 percent in 2015 and 3.3 percent in 2016, driven by both domestic demand and exports.

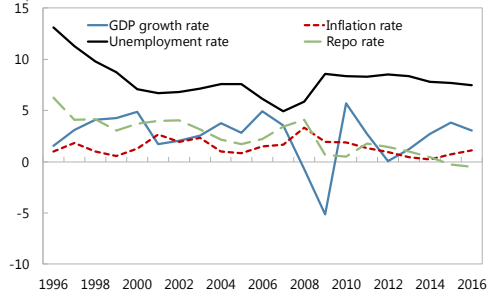
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<sup>1</sup> Prepared by Ivo Krznar (MCM)

<sup>2</sup> Prior to the boom of the late 1980s, Sweden maintained a pegged exchange rate. Sweden liberalized its financial markets in the mid-1980s, which, together with a surge in population growth, spurred credit growth and increases in real estate prices—both commercial and residential—and a construction boom. As the interest rate increased to defend the peg, real estate prices fell sharply and borrowers and the banking sector were put under a severe stress. A speculative attack on the krona eventually forced the authorities to adopt a flexible exchange rate and implement an inflation targeting framework. Losses were concentrated in commercial real estate loans, which were resolved over time by an asset management company. Final obstacles to capital flows were removed between 1993 and 1995 and Sweden has had a fully open capital account ever since then.

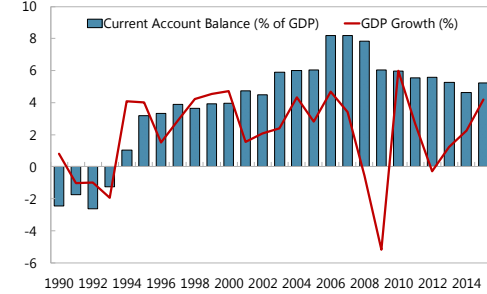
**Figure 1. Sweden—Capital Flows, External Position**

**Main Macro Variables**  
(In percent)



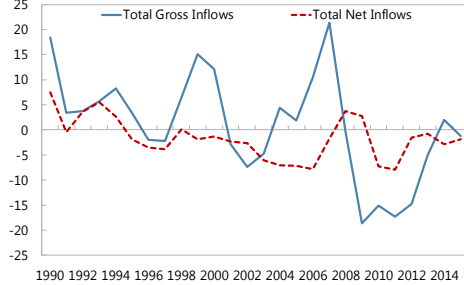
Source: Haver Analytics.

**GDP Growth and Current Account Balance, 1990-2015**  
(In Percent)



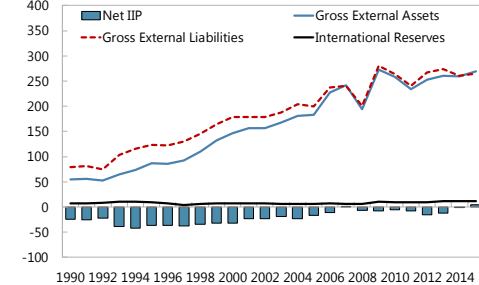
Source: IMF.

**Gross and Net Capital Inflows**  
(Percent of GDP)



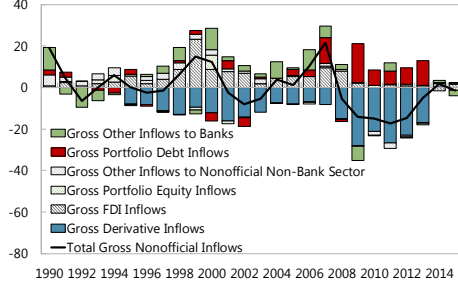
Source: IMF.

**Sweden's External Balance Sheet**  
(Percent of GDP)



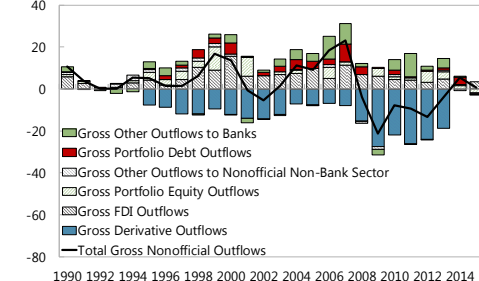
Source: Lane and Milesi-Ferretti (2007), IMF.

**Gross Capital Inflows to Sweden, 1990-2015**  
(Percent of GDP)



Source: IMF.

**Gross Capital Outflows to Sweden, 1990-2015**  
(Percent of GDP)

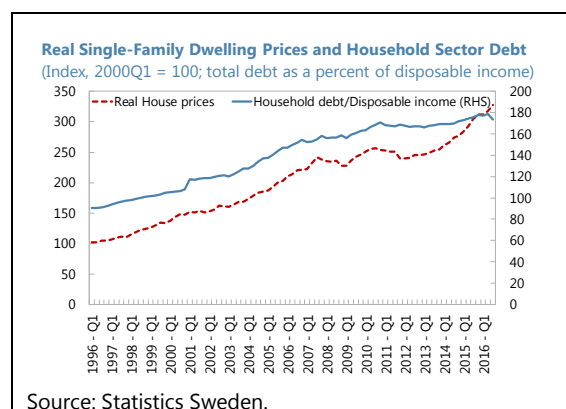


Source: IMF.

## B. The Rise of Risks and Vulnerabilities

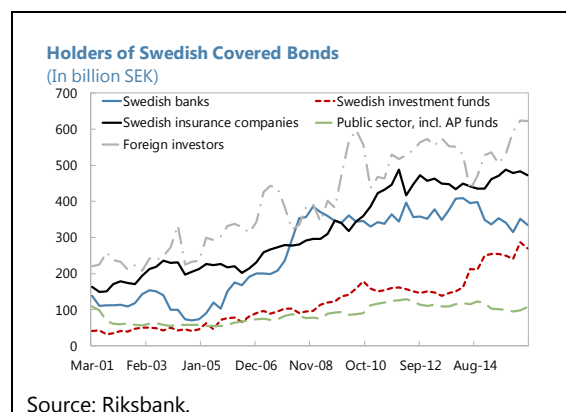
### 3. The robust economy and low interest rates, together solid population growth and inelastic housing supply, boosted housing prices and hence household debt:<sup>3</sup>

- As a percentage of disposable income, household indebtedness has almost doubled since 1996 and now stands at about 180 percent, with a growing share of new borrowers taking on high debts relative to income. The growth in debt has primarily reflected rising housing prices owing to prolonged supply-demand imbalances exacerbated by low amortization,<sup>4</sup> low interest rates, and tax incentives to hold real estate and to finance it with debt.<sup>5</sup>
- House prices have also doubled in real terms since 1996 and Swedish homes are highly valued from a historical perspective. The price-to-income ratio is 40 percent above its 20-year average—highest among the OECD countries. Model-based estimates of overvaluation are notably smaller, at about 10 percent, but are subject to significant uncertainty.



### 4. Cheap wholesale funding, from a mix of Swedish and foreign sources, including in foreign currency, has underpinned mortgage growth.

Customer deposits represent around 40 percent of banks' total funding since Swedish households invest a large proportion of savings in mutual funds rather than bank accounts, in part reflecting high mandatory contributions to pension funds (Figure 2). With banks having one of the highest loan-to-deposit ratios in European countries (about 200 percent), the long-maturity residential mortgages rely on wholesale funding,

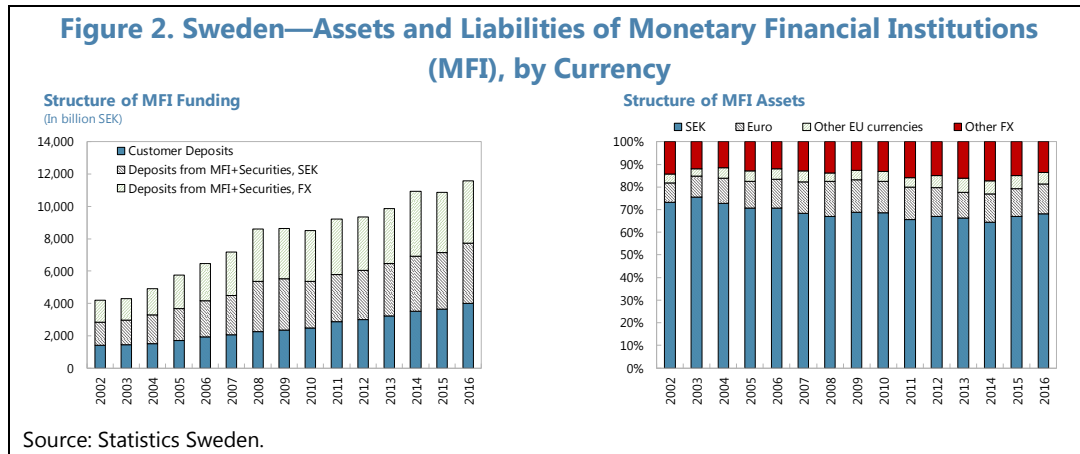


<sup>3</sup> See R. Turk, Housing Price and Household Debt Interactions in Sweden, WP/15/276.

<sup>4</sup> The stock of mortgage loans granted before June 2016 does not have mandatory amortization. Contracts are reviewed every one to five years, and on these occasions, interest rate and amortization requirements are negotiated. About 65 percent of this stock amortizes, but amortization is low, with about 1.3 percent of households' loan amounts amortized in 2015. High mandatory pension contributions, and relatively high down payments (with LTV averaging 68.3 percent in 2015) limit household interest to save via loan amortization.

<sup>5</sup> Thirty percent of mortgage interest payments are deductible from taxable income. Moreover, the ceiling on property taxes is very low.

such as covered bonds, unsecured bonds and commercial paper, giving rise to refinancing risks. Nonetheless, a substantial portion of this wholesale funding comes from Swedish pension funds and insurance companies, who may be less flighty investors. About half of the wholesale funding is in foreign currency predominantly in euro and USD. The Riksbank estimates that about 25 percent of the major banks' foreign funding is used to fund Swedish assets.<sup>6</sup> The banks use currency swaps to hedge this funding to match their SEK denominated loans.



**5. Home ownership financed by high levels of mortgage debt make households vulnerable to falling house prices.** Although the immediate effect of a potential decline in housing prices on Swedish household default rates appears to be contained,<sup>7</sup> the indirect macroeconomic impact can be sizeable. Analysis by Sweden's National Institute of Economic Research finds a 20 percent drop in housing prices would lead to a recession-like impact on household consumption and unemployment, with an even greater impact if this drop coincided with a global downturn.<sup>8</sup> In an extreme but plausible scenario, this can combine with a broader loss of confidence in housing collateral and potentially higher funding interest rates. Given the high interconnectedness among the Nordic-Baltic financial systems, such a shock could also have significant cross-border spillovers.

**6. Swedish banks' heavy reliance on wholesale funding in FX could reinforce the risks.** As illustrated by the financial crisis, the build-up of unease on international financial markets from 2007 had an impact on the Swedish covered bond market.<sup>9</sup> During the second half of 2007, foreign investors reduced their holdings of Swedish covered bonds by almost one-third affecting the banks' possibilities of obtaining funding and prompting government intervention.

<sup>6</sup> In addition to funding SEK assets, banks use FX funding to fund illiquid and liquid assets in FX.

<sup>7</sup> See 2016 FSAP stress testing note.

<sup>8</sup> <http://www.konj.se/download/18.42684e214e71a39d0723a0c/1436518472414/Working-Paper-138-Macroeconomic-Effects-of-a-Divide-in-Housing-Prices-in-Sweden.pdf>

<sup>9</sup> See J. Chen, The Adequacy of Sweden's Foreign Reserves, IMF Country Report No. 16/354.

## C. Authorities' Response—Macroprudential Measures

**7. The authorities have responded to rising household debt with a range of macroprudential measures to protect the resilience of households and the banking sector** (Table 1). An 85 percent cap on loan-to-value (LTV) ratios was adopted in 2010 in order to protect households against the risk of negative equity which could increase the risk of default.<sup>10</sup> A requirement for a stress test on households at the time of mortgage origination aims to ensure households have adequate buffers against significantly higher interest rates. In May 2013, the FSA introduced a 15 percent floor for risk weights on Swedish residential mortgages to address IRB model risks. In 2014, the floor was raised to 25 percent as a macroprudential measure, to target risks arising from high growth rates in residential mortgage lending. The countercyclical capital buffer has been increased three times since 2015 to support banks' resilience to shocks. The recently introduced minimum amortization requirement applies to mortgages issued after June 2016, until LTV ratios reach 50 percent. The minimum annual amortization is 2 percent for LTV ratios above 70 percent, and 1 percent for LTV ratios between 50 and 70 percent.

**Table 1. Sweden—Macroprudential Measures Since 2010**

<b>Measure</b>	<b>Implementation</b>
Maximum LTV ratio, 85 percent	October 2010
Risk-weight floor for mortgages, 15 percent	May 2013
LCR regulation, including in USD, euro, and total	January 2013
Pillar II capital add-on 2 percent for the four largest banks	September 2014
Risk-weight floor for mortgages, 25 percent	September 2014
Systemic risk buffer 3 percent for four largest banks	January 2015
Counter-cyclical capital buffer activated at 1 percent	September 2015
Amortization requirement	June 2016
Counter-cyclical capital buffer raised to 1.5 percent	June 2016
Counter-cyclical capital buffer raised to 2.0 percent	March 2017

**8. The authorities also introduced a Liquidity Coverage Ratio (LCR) requirement<sup>11</sup> to reinforce the banks' resilience to shocks in FX funding.** The requirement of 100 percent, introduced in January 2013, applies separately to EUR and USD as well as to all currencies and ensures that the banks have enough liquid FX assets to withstand FX liquidity stress in the short term. The decision to also introduce separate currency requirements was justified by Swedish banks' extensive dependence on market funding in foreign currency, which makes them particularly sensitive to liquidity shocks in these currencies. In addition, as the Riksbank's ability to provide liquidity assistance in foreign currency is limited, the authorities argued that it is

<sup>10</sup> Although there is the possibility to take uncollateralized loans above the cap, in practice less than 5 percent of loans have LTV ratios over the cap.

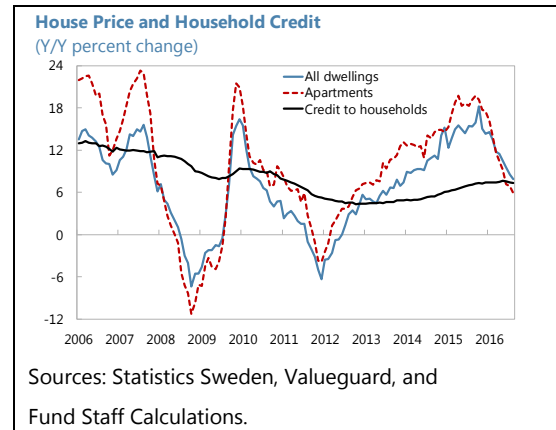
<sup>11</sup> The Swedish LCR regulations are based on the LCR originally proposed by the Basel Committee in 2010, which is more conservative than the revised proposal from 2013.

important that the banks themselves ensure that they have FX buffers to deal with liquidity disruptions in the main foreign currencies.

## D. Effectiveness of the Measures

### 9. Macroprudential measures appear to have helped contain vulnerabilities, and may have slowed housing prices and lending, but it is not yet clear how lasting the latter impacts will be.

Average LTV ratios on new mortgages have declined from 71 percent in 2010 to 69 percent in 2016, and credit growth to households has remained at a single digit pace since 2010, even as house prices gains accelerated to around 15 percent in 2014-15. The announcement of the mortgage amortization requirement in late 2015 was followed by a period of significantly slower housing price increases, especially in apartments, which was reflected in slower credit growth with a lag.<sup>12</sup> But following the actual implementation of the measure, prices appear to rebound somewhat in the second half of 2016. Nonetheless, housing price increases remain well below the pace seen in 2014-15. For new mortgages, average amortization has risen to 4.6 percent of income in 2016, from 3.3 percent in 2015. Further analysis of the impact of the amortization requirements by the Swedish supervisor finds it has resulted in households buying less expensive homes and borrowing less, which suggests the potential for a more lasting effect on the level of housing demand and household debt.<sup>13</sup> The share of households taking on high debt burdens (exceeding 600 percent of gross disposable income) had risen from 10 percent in 2011 to 17 percent 2015, but edged back to 16.4 percent in 2016.<sup>14</sup>



### 10. The Article IV consultations in 2015 and 2016 recommended additional measures to address the risks associated with rising housing prices and housing indebtedness.

The consultations emphasized the need for deep reforms of Sweden's poorly functioning housing market, including to (i) sustain the increase in housing supply; (ii) tax reforms to reduce housing demand and incentives for debt financing, and; (iii) phasing out rent controls which leave many household with no option other than to purchase. It also recommended that a limit on the share of high debt-to-income (DTI) loans be adopted soon to contain increases in the interest sensitivity of consumption and protect household resilience to incomes losses, to automatically reduce LTVs on high DTI loans when housing prices rise faster than income, and to make lending

<sup>12</sup> Other factors may also have impacted housing prices at this time, such as the government's announcement of more housing construction and increased discussion of mortgage interest deductibility.

<sup>13</sup> See "The Swedish Mortgage Market", 6 April 2017, Finansinspektionen.

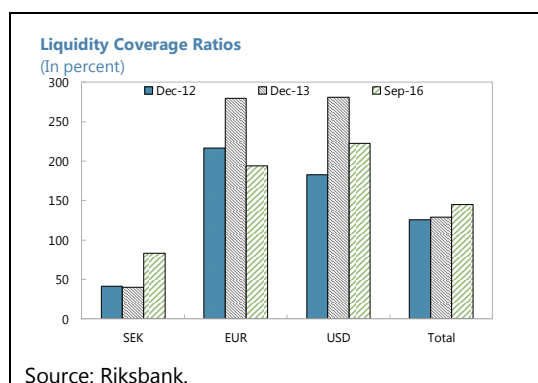
<sup>14</sup> A 600 percent threshold is broadly comparable to the DTI limits in the UK and Ireland, which apply to net disposable income, see footnote 10 of the 2016 Article IV Consultation with Sweden.



responses to housing price increases less elastic, dampening potential for an upward credit-price spiral.

### 11. The LCR in EUR and USD boosted banks resilience to refinancing risk in foreign currency.

Banks have improved their short-term FX liquidity after the global financial crisis and even further after the implementation of the LCR (Figure 1). To date, all major Swedish banks have met the requirements, with much higher LCR ratios in foreign currencies. Moreover, the FSAP liquidity tests found that banks are broadly resilient to shocks as characterized by withdrawal of funds and haircuts on liquid assets similar to the Swedish LCR standards.



**12. Nonetheless, the FSAP recommended the evaluation of a further strengthening banks' foreign exchange liquidity requirements.** The LCR is based on an analysis with a one-month horizon, but the FSAP maturity ladder exercise suggests that maturity mismatches beyond one month are large for some banks—reflecting heavy reliance on wholesale funding in foreign exchange. Moreover, in case market funding is interrupted, banks could need sizable FX liquidity support, in part because some of banks' liquid assets are held in securities that may not be widely traded in a crisis, such as covered bonds. Therefore, the FSAP recommended monitoring of an extended (three-month) LCR in U.S. dollars and euros. The FSAP also recommended that the Riksbank establish swap agreements with central banks in the Nordic countries, as well as swap agreements with the Fed and the ECB, as a backstop to its own foreign reserves.

## TURKEY<sup>1</sup>

*Turkey has experienced a number of capital inflow surges in recent years, which have been associated with credit booms and a build-up of risk. The authorities have taken a wide range of measures to try to strengthen the resilience of the financial sector in the face of these risks including by aligning capital with the risks, addressing excessive credit growth, increasing the resilience of borrowers and incentivizing banks to opt for less risky funding structures.*

### A. Economic and Policy Context

- 1. Turkey has experienced rapid but volatile growth in recent years, associated with periodic credit booms and elevated external vulnerabilities.** A strong recovery from the 2001 crisis was achieved amid sound macro policies and, with prospects of EU accession, produced high growth, at close to 7 percent on average during 2002–07. Vulnerabilities also emerged over this period, however, including large current account deficits, an appreciating currency, and rapid credit growth (see IMF Article IV Consultation with Turkey, 2010). Similarly, growth rebounded following the global financial crisis (GFC), as aggressive monetary and fiscal policy easing and regulatory forbearance were associated with rapid credit growth and a widening current account deficit. A credit-fueled domestic demand boom took hold, pushing inflation into double digits and driving the current account deficit to 10 percent of GDP in 2011. From 2012, both domestic demand and growth slowed significantly.
- 2. The inflation target was met only twice between 2006, when inflation targeting was introduced, and 2016.** Inflation expectations have been imperfectly anchored and the monetary transmission mechanism undermined. This was mainly due to the insufficiently tight monetary policy rates and to high exchange rate pass through, which generated inflation volatility in periods of less favorable capital inflows. Another factor behind this was the Central Bank of the Republic of Turkey CBRT's unorthodox framework from 2010 for providing liquidity to banks at multiple rates and with multiple instruments, rather than relying only on the key policy rate. This tended to obscure the central bank reaction function and impaired the transmission of monetary policy (See Article IV consultation with Turkey, 2016).
- 3. Policy frameworks have evolved over the past decade as the authorities have developed new tools to help address financial stability risks.** The Central Bank of the Republic of Turkey (CBRT) began to incorporate financial stability considerations into the IT framework from 2010, while maintaining the primacy of price stability. With initially no formal institutional framework for macroprudential policies (MPPs), the CBRT saw a role for itself in taming financial risks in a challenging external environment. It thus introduced multiple new instruments aiming at safeguarding financial stability, achieving a less volatile exchange rate and gaining additional

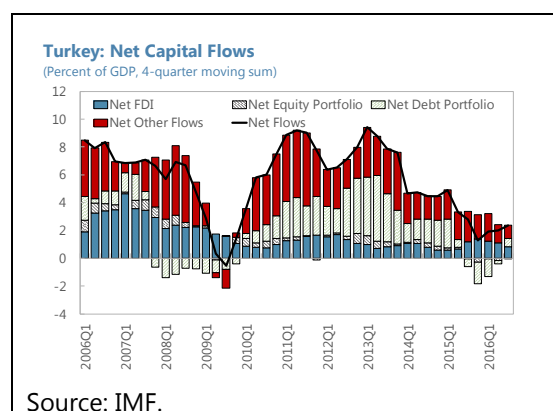
<sup>1</sup> Prepared by Ghada Fayad (SPR)

degrees of freedom in setting domestic interest rates. The instruments included reserve requirements as well as a wide interest rate corridor and a highly variable cost of liquidity within the corridor.<sup>2</sup> However, the joint use of reserve requirements and interest rates for both monetary policy and macro prudential purposes was not successful in responding to credit growth and capital flow volatility. Credit growth exceeded 30 percent on average in 2010–13, and leverage among households and non-financial corporates rose significantly.

**4. Reflecting these risks, the Financial Stability Committee (FSC) was founded as the formal institutional framework for MPPs in June 2011.**<sup>3</sup> The FSC intended to improve the detection and mitigation of emerging systemic risks, and achieve a more coordinated and comprehensive response to risks, also involving the BRSA. The relevant institutions have subsequently taken a broad range of measures to try to contain episodes of excessive credit growth and leverage, and more recently to improve the quality of external financing.

## B. Key Developments in Capital Inflows and Outflows Over the Cycle

**5. Turkey has faced frequent risk-on risk-off episodes with implications for the financial sector.** Large external financing needs and short-term funding composition affected market sentiment and increased capital flow volatility, with several episodes, such as the May-June 2006 market turbulence, the 2011 Euro debt crisis, the 2013 taper tantrum, and the early 2014 episode. Reserve use to contain depreciation episodes was prevalent but has decreased in the latest stress episodes, with the exchange rate allowed more downward flexibility (see text chart).



**6. Turkey experienced a capital inflow surge during 2002–07 reflecting low global interest rates, abundant global liquidity, as well as high returns and an improved investment climate as the country recovered from the 2001 crisis.** Although FDI covered more than half the current account deficit during this period, short-term debt rollover requirements remained high and the stock of nonresidents' portfolio investment also reached record levels. These developments, combined with low reserve coverage, exposed Turkey to changes in investor sentiment, the first of which occurred in mid-2006 when the Fed raised rates.

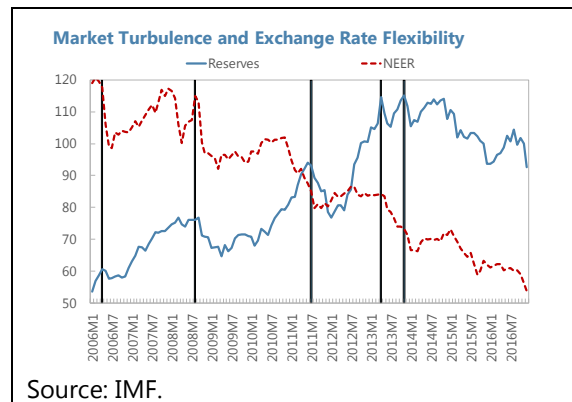
<sup>2</sup>Under this framework, monetary policy can be tightened without changing officially announced rates through a change in CBRT funding composition. For instance, the central bank can suspend its main policy rate (the one-week repo) and instead provide liquidity at the higher overnight repo rate. The asymmetric interest rate corridor was designed to ease the trade-off between financial and price stability amid volatile flows.

<sup>3</sup> See the recommendations of the FSAP (2011). The FSC comprises the Treasury, the CBRT, the Banking Regulation and Supervision Agency, the Deposit Insurance Fund, and the Capital Markets Board, and is chaired by the Minister in charge of the Undersecretariat of the Treasury (currently Deputy Prime Minister).

The CBRT increased the policy interest rate by 425 basis points and actively withdrew liquidity through deposit auctions, contributing to an inflow surge that led to a 40 percent real appreciation and widening of the current account deficit.

**7. Large outflows occurred for a short period at the height of the GFC.** The CBRT halted FX purchase auctions in late 2008 and sold around \$15 billion of reserves in the first half of 2009. Capital inflows soon resumed strongly, reflecting Turkey's generally strong balance sheets and medium-term growth prospects, as well as abundant global liquidity. However, the composition of external financing shifted away from FDI and longer-term debt to riskier flows such as shorter-duration inflows, largely channeled through banks, as well as one-off inflows.

**8. In the last quarter of 2011, euro area related turbulence and uncertainties over the domestic policy framework again led to a reversal of capital flows.** There was a weakening of funding for local banks (via foreign banks' FX loans to Turkish banks and corporates), FDI and trade. The CBRT responded by tightening monetary policy considerably, and selling around 15 percent of its FX reserves to defend the lira.



**9. Capital inflows remained strong until 2013, but there were further outflows after the 'taper tantrum'.** In early 2014 Fed tapering, loose and opaque monetary policy, and domestic political uncertainty led to a 15 percent exchange rate depreciation (See Article IV Consultation with Turkey, 2014). After a period of unsterilized FX intervention, which resulted in a rapid loss of international reserves, the CBRT increased the one-week repo rate by 550 basis points and adjusted its policy framework. Overall, net capital flows declined sharply during 2013–16, from 31 percent of GDP in 2012 to 12 percent of GDP in 2016 (up to Q3). With most of the outflows in portfolio debt, the concentration became more skewed toward other investment flows.

### C. Transmission of Capital Flows to Systemic Risk

**10. A low savings-investment balance has made Turkey's economy prone to boom-bust cycles in which capital inflows are associated with rising systemic risks.** Capital inflow episodes have been associated with lending booms and increases in banks' non-core external funding, and a build-up in rollover and indirect credit risk through banks' lending in FX to unhedged corporates. The build-up of stock imbalances has left the private sector and financial system more prone to strains in periods of capital outflows, increases in interest rates, and FX depreciation.

**11. Prudential regulation adopted in 2009 banned FX lending to households, but allowed non-FX earning corporates to borrow in FX from local banks under certain circumstances.**<sup>4</sup> This triggered a permanent shift in the composition of external debt from non-financial corporates (NFC) to banks: banks' total external debt increased from about 9 percent of GDP in 2008 to about 20 percent of GDP by late 2015. These external liabilities are mainly in FX and are mostly matched by FX-denominated loans to NFCs and FX deposits with the central bank. With a regulatory cap on their net open FX position, banks hedge the FX risk associated with this funding, mainly off-balance sheet. Notwithstanding household deposits as an important source of FX funding to banks, such hedged external wholesale FX funding became a key feature sustaining loan growth. Reflecting this, the sector's loan to deposit (LTD) ratio increased to 120 percent in 2016Q3, with the ratio at 100 and 133 percent for foreign and local currency respectively, exposing banks to rollover risks in a case of reversal of market sentiment.

**12. Since the 2009 amendments, NFCs have borrowed significantly from local banks in FX, posing indirect credit risk to the banking sector.** NFC liabilities increased from 30 percent of GDP in 2007 to nearly 60 percent of GDP by 2015, mostly from Turkish banks, with half of this borrowing in FX. NFC's FX assets cover less than 40 percent of their FX liabilities, implying a substantial negative net FX position, although their short-term FX position is closed. Turkish banks thus face indirect credit risk stemming from their FX loans to NFCs.<sup>5</sup>

**13. Household leverage also became a concern, although households have almost no FX liabilities.** With low savings, consumer loans have been highly correlated with current account deficits: periods of inflow surges coincided with excessive consumer credit growth, raising household leverage, even though from a low base. Households have significant FX deposits, but almost no FX liabilities, owing to the regulations introduced in 2009 that prohibit FX lending to households.

<sup>4</sup> See Article IV Consultation with Turkey 2010.

<sup>5</sup> Data gaps prevent precise quantification of how much this net NFC open position is hedged or covered by FX collateral. While a large portion of NFC FX debt is held by larger companies, some of which are hedged indirectly through export earnings or directly using financial hedges, a non-trivial portion of total FX debt is owed by SMEs that are less naturally hedged. Furthermore, aggregate data on such hedges is not readily available.

## D. Macprudential Measures and their Effectiveness

**14. The macroprudential toolkit in Turkey has evolved and expanded over the last decade, with a wide range of tools applied to both borrowers and financial institutions** (Table 1). The role of capital flows in driving macro-financial risks and business cycles, has been key in the design of macroprudential measures (MPMs), which were closely coordinated with monetary policy in Turkey. However, ahead of the 2011 formation of the FSC, there were delays in the tightening of MPMs when credit booms were underway. Moreover, early loosening of some measures to stimulate demand may have impaired the authorities' ability to address systemic risks.

**15. The CBRT took measures to address the risks arising from the 2010 credit boom.** Starting in late 2010, the CBRT initially relied on successive increases in unremunerated RRRs on shorter maturity liabilities to lengthen the maturity of bank funding and temper loan growth. The authorities also introduced an informal limit on overall credit growth of 25 per cent and sought to enforce it by moral suasion, raised reserve requirements ratios (RRRs) on banks' FX-denominated liabilities, and widened the interest rate corridor to facilitate greater volatility of short-term money market rates with the aim of reducing the attractiveness of carry-trade type of inflows.

**16. However, the initial measures were not fully effective in curbing credit growth.** While there was some impact on loan growth, banks tended to absorb the higher RRRs into their profit margins. They also started to sell or repo part of their government securities portfolio to fund further loan growth. Moreover, the CBRT offset the higher RRs by injecting additional liquidity via open-market operations to sever the link between money market rates and the policy rate.

**Table 1. Turkey—Macroprudential Measures Since 2010**

Measure	Adoption Date
Reserve requirement ratio (RRR) raised successively, and more so on shorter maturities.	November 2010-April 2011
LTV ceilings implemented on housing loans (75%) and on purchases of commercial real estate loans (50%)	December 2010
Implicit nominal credit growth target (25%) introduced	Spring 2011
Higher risk weights for consumer loans (150 percent from 100 percent)	June 2011
Increased provisions for new (performing) consumer loans (4% from 1%). General provisions for (pre-nonperforming) loans increased (8% from 2%)	June 2011
Limits to credit card payments	June 2011
Capital charges on large maturity mismatches to contain interest rate risk	August 2011
Changes to minimum CAR for banks with strategic shareholders	September 2011 - Abolished Feb 2013
Changes to deposit insurance premiums - premium surcharge for large banks	September 2011
Abolition of LTV for commercial real estate loans	April 2013
Credit card limits introduced and tied to incomes. Minimum payment limits and risk weights were increased	October 2013
Increase general provisioning rate for consumer loans (4% from 1%). Decrease provisioning rates for export (0% from 1%) and SME loans (0.5% from 1%)	October 2013
Increase in risk weights for consumer loans with a remaining maturity longer than a year.	October 2013
Maturity of consumer loans capped at 36 months for consumer loans excluding housing loans and other real estate related loans, and at 48 months for car loans.	December 2014
Limits to installments and credit card cash advances.	February 2014
LTV requirements for car loans	February 2014
Remuneration of Lira required reserves.	November 2014
RRR of FX denominated liabilities of banks and financing companies raised for short maturities (up to and including 2 years) and lowered/kept same for longer maturities.	February 2015
RRR of FX denominated liabilities of banks and financing companies raised to increase marginal cost of FX liabilities and defend the Lira.	March 2015
ROC of FX RRR for Lira denominated liabilities changed to increase marginal cost of FX liabilities and defend the Lira.	March 2015
Remuneration of Lira required reserves raised by 150 bps, in three equal installements in September, October, and December.	August 2015
RRR of FX denominated liabilities increased across shorter maturities (up to and including 3 years) to encourage the extension of maturities of non-core FX liabilities	October 2015
Maturity limits on consumer loans eased	November 2015
Risk weight on housing loans cut from 50 percent to 35 percent	January 2016
LTV ceilings on housing loans increased from 75 percent to 80 percent	September 2016
Provisioning requirement for restructured loans in energy and tourism sectors reduced	

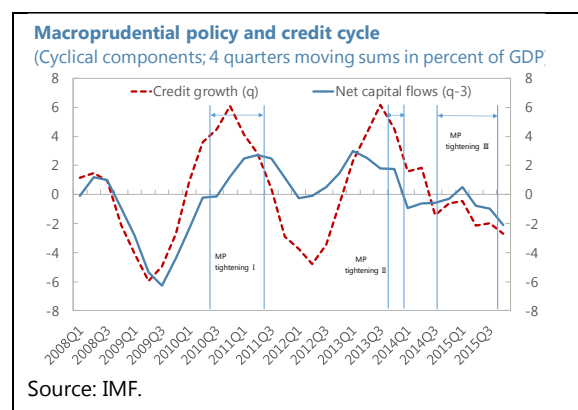
Sources: 2016 and 2017 AIV Consultation Staff Report and 2017 AIV Selected Issues Papers.

**17. Further measures were adopted in 2011 following the creation of the FSC to try to prevent the build up of excessive leverage and strengthen banks' buffers.** The authorities imposed maximum LTVs on consumer loans and on purchases of real estate. They also increased risk weights and provisioning requirements on consumer loans, which strengthened the resilience of the banks while also contributing to a slowdown in credit growth. These steps, combined with tighter monetary policy, more than outweighed the stimulus from still-rapid public spending growth, and led to a deceleration in consumption and investment, with annual credit growth declining from 35 percent in 2011H1 to about 15 percent in early 2012.

**18. In 2011 the CBRT also introduced a reserve option mechanism (ROM) in order to increase the resilience to volatile capital flows and dampen the strong link between capital flows, the exchange rate and credit growth.** The ROM allows banks to meet part of their reserve requirements on lira liabilities with FX and gold. This facility has the effect of dampening fluctuations in the exchange rate, limiting conversion of FX inflows into bank lending, and incentivizing banks to accumulate FX for “a rainy day.” As the reserve option coefficient (ROC) changes, banks voluntarily choose to utilize the ROM, either releasing FX from the ROM or placing it into the facility, mitigating pressures on the lira.<sup>6</sup> For instance, during periods of strong inflows, the cost of FX liquidity declines, the break-even ROC increases and banks have an incentive to put more FX resources into the ROM. This releases lira, previously locked in the central bank, countering appreciation pressures and limiting conversion of inflows into bank lending.

**19. The ROM facility has been somewhat effective in dampening capital inflow/appreciation episodes, and only recently helped alleviate capital outflow/depreciation episodes.** It proved useful in 2012 and through May 2013 in partially absorbing capital inflows. During the taper tantrum, banks did not draw on their ROM FX reserves, and the CBRT intervened to alleviate exchange rate pressures.<sup>7</sup> However, the ROM proved useful in releasing needed FX in the wake of the failed coup attempt, without the need for FX intervention.

**20. A second package of MPMs were introduced late in 2013-early 2014 as credit growth stood at 32 percent and household leverage had reached over 50 percent of disposable income.** The measures included introducing further caps, limits and higher risk weights on credit cards, LTV ceilings for vehicle loans and maturity limits on consumer loans. These measures and others, coupled with a tighter monetary policy stance, successfully curbed credit growth, which has since then been on a declining path.



**21. In addition to addressing credit booms, the authorities have taken steps to address risky funding structures.** Starting in late 2014 and throughout 2015, MPMs were introduced to

<sup>6</sup> The fraction of TL required reserves that can be held in FX or gold is set by the reserve option ratio (ROR), and the amount of FX or gold that can be held per unit of Turkish lira is called the reserve option coefficient (ROC). The break-even ROC, at which banks would be indifferent between meeting their reserve requirements on lira-denominated liabilities in local currency or FX, increases when the cost of lira funding relative to FX funding increases, lira appreciates or is expected to depreciate. It should be noted that, through its process, the ROM gave an incentive for banks to increase FX liabilities.

<sup>7</sup> For potential reasons, why the ROM did not alleviate outflow pressures post taper tantrum, see Aslaner, Oguz, Ugur Ciplak, Hakan Kara, and Doruk Kucuksarac, 2014, “Reserve Option Mechanism: Does it work as an Automatic Stabilizer?” Central Bank of the Republic of Turkey, Working Paper No 14/38



encourage banks to lengthen their FX maturities and to discourage them from funding their lending via increased short-term FX borrowing. The CBRT first raised the RRRs of FX denominated liabilities of banks and financing companies in early 2015 to encourage a lengthening of maturities of non-core FX liabilities. RRRs were raised further in March and again in October to increase the marginal cost of FX liabilities. In addition, the CBRT started remunerating reserves held against lira-denominated liabilities in November 2014, with higher rates for banks whose core funding exceeded the sector average, and further raised the remuneration rate in August 2015. The RRR increases were effective, lengthening the maturity of FX funding.

**22. However, more measures may be needed to address risks from unhedged corporate borrowing in FX.** To address rising rollover and indirect credit risks, the 2017 AIV consultation recommended further measures that would slow banks' FX wholesale borrowing and lengthen the maturity of their external financing, as well as measures that would encourage banks to internalize the increased indirect credit risk associated with FX lending to corporates (IMF, 2017). As a first step, the CBRT is initiating a database on firms' FX positions (covering the largest 111 firms that hold nearly 40 percent of total corporate FX debt). The aim is to establish the capacity to monitor both FX and hedging positions, with the view, in a second step, to design macroprudential tools to discourage excessive risk taking by firms.

**23. A number of MPP measures were loosened in 2016 to support credit growth.** Maturity limits on consumer loans were eased, risk weights on housing loans decreased and provisioning on those loans reduced. As a result of these and other measures, retail credit growth has since picked up from around 4 to 7 percent, led mainly by state-owned banks. However, these actions took place against a backdrop of still high systemic risk.

**24. In its general advice on MPPs, the Fund has emphasized that they should not be used to manage business cycles** (see Key Aspects of Macroprudential Policy, IMF, 2013). A softening of aggregate demand is not sufficient to justify a relaxation of macroprudential tools, which was in this case implemented despite continued concerns about systemic risk, with debt-to-disposable income rising until recently. The 2016 FSAP and 2017 Article IV consultations therefore both concluded that the relaxation was premature.