4. Macroprudential Policy and Capital Flow Measures in Asia: Use and Effectiveness

Introduction and Main Findings

Prolonged periods of substantial capital inflows, booming real estate markets, and rapid credit growth have raised financial stability challenges across many parts of Asia since the mid-2000s. In some cases, macroeconomic policies alone have struggled to address these risks to financial stability. The global financial crisis vividly demonstrated the need for policymakers to have an overarching framework to both monitor and ensure systemic financial stability. Against this backdrop, policymakers in Asia and other regions have increasingly used a range of policy tools that explicitly focus on systemwide risks—macroprudential policies. In addition, some countries have also utilized capital flow management measures to counter large capital inflows.[1]

Drawing on a newly constructed database, this chapter reviews the use of key macroprudential policies (MPPs) and capital flow measures (CFMs) in 13 Asian economies and 33 economies in other regions since 2000. It then provides empirical evidence about their effects on relevant macro-financial variables, using cross-country and bank-level panel econometric analysis as well as event studies. Finally, the chapter discusses whether, and under which conditions, such measures should be recalibrated in the event that capital flows, credit growth, and asset price dynamics either slow down or reverse.

A number of conclusions specific to Asia emerge from the analysis:

- Macroprudential instruments have been used more extensively in Asia than in other regions. This has been particularly true of measures related to the housing market. By contrast, Asian economies, which have comparatively less open financial accounts, have taken a smaller number of measures than others to discourage transactions in foreign currency and residency-based CFMs.
- MPPs and CFMs have sometimes been used as a counter-cyclical tool. Usually they have been used to dampen the macroeconomic and financial stability risks associated with large capital inflows, but they were also used counter-cyclically in 2009 with policies loosened as the global financial crisis unfolded.
- Housing-related macroprudential instruments have had an impact—particularly caps on loan-to-value ratios and the taxation of housing transactions. In particular, such instruments have helped lower credit growth, slow house price inflation, and dampen bank leverage in Asia (although the latter effect is quite small).
- There appears to be little evidence that non-housing related macroprudential policies and CFMs have had a systematic and measurable effect on lending, leverage, or portfolio inflows in Asia. However, these policies may have had an impact on the distribution of risks in the financial system and the resilience of the system in the face of systemic pressures. For example, foreign-exchange-related measures can contain currency and liquidity mismatches, without having a strong impact on loan growth or asset prices.

While some MPPs appear to have helped mitigate the buildup of financial risks, experience still needs to be gained on whether and how they could be recalibrated in the event of asset price declines,

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The main author is Edda Zoli. The chapter is based on Zhang and Zoli (2014). Sidra Rehman provided research assistance.

[1] As discussed in IMF (2012b, 2013a), macroprudential measures are designed to limit systemic vulnerabilities, while capital flow measures are specifically designed to limit capital flows by nonresidents. There can be overlap between the two, as policies to contain systemic risks from capital flows (for example, regulation to discourage foreign-currency borrowing) can be considered both macroprudential and capital flow measures.

slowing credit growth, and/or capital flow reversals. While fine-tuning these policies seems out of reach, certain measures might be eased to avoid excessive deleveraging in the face of sharp, unexpected swings in credit or asset prices.

More specifically, in the event of a downturn in the financial cycle:

- Accumulated capital buffers could be used to avoid a procyclical contraction in loan supply. In this respect, the adoption of countercyclical capital requirements and dynamic provisioning could be helpful to foster the buildup of buffers in the upward phase of the cycle in the future.
- Reserve requirements could be lowered to release additional liquidity.
- The appropriateness of easing housing-related tools and measures to discourage foreign currency transactions is more controversial. However, there may be a case for relaxing these instruments especially where regulation is very tight, after assessing the soundness of banks' and households' balance sheets.

Asia's Use of Macroprudential and Capital Flow Measures

Since 2000, among the 46 economies in our sample (13 from Asia), a variety of instruments has been used to mitigate systemic risks in the financial sector and influence capital flows (Box 4.1). Asia stands out among regions as a heavy user of

Box 4.1

The Macroprudential Toolkit[1]

Country authorities in Asia and other regions have used a variety of policy instruments to mitigate systemic risks and influence capital flows. The toolkit has typically included the following:

- *Housing-related measures* to address risks in the housing market which include loan-to-value (LTV) and debt-to-income (DTI) ratio caps, higher risk weights requirements on mortgage loans in the calculation of capital-asset ratios, larger loan loss provisions requirements on mortgage loans, and housing- or land-related taxation (for example, stamp duties).
- *Consumer loan measures*, such as debt service limits on credit cards and personal loans.
- *Credit limits*, such as explicit ceilings on banks' credit growth or their loan-to-deposit ratio.
- *Capital measures*, including countercyclical capital requirements and restrictions on profit distribution.
- *Dynamic provisioning*, which requires building a cushion of reserve provisions during the upswing phase of the business cycle.
- *Reserve requirements on deposits in local currency.*
- *Other liquidity tools*, such as the minimum core funding ratio requiring banks to hold sufficient retail and longer-dated wholesale funding, or other liquidity ratio requirements.
- *Measures to discourage transactions in foreign currency*, such as broad limits on foreign currency borrowing, specific reserve requirements on foreign currency deposits, or additional provisioning requirements on foreign exchange lending.
- *Residency-based CFMs*, which affect cross-border financial activity discriminating on the basis of residency—often referred to as capital controls (for example, unremunerated reserve requirements on nonresident deposits, withholding tax, or restrictions on nonresident holdings of domestic assets).

[1] The main author is Edda Zoli.

housing-related measures and as a limited user of CFMs (Figure 4.1)[2]:

- In Asia, caps on loan-to-value (LTV) ratios are the most actively used tool, as several economies have faced overheating housing markets over the past decade (Figure 4.1, panel 1). A tightening of LTV ratios has occurred more than twice as often in Asia as it has in Central and Eastern Europe/ Commonwealth of Independent States (CEE/ CIS) and advanced Europe and North America.
- Changes in reserve requirements on local currency deposits have been common in Asia, probably reflecting their role as a monetary policy tool (as in China and India) (Figure 4.1, panel 2).[3]
- Other liquidity tools, credit limits, dynamic provisioning, restrictions on consumer loans, and capital measures have all been rather rarely utilized in Asia (Figure 4.1, panels 3 and 4).
- Measures to discourage transactions in foreign currency have been used less frequently in Asia, especially when compared with the CEE and Latin America, where foreign-exchange-denominated or indexed loans have been more widespread (Vandenbussche, Vogel, and Detragiache, 2012). In Asia, however, they were deployed for example in Korea and the Philippines.
- Residency-based capital flow management measures have been less actively employed in Asia than in some other regions.

Two aggregate indices were constructed—one for macroprudential policies and one for capital flow measures—by cumulating all the individual policy actions taken in each area since 2000[4] (Figures 4.2 and 4.3). Based on that index, there appears to have been a structural tightening of the MPP stance over time that is particularly pronounced in Asia. MPPs were most heavily used in the precrisis boom period during 2006–07, and then again after the crisis as capital flowed back into the region and asset prices inflated (Figure 4.2). The economies that experienced large capital inflows or housing and credit booms (Hong Kong SAR, Korea, Singapore, and Thailand) were the heaviest users. There has been a widespread tightening of CFMs too, including in Asia, although relatively closed financial accounts have in some cases limited the need for active use of such measures (Figure 4.3).

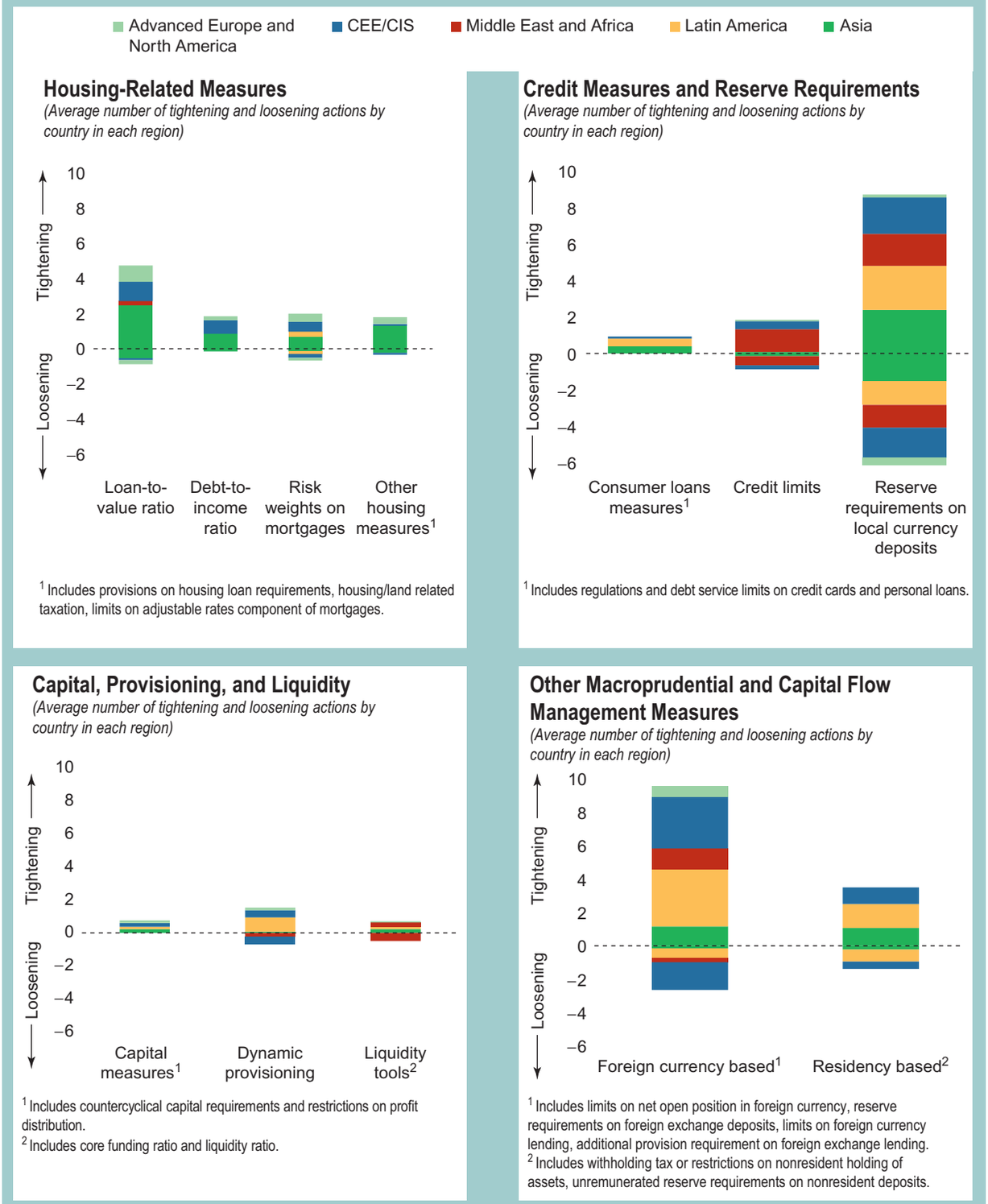
There is significant cross-country heterogeneity within Asia in the tools that have been used. New Zealand introduced a minimum requirement

[2] To numerically code changes in macroprudential policies and capital flow measures, a simple binary variable is created that takes value 1 for tightening actions and −1 for loosening ones. This approach treats all policy actions identically to avoid an arbitrary assessment on the strength of each policy measure. A drawback is that differences in the magnitude of the individual actions taken are ignored. Overall, 353 episodes of policy tightening and 125 episodes of loosening are identified over the period across different regions. Of these, 139 tightening and 41 loosening policy actions took place in Asia.

[3] Reserve requirements are categorized as macroprudential policies in a number of studies (for example, IMF, 2013a; Tovar, Garcia-Escribano, and Martin, 2012).

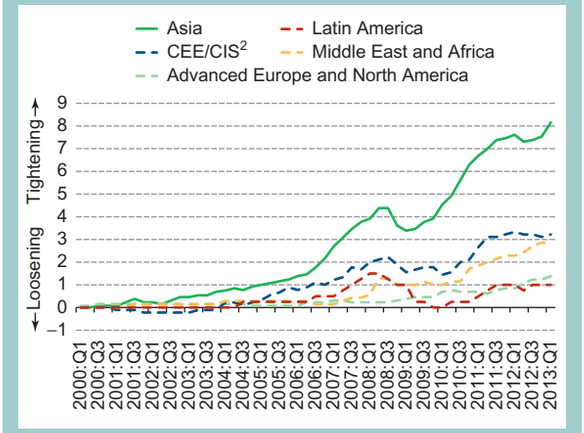
[4] The MPP index aggregates housing-related and non-housing-related domestic prudential measures, while the CFM index summarizes policy actions aimed at discouraging transactions in foreign currency as well as residency-based capital flow management measures. This categorization involves some degree of judgment, given the overlap between certain macroprudential and capital flow management measures. Nevertheless, it tries to reflect as closely as possible the broad definitions of macroprudential and capital flow measures discussed in footnote 1. One caveat is that the impact of pre-2000 actions on the overall stance is not taken into account, as the sample starts in 2000. Also, since the action indices treat all tightening or loosening episodes alike, regardless of their magnitude, the cumulative index over time is, admittedly, an imperfect indicator of macroprudential policy stance, which to some extent may bias cross-country comparisons. For example, Asian policymakers tend to make more frequent but smaller policy changes than their Latin American counterparts. Hence, the cumulative MPP and CFM indices over time might overestimate the difference in stance between Asia and Latin America.

Figure 4.1
Use of Instruments Across Regions



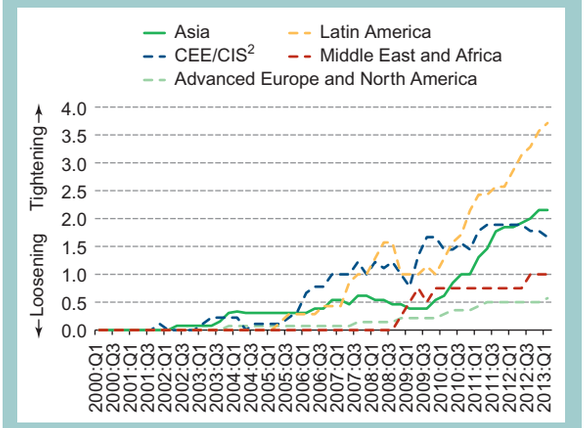
Source: IMF staff estimates.

Figure 4.2
Macroprudential Policies: Cumulative Actions by Region
(Average per country in each region; 2000:Q1–2013:Q1)[1]



Source: IMF staff calculations.
[1] Index summing up housing-related measures, credit measures, reserve requirements, dynamic provisioning, and core funding ratio. Simple average across countries within country groups.
[2] Central and Eastern Europe and Commonwealth of Independent States.

Figure 4.3
Capital Flow Management Measures: Cumulative Actions
(Average per country in each region; 2000–2013:Q1)[1]



Source: IMF staff calculations.
[1] Index summing up foreign currency and residency-based measures. Average across countries within country groups.
[2] Central and Eastern Europe and Commonwealth of Independent States.

on core funding and, recently, has revised its macroprudential framework to introduce countercyclical capital buffers, overlays to sectoral capital requirements, and LTV restrictions. Hong Kong SAR and Singapore have predominantly relied on housing-related tools. Korea, in addition to housing measures, also imposed a levy on bank non-deposit foreign currency liabilities and a ceiling on bank foreign-exchange derivative positions (Box 4.2). China and India have been heavy users of reserve requirements (as a monetary policy tool). Among ASEAN economies, domestic prudential tools and reserve requirements on foreign-exchange deposits have been used. Capital flow measures have been used in Indonesia and Thailand, including minimum holding periods for central bank bills in the former, and withholding taxes for nonresident investors in the latter.

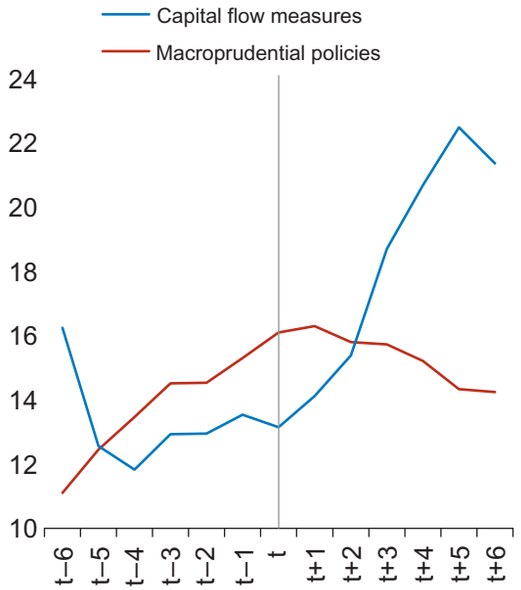
The Impact of Macroprudential and Capital Flow Management Policies in Asia

To describe the broad effects associated with changes in MPPs and CFMs, an event study is used. It examines 110 episodes of MPP and 29 episodes of CFM tightening in Asia. The study finds the following:

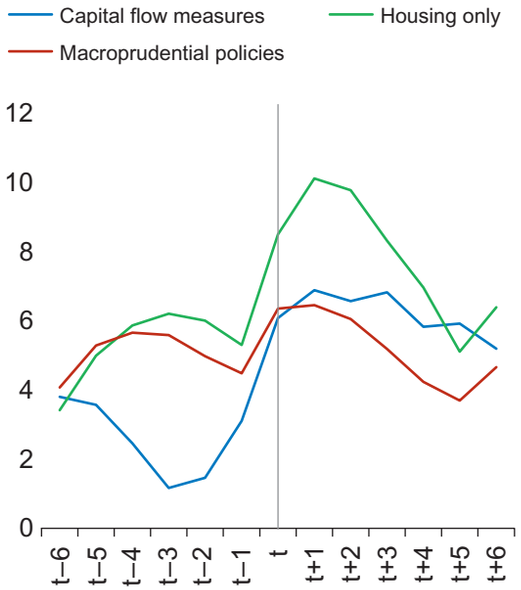
- The tightening of MPPs has been followed (with a one-quarter lag) by a decline in credit growth. By contrast, CFM tightening measures were not followed by a change in the pace of credit growth (Figure 4.4, panel 1).
- MPP tightening has been followed by a decline in real housing price growth (Figure 4.4, panel 2), particularly for those policies specifically related to housing (where house price growth has fallen by around 5 percentage points after five quarters). CFM tightening measures have been followed by a small decline in housing inflation.
- A tightening of CFMs was followed by lower inflows of portfolio equity, but had little impact on debt inflows (Figure 4.4, panels 3 and 4). MPP tightening was not associated with any subsequent reduction in either equity or debt security inflows.

Figure 4.4
Event Study

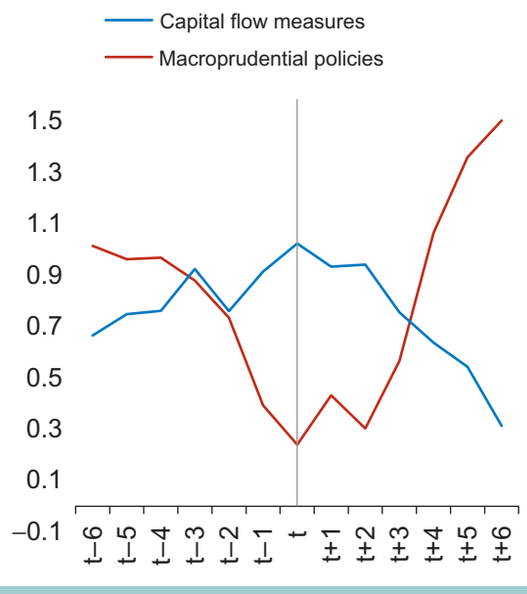
Asia: Credit Growth[1]
(Average across all episodes; year-over-year percentage change)



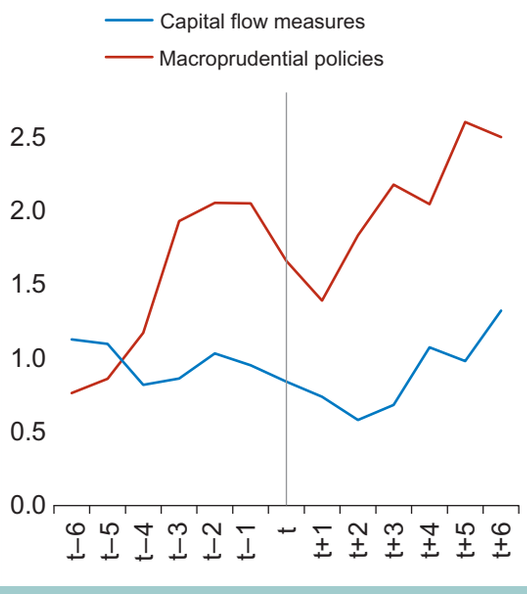
Asia: Housing Prices[1]
(Average across all episodes; year-over-year percentage change)



Asia: Nonresident Capital Flows: Equity[1]
(Four-quarter moving average; percent of GDP)



Asia: Nonresident Capital Flows: Debt Securities[1]
(Four-quarter moving average; percent of GDP)



Sources: CEIC Data Co Ltd.; Haver Analytics; IMF, *World Economic Outlook* database; and IMF staff estimates.
[1] Relevant tightening policies introduced over the period 2000:Q1–2013:Q1. Excludes overlapping episodes within four quarters.

Box 4.2

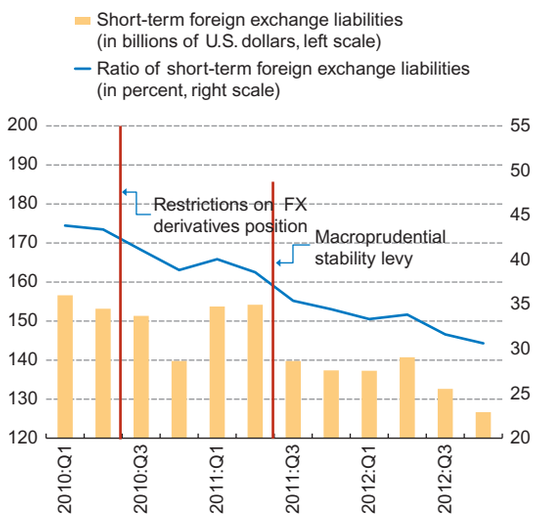
Foreign-Exchange-Related Macroprudential Policy in Korea[1]

Korea has traditionally been highly vulnerable to capital flow reversal mainly due to short-term borrowing in the banking sector creating maturity mismatches and foreign exchange liquidity problems. The aggregate short-term external debt of Korean banks reached US$160 billion in 2008:Q3[2]—a sharp increase from the US$60 billion level in 2006:Q1—but in the four months following the Lehman Brothers bankruptcy, nearly US$70 billion left the country. The volatility of capital flows has been higher in Korea than in other economies during the global financial crisis (Ree, Yoon, and Park, 2012).

To mitigate vulnerabilities from short-term foreign borrowing, Korea adopted a series of macroprudential policies beginning in June 2010, including ceilings on banks' foreign exchange derivatives position and a macroprudential stability levy on noncore foreign exchange liabilities. The former measure intends to reduce maturity and currency mismatches. The ceiling is designed to be adjusted depending on the credit cycle. The stability levy is a tax on banks' noncore foreign currency liabilities. It is also adjustable and can be used as a countercyclical tool when capital flow surges seriously threaten financial stability, with the maximum rate of 50 basis points. Its proceeds flow into the Foreign Exchange Stabilization Fund, which is separate from the government budget and can be used as a buffer in the event of financial crisis. Other important measures include limits on foreign currency bank loans and prudential regulations to improve the foreign exchange risk management of financial institutions.

Figure 4.2.1

Korea: Impact of Macroprudential Policy on Bank Foreign Exchange Liabilities



Sources: Bank of Korea; and IMF staff calculations.

While Korea's experience in the use of these tools is limited, preliminary evidence suggests that these tools have been effective in limiting overexposure to funding shocks and putting a brake on procyclical lending. Indeed, banks' short-term net external debt, including that of foreign banks' branches, declined steadily from US$153 billion in June 2010 to US$126 billion in December 2012, and the short-term external debt ratio fell continuously, reaching 30.6 percent by the end of 2012, after peaking at 51.9 percent in the third quarter of 2008 (Figure 4.2.1). The sensitivity of capital inflows to global conditions fell after the imposition of the levy, relative to a comparison group of countries (Bruno and Shin, 2013). Rollover risks for domestic banks also diminished, since their external debt maturities lengthened. The sensitivity of exchange rate volatility to changes in the VIX declined, too, reflecting lower foreign exchange liquidity mismatches (Ree, Yoon, and Park, 2012).

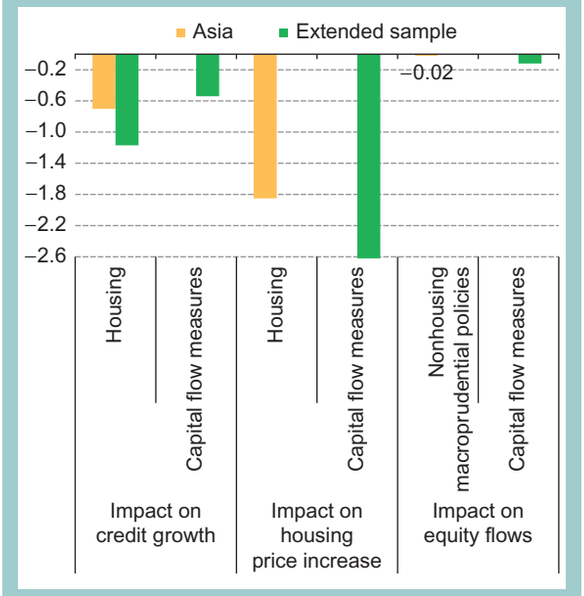
[1] The main author is Yitae Kim.

[2] This included debt owed by the branches of foreign banks operating in Korea.

To isolate the impact of MPP and CFM measures on relevant macro-financial variables, while controlling for other factors that may have also affected these variables, a multivariate model is estimated in a panel of 13 Asian economies over the period 2000:Q1–2013:Q1.[5] For comparison, the model is also separately estimated on a larger panel of 46 economies, including 33 additional countries from other regions. The main control variables comprise GDP growth, as a proxy for demand pressure, domestic interest rates, and the VIX, as a proxy for global factors.[6] The estimates point to the following:

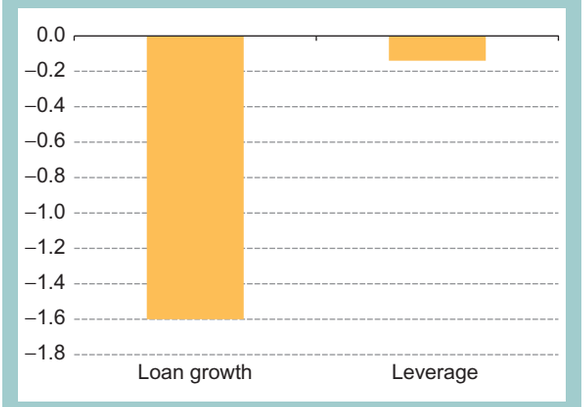
- Housing-related measures have mitigated private credit growth in Asia, but this is not true for other MPP instruments and CFMs. On average, a tightening in housing-related tools is estimated to have reduced credit growth in Asia by 0.7 percentage point after one quarter and by 1.5 percentage points after a year—a significant but not very large impact, considering that sample credit growth averaged around 10 percent (Figure 4.5). A complementary analysis that looks at 74 banks in 11 Asian economies verifies that housing-related tools have had a significant impact on bank loan growth and, to a lesser extent, on banks' leverage (Figure 4.6). The significant impact of housing-related MPPs is also visible in the broader sample of countries.

Figure 4.5
One-Quarter Impact of Macroprudential and Capital Flow Measures on Macro-Financial Variables
(In percent)



Source: IMF staff estimates.

Figure 4.6
Impact of Housing Measures on Bank Loan and Leverage in Asia
(In percent)



Source: IMF staff estimates.

- Housing-related instruments have also dampened property price expansion in Asia. A tightening lowered house price growth by about 2 percentage points after one-quarter—a sizable impact given that average housing

[5] Other cross-regional empirical analyses on macroprudential policies and capital flow measures include Lim and others (2011), Qureshi and others (2011), Kuttner and Shim (2012), Arregui and others (2013), Dell'Ariccia and others (2012), IMF (2013a, b). Country-focused empirical studies on Asia include Wang and Sun (2013) on China; Hong Kong Monetary Authority (2011) and Ahuja and Nabar (2011) on Hong Kong SAR; Igan and Kang (2011), Bruno and Shin (2013), and Kim (2013) on Korea.

[6] The model is specified as fixed-effect dynamic panel regressions, and estimated with the Arellano-Bond generalized method of moment's procedure. See Zhang and Zoli (2014) for details.

price growth was about 4 percent. On the other hand, CFMs have had little effect. This contrasts with results from the full sample where CFMs are found to have affected housing prices—a result driven entirely, however, by measures to discourage foreign exchange transactions, including household loans to finance housing purchases, in the CEE/CIS.

- LTV ratios and housing taxes have been particularly effective in Asia in lowering housing prices and credit growth.
- CFM policies have discouraged portfolio equity inflows and affected the pace of credit expansion in the full country sample, but have not had a significant effect in Asia, possibly because their use was less frequent there than in other regions. Neither CFM nor MPP measures are found to have had an impact on debt inflows.

It is important to note that macroprudential tools seek to contain the buildup of financial imbalances, including in specific sectors, and to enhance resilience against financial cycle downturns, but they are not intended to play a broader role in economic management. Therefore, their effectiveness in mitigating systemic vulnerability cannot be assessed only by their impact on the macro-financial variables analyzed in this chapter. For example, foreign-exchange-related measures can contain currency and liquidity mismatches within the banking system without having a strong impact on loan growth or asset prices.

On the other hand, it has to be recognized that macroprudential policy also entails costs, mainly arising from higher intermediation charges and their effect on long-run output (Arregui and others, 2013), Furthermore, it is important to stress that macroprudential policy cannot achieve its goal of containing systemic vulnerabilities by itself. On the contrary, it needs to be supported by strong microprudential policy, including effective supervision and enforcement, and complemented by appropriate monetary and fiscal policies (IMF, 2013a).

The Use of Macroprudential Policies As the Tide Flows Out[7]

Some MPPs do appear to have helped mitigate the buildup of financial risks, but can these policies still be useful in the event of asset price declines, slowing credit growth, and/or capital flow reversals?

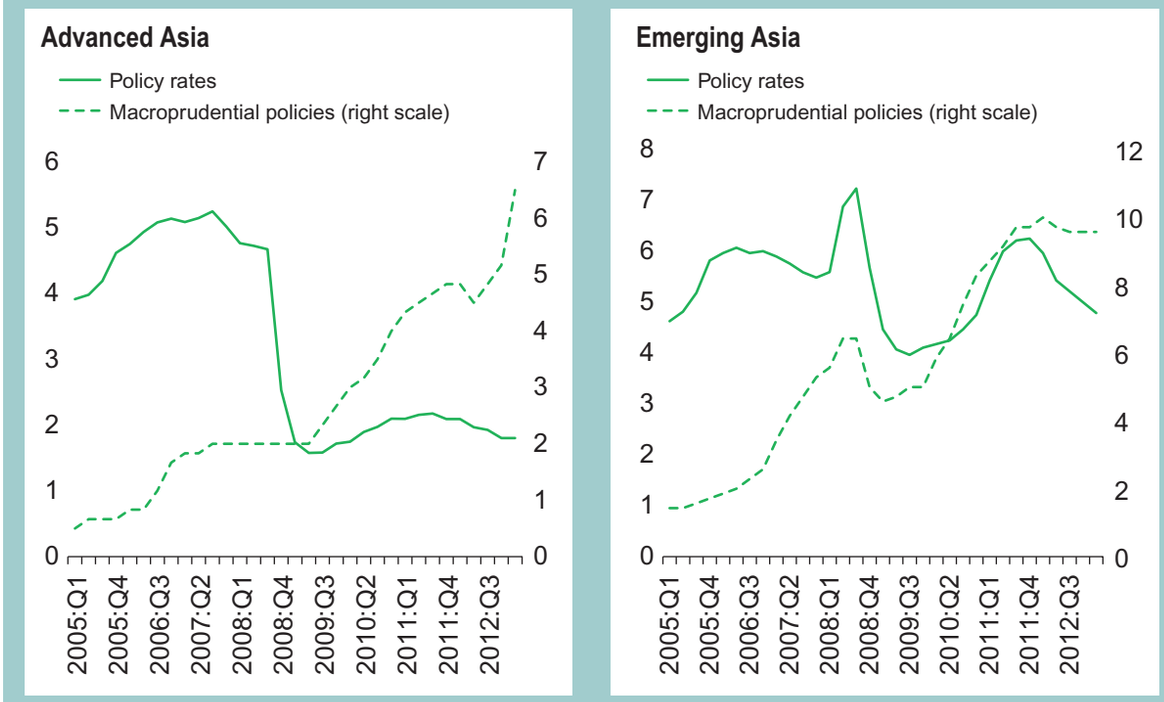
MPPs were typically eased in emerging Asia during the global financial crisis with reserve requirements lowered in China, India, and Malaysia and the LTV cap increased in Thailand. Reflecting this, the average MPP index declined in 2008–09. Among advanced economies, MPPs were on average kept on hold, as reflected in a flat MPP index around the crisis (Figure 4.7). As such, any empirical assessment of the effectiveness of relaxing MPPs is constrained by the small number of past easing episodes. Still, relative to 2009, macroprudential instruments are now much tighter and there may be scope for some countercyclical loosening on policies if the macro-financial cycle starts to turn.[8]

Deciding on whether, under which conditions, and over what time frame to roll back MPPs involves some judgment by the regulators, based on indicators of systemic risk. The main challenge is to strike a balance between preserving future resilience to shocks and averting a severe downturn of the financial cycle. Generally speaking, policymakers could consider loosening MPPs to prevent excessive deleveraging in the downward phase of the financial cycle, particularly if that is associated with a weak phase of the economic cycle (Committee on the

[7] This section focuses mostly on MPPs instead of CFMs, given that the former were used more intensively in Asia. For a broader discussion on CFMs recalibration amid capital flow reversal, see IMF (2012b).

[8] On theoretical grounds, the use of MPPs as counter-cyclical tools can be justified in a context where financial frictions create procyclicality in the financial system, exacerbating business cycle fluctuations (for example, see Angeloni and Faia, 2013; N'Diaye, 2009; and Box 4.3).

Figure 4.7
Use of Monetary Policies Versus Macroprudential Measures
(Policy rates, simple average in percent; index, cumulative)



Source: IMF staff estimates.
Note: Advanced Asian economies include Australia, Hong Kong SAR, Korea, New Zealand, Singapore, and Taiwan Province of China. Emerging Asia includes China, India, Indonesia, Malaysia, Philippines, Thailand, and Vietnam.

Global Financial System, 2012).[9] Research has shown that credit and asset price cycles typically accentuate each other, and recessions associated with credit crunches or house price busts are deeper and longer than others (Claessens, Kose, and Terrones, 2011a and 2011b). Therefore, a timely easing of MPPs may reduce the likelihood of, and damage from, such credit or housing price collapses. On the other hand, easing regulation as the economy enters a downturn could lower resilience and possibly jeopardize financial stability going forward. The rolling back of policies will ultimately depend on (1) how acute is the downswing of the financial cycle; and (2) the specific MPPs measures in place.

If macroeconomic conditions weaken and banking sector losses grow, but there is no confidence crisis, then accumulated **capital buffers** can be released to avoid banks excessively deleveraging for regulatory reasons and to dampen any procyclical contraction in loan supply (Committee on the Global Financial System, 2012). If, however, solvency and liquidity of the banking system are questioned, then bank capital and liquidity

[9] When the financial and economic cycles are not in sync, the optimal course of policy may be more controversial, and different individual MPP and CFM instruments may need to be recalibrated in different directions. For example, in Indonesia after May 2013, amid capital flows reversal and falling equity prices, but continued demand pressure and high inflation, LTV limits on second and third properties, LTV-linked reserve requirements, and secondary reserve requirements were tightened, while the minimum holding period for central bank bills was shortened in September 2013 to increase their liquidity and boost the efficacy of monetary operations.

requirements may instead need to be *raised pro-cyclically* to restore market confidence.[10]

These considerations provide support for the adoption of countercyclical capital requirements (CCRs) and dynamic provisioning, which are specifically designed to build buffers during the upswing phase of the cycle that can be used during a downswing (Box 4.3). Even though there is little empirical evidence about their effectiveness and they are no silver bullet,[11] these instruments seem helpful particularly in increasing the predictability of regulatory changes through the cycle. At present, they barely exist in Asia,[12] although with the implementation of Basel III the adoption of a countercyclical capital buffer is likely to become more widespread.

The countercyclical use of **reserve requirements** is relatively uncontroversial. Indeed, reserve requirements have been used actively in emerging markets, possibly also because they may be perceived as being able to dampen credit cycles while having less of an impact on capital flows than changes in policy interest rates (Federico, Vegh, and Vuletin, 2012).

On the other hand, the case for easing **housing-related tools**—which have been used most often in Asia and seem the most effective—in the downward phase of the cycle is less clear cut. Lags in the impact of these tools and uncertainty about their quantitative effects raise doubts about the feasibility and appropriateness of fine-tuning them. Furthermore, changing the regulations periodically could generate uncertainty, and possibly reduce their future effectiveness by creating expectations of subsequent reversals. In this regard, a rule-based approach in conducting macroprudential policy—although difficult to design—would be more predictable, transparent, easily communicated, and could possibly serve as a commitment device. Easing housing-related tools, which operate by affecting mostly credit demand, may also have a lower impact in a downturn than tightening does in an upswing.[13] Furthermore, loosening LTV and debt-to-income (DTI) ratio caps as the housing market deteriorates could attract less creditworthy buyers into the market just as the cycle turns, thus harming household balance sheets and potentially weakening financial stability further down the road, especially if house prices are to fall significantly. In this respect, easing housing tax measures is likely to have less of an adverse impact on balance sheets.

In spite of the above arguments, there might be a case for relaxing some instruments in those economies where regulation is particularly tight. Looking specifically at Asia, macroprudential housing regulation is currently very stringent in Hong Kong SAR and Singapore; this suggests that some reversal may become warranted should house prices fall steeply below their estimated equilibrium level (Box 4.4). Monitoring market developments will be critical in deciding whether and when measures should be recalibrated. The case for easing will also be stronger if there is evidence of adequate capacity for servicing household debt, considering also the expected mortgage rates normalization in the medium term.

[10] For example, in the United States in 2009 in the midst of the financial crisis, several large banks were required to raise capital after the Supervisory Capital Assessment Program was conducted (Bernanke, 2009).

[11] Apart from theoretical exercises and assessments that are numerically simulated, empirical studies of how the CCR mechanism actually works are absent. Jimenez and others (2012) provide some empirical evidence on the effectiveness of dynamic provisioning in Spain.

[12] China introduced the CCR in 2010 and New Zealand introduced the CCR framework in 2013.

[13] Igan and Kang (2011) find some evidence of a smaller housing price response to LTV and DTI loosening than to tightening in Korea, although the response of mortgage loans appears to be symmetric. The econometric analysis in this chapter also suggests that easing housing measures has been less effective than tightening both in Asia and the full sample of 46 economies—although this result needs to be interpreted with caution, given the limited number of easing episodes in the sample. On the other hand, IMF (2012c) found no difference in the effect of LTV loosening and tightening.

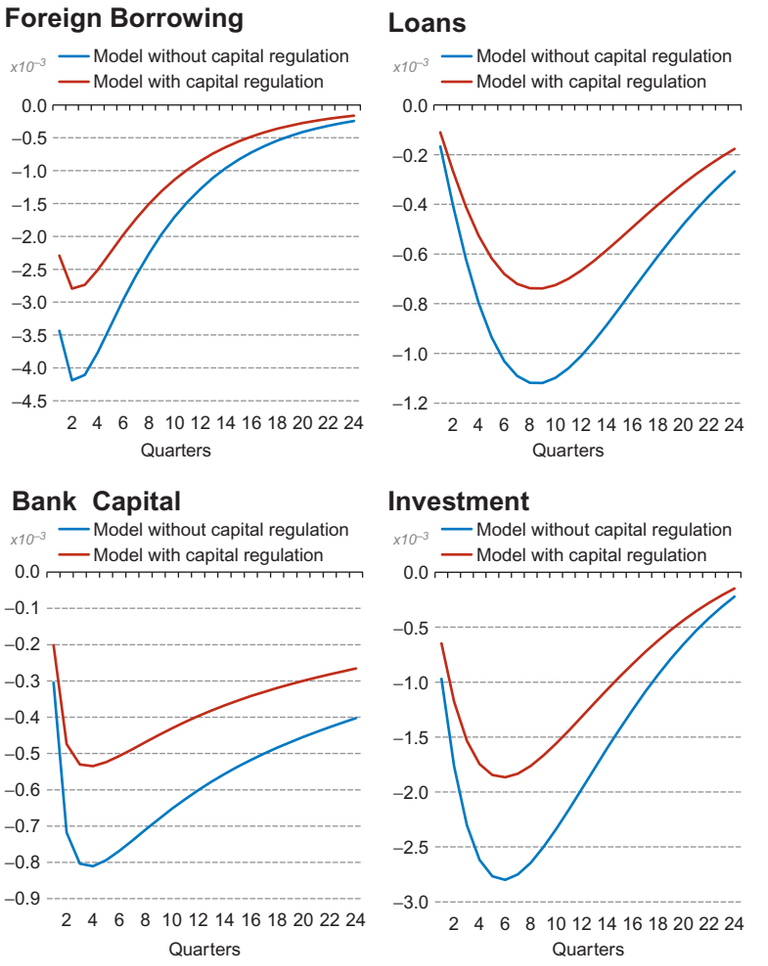
Box 4.3

Countercyclical Capital Requirements Amid Capital Flows Volatility: Possible Benefits for Asia[1]

Managing the macroeconomic stability implications of volatile capital inflows and associated buildup of systemic risks is of great importance to Asia, especially in a context where such flows are expected to remain volatile (see Chapter 1).

To explore how countercyclical capital requirements (CCRs) can help lessen the amplitude of the business cycle, an open economy Dynamic Stochastic General Equilibrium model, calibrated on an Asian emerging economy,[2] is constructed. In this set up, loan supply partly depends on wholesale foreign borrowing, asset prices, and bank capital, which in turn are larger in the upturn phase of the cycle. A reversal of capital flows raises the cost of capital and lowers credit and investment. The ensuing downturn further intensifies the drop in bank capital, and accelerates the credit and investment decline. This financial accelerator fosters inefficient economic fluctuations (such as excess volatility in lending, investment, and output).

Figure 4.3.1
Foreign Borrowing Shock
(Percent deviation from steady state)



Source: IMF staff calculations.
[1] Shock is calculated as impulse response to a 1 percent increase in the standard deviation of the domestic country's external risk premium.

With a CCR, the release of the accumulated capital buffer dampens the size of the credit contraction as capital flows reverse, by making it easier for banks to meet regulatory capital requirements (Figure 4.3.1). Specifically, in this model the CCR can lower the impact of capital outflows on investment by one-third and reduce the volatility of both loans and output by around 50 percent, thus helping prevent boom and bust cycles.

[1] The main authors are Matteo F. Ghilardi (RES) and Shanaka J. Peiris (APD). The analysis is based on Ghilardi and Peiris (forthcoming).
[2] As far as possible, parameters are chosen based on quarterly data for the Philippines. Elsewhere the parameters reflect broad characteristics of emerging economies.

Box 4.4

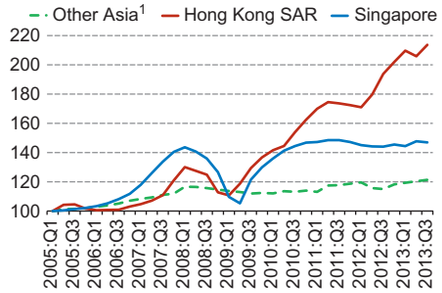
Macroprudential Policies and House Prices in Hong Kong SAR and Singapore[1]

Singapore and Hong Kong SAR—the two regional financial centers in Asia—have relied extensively on macroprudential policies targeting the housing sector in recent years. The use of these tools intensified after 2009, following a sharp rebound in real housing prices and a surge in mortgage loans. Between 2009:Q2 and 2011:Q2, real house prices in Singapore went up by more than 40 percent, though they stabilized afterward (Figure 4.4.1). Real house prices in Hong Kong SAR rose by about 90 percent from 2009:Q1 to 2013:Q3, while toward the end of 2013, prices started to level off in nominal terms.

Figure 4.4.1

Real House Price Index

(2005:Q1 = 100)



Sources: CEIC Data Company Ltd.; Haver Analytics; national authorities; and IMF staff calculations.
[1] Other Asia includes Australia, China, India, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Taiwan Province of China, and Thailand.

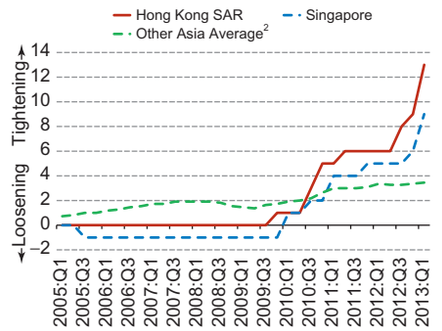
Several factors have played a role in driving house prices in these economies. The supply of housing is rather inelastic and is mainly driven by public land auctions, contributing to lags in supply expansion. In parallel, strong income growth and persistently low interest rates after the global financial crisis supported domestic demand for housing.[2] Foreign investors further boosted demand for real estate.

A wide range of macroprudential policies have been used to enhance financial stability amidst rising house prices and credit growth (Figure 4.4.2). LTV limits have been tightened (that is, lowered) sharply in both economies. While Singapore has used LTV limits to target second (and plus) mortgages and mortgages with high tenors, Hong Kong SAR targeted all mortgages, applying tighter caps to luxury properties, investment properties, and borrowers with sources of income from abroad. Hong Kong SAR has also tightened the DTI ratio limit, which had been introduced back in 1997, while Singapore adopted a DTI limit in 2013. Hong Kong SAR further imposed higher risk weight requirements for mortgages. Real estate taxes and loan tenor limits have also been used in both economies. For example, in Hong Kong SAR stamp duty measures were introduced to cool down the housing market in 2010, 2012, and 2013.

Figure 4.4.2

Macroprudential Policies Related to Housing: Cumulative Actions

(Average per country in each region; 2000:Q1–2013:Q1)[1]



Source: IMF staff calculations.
[1] Index summing up housing-related measures. Simple average across countries within country groups.
[2] Other Asia includes Australia, China, India, Indonesia, Korea, Malaysia, New Zealand, Philippines, Taiwan Province of China, Thailand, and Vietnam.

Macroprudential policies have contributed to cooling down somewhat the housing market in both economies. In Singapore, after the introduction of LTVs, the share of borrowers with single mortgages increased, and speculative transactions fell. For Hong Kong SAR, empirical evidence suggests that the changes in LTV limits helped reduce transaction volumes and slowed house price inflation (Ahuja and Nabar, 2011). LTV limits also dampened borrowers' leverage and credit growth and lowered the impact of a property price correction on mortgage default risk (Hong Kong Monetary Authority, 2011; Wong, Tsang, and Kong, 2014).

Both countries have also had periods where they loosened their macroprudential policies. Singapore lowered stamp duties during the Asian crisis as the macroeconomic environment deteriorated. In addition, as housing markets weakened, Singapore eliminated the capital gains tax during the 2001 recession and raised the LTV ceiling in 2005. In Hong Kong SAR, the LTV limit for luxury properties was tightened in 1997 and then reversed in 2001 as prices collapsed. However, recalibrating macroprudential tools maybe more complicated in the current juncture, given the need to coordinate a much broader and more extensive set of measures now in the system.

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[1] The main authors are Elif Arbatli and Mali Chivakul.

[2] In both Singapore and Hong Kong SAR, domestic interest rates are closely linked to global rates given their exchange rate regimes and open capital accounts.

The appropriateness of easing **measures to discourage foreign exchange transactions** in a downward phase of the financial cycle or amid capital flow reversal is also controversial. Relaxing restrictions on bank foreign exchange borrowing could allow the most creditworthy institutions to access additional funding from abroad, and this could have a positive impact on domestic loan supply. Similarly, easing reserve requirements on foreign exchange deposits could help avoid excessive deleveraging that may otherwise take place. On the other hand, easing these instruments when the risk of exchange rate depreciation is heightened could lower resilience and jeopardize financial stability. Again, regulators would need to closely assess lenders' and borrowers' balance sheets soundness before making any policy change. Instead, residency-based CFMs, such as unremunerated reserve requirements on nonresident deposits and withholding taxes or restrictions on nonresident holdings of domestic assets, could be eased in the face of capital flows reversal to reduce disincentives for foreign investors.